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(54) **Title:** METHODS FOR GENETIC CONTROL OF INSECT INFESTATIONS IN PLANTS AND COMPOSITIONS THEREOF

(57) **Abstract:** The present invention relates to control of pest infestation by inhibiting one or more biological functions. The invention provides methods and compositions for such control, By feeding one or more recombinant double stranded RNA molecules provided by the invention to the pest, a reduction in pest infestation is obtained through suppression of gene expression. The invention is also directed to methods for making transgenic plants that express the double stranded RNA molecules, and to particular combinations of transgenic pesticidal agents for use in protecting plants from pest infestation.

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METHODS FOR GENETIC CONTROL OF INSECT INFESTATIONS IN PLANTS AND COMPOSITIONS THEREOF

INCORPORATION BY REFERENCE OF SEQUENCE LISTING SUBMITTED ON A COMPACT DISC

The Sequence Listing is submitted on one compact disc (Copy 1), together with a duplicate thereof (Copy 2), each created on September 15, 2006, and each containing one 669 kb file entitled "MNDE002.APP.TXT." The material contained on the compact disc is specifically incorporated herein by reference.

PRIORITY CLAIM

This application claims the priority of U.S. Provisional Application Ser. No. 60/718,034, filed September 16, 2005, which application is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to genetic control of pest infestations. More specifically, the present invention relates to recombinant DNA technologies for post-transcriptionally repressing or inhibiting expression of target coding sequences in the cell of a pest to provide a pest-protective effect.

2. Description of Related Art

The environment in which humans live is replete with pest infestation. Pests including insects, arachnids, crustaceans, fungi, bacteria, viruses, nematodes, flatworms, roundworms, pinworms, hookworms, tapeworms, trypanosomes, schistosomes, botflies, fleas, ticks, mites, and lice and the like are pervasive in the human environment. A multitude of means have been utilized for attempting to control infestations by these pests. Compositions for controlling infestations by microscopic pests such as bacteria, fungi, and viruses have been provided in the form of antibiotic compositions, antiviral compositions, and antifungal compositions. Compositions for controlling infestations by larger pests such as nematodes, flatworm, roundworms, pinworms, heartworms, tapeworms, trypanosomes, schistosomes, and the like have typically been in the form of chemical compositions that can

be applied to surfaces on which pests are present or administered to infested animals in the form of pellets, powders, tablets, pastes, or capsules and the like. There is a great need in the art for improvement of these methods and particularly for methods that would benefit the environment relative to the prior techniques.

Commercial crops are often the targets of insect attack. Substantial progress has been made in the last a few decades towards developing more efficient methods and compositions for controlling insect infestations in plants. Chemical pesticides have been very effective in eradicating pest infestations. However, there are several disadvantages to using chemical pesticidal agents. Chemical pesticidal agents are not selective. Applications of chemical pesticides intended to control invertebrate pests, such as coleopteran insects including corn rootworm species that are harmful to various crops and other plants, exert their effects on non-target fauna as well, often effectively sterilizing a field for a period of time over which the pesticidal agents have been applied. Chemical pesticidal agents persist in the environment and generally are slow to be metabolized, if at all. They accumulate in the food chain, and particularly in the higher predator species. Accumulations of these chemical pesticidal agents results in the development of resistance to the agents and in species higher up the evolutionary ladder, can act as mutagens and/or carcinogens to cause irreversible and deleterious genetic modifications. Thus there has been a particularly long felt need for environmentally friendly methods for controlling or eradicating insect infestation on or in plants, *i.e.*, methods that are selective, environmentally inert, non-persistent, and biodegradable, and that fit well into pest resistance management schemes.

Compositions that include *Bacillus thuringiensis* (Bt) bacteria have been commercially available and used as environmentally safe and acceptable insecticides for more than thirty years. The insecticidal effect of Bt bacteria do not persist in the environment, are highly selective as to the target species affected, exert their effects only upon ingestion by a target pest, and have been shown to be harmless to plants and other non-targeted organisms, including humans. Transgenic plants containing one or more genes encoding insecticidal Bt protein are also available in the art and are remarkably efficient in controlling insect pest infestation. A substantial result of the use of recombinant plants expressing Bt insecticidal proteins is a marked decrease in the amount of chemical pesticidal agents that are applied to the environment to control pest infestation in crop fields in areas in which such transgenic crops are used. The decrease in application of chemical pesticidal agents has resulted in cleaner soils and cleaner waters running off of the soils into the surrounding streams, rivers, ponds and lakes. In addition to these environmental benefits,

there has been a noticeable increase in the numbers of beneficial insects in crop fields in which transgenic insect resistant crops are grown because of the decrease in the use of chemical insecticidal agents.

Antisense methods and compositions have been reported in the art and are believed to exert their effects through the synthesis of a single-stranded RNA molecule that in theory hybridizes *in vivo* to a substantially complementary sense strand RNA molecule. Antisense technology has been difficult to employ in many systems for three principle reasons. First, the antisense sequence expressed in the transformed cell is unstable. Second, the instability of the antisense sequence expressed in the transformed cell concomitantly creates difficulty in delivery of the sequence to a host, cell type, or biological system remote from the transgenic cell. Third, the difficulties encountered with instability and delivery of the antisense sequence create difficulties in attempting to provide a dose within the recombinant cell expressing the antisense sequence that can effectively modulate the level of expression of the target sense nucleotide sequence.

There have been few improvements in technologies for modulating the level of gene expression within a cell, tissue, or organism, and in particular, a lack of developed technologies for delaying, repressing or otherwise reducing the expression of specific genes using recombinant DNA technology. Furthermore, as a consequence of the unpredictability of these approaches, no commercially viable means for modulating the level of expression of a specific gene in a eukaryotic or prokaryotic organism is available.

Double stranded RNA mediated inhibition of specific genes in various pests has been previously demonstrated. dsRNA mediated approaches to genetic control have been tested in the fruit fly *Drosophila melanogaster* (Kennerdell and Carthew, 1998; Kennerdell and Carthew, 2000). Kennerdell and Carthew (1998) describe a method for delivery of dsRNA involved generating transgenic insects that express double stranded RNA molecules or injecting dsRNA solutions into the insect body or within the egg sac prior to or during embryonic development.

Research investigators have previously demonstrated that double stranded RNA mediated gene suppression can be achieved in nematodes either by feeding or by soaking the nematodes in solutions containing double stranded or small interfering RNA molecules and by injection of the dsRNA molecules. Rajagopal *et. al.* (2002) described failed attempts to suppress an endogenous gene in larvae of the insect pest *Spodoptera litura* by feeding or by soaking neonate larvae in solutions containing dsRNA specific for the target gene, but were successful in suppression after larvae were injected with dsRNA into the hemolymph of 5th

instar larvae using a microapplicator. Recently, Yadav *et al.* (2006) reported that host-generated dsRNA produced in a plant can protect such plants from infection by nematodes. Similarly, U.S. Patent App. Pub. No. 2003/0150017 prophetically described a preferred locus for inhibition of the lepidopteran larvae *Helicoverpa armigera* using dsRNA delivered to the larvae by ingestion of a plant transformed to produce the dsRNA. WO 2005/110068 teaches providing, in the diet of corn rootworm (CRW), CRW-specific dsRNA directed to essential CRW genes. The dsRNA is provided in the CRW diet *in-vitro* and *in-planta*, with the result that CRW larvae are stunted or killed after feeding on the diet, and this effect was demonstrated for several different genes.

Therefore, there has existed a need for identifying efficacious nucleotide sequences for use in improved methods of modulating gene expression by repressing, delaying or otherwise reducing gene expression within a particular coleopteran pest for the purpose of controlling pest infestation or to introduce novel phenotypic traits.

SUMMARY OF THE INVENTION

In one aspect, the invention provides a method of inhibiting expression of a target gene in a coleopteran pest. In certain embodiments, the method comprises modulating or inhibiting expression of one or more target genes in a coleopteran pest that causes cessation of feeding, growth, development, reproduction and/or infectivity and eventually result in the death of the insect. The method comprises introduction of partial or fully, stabilized double-stranded RNA (dsRNA), including its modified forms such as small interfering RNA (siRNA) sequences, into the cells or into the extracellular environment, such as the midgut, within a coleopteran pest body wherein the dsRNA enters the cells and inhibits expression of at least one or more target genes and wherein the inhibition exerts a deleterious effect upon the coleopteran pest. The methods and associated compositions may be used for limiting or eliminating coleopteran pest infestation in or on any pest host, pest symbiont, or environment in which a pest is present by providing one or more compositions comprising the dsRNA molecules described herein in the diet of the pest. The method will find particular benefit for protecting plants from insect attack. In one embodiment, the pest is defined as comprising a digestive system pH within the range of from about 4.5 to about 9.5, from about 5 to about 9, from about 6 to about 8, and from about pH 7.0.

In another aspect, the present invention provides exemplary nucleic acid compositions that are homologous to at least a portion of one or more native nucleic acid sequences in a target pest. In certain embodiments, the pest is selected from among *Diabrotica* sp. including

Western Corn Rootworm (WCR, *Diabrotica virgifera* or *Diabrotica virgifera virgifera*), Southern Corn Rootworm (SCR, *Diabrotica undecimpunctata howardi*), Mexican Corn Rootworm (MCR, *Diabrotica virgifera zea*), Brazilian Corn Rootworm (BZR, *Diabrotica balteata, Diabrotica viridula, Diabrotica speciosa*), Northern Corn rootworm (NCR, *Diabrotica barberi*), *Diabrotica undecimpunctata;* as well as Colorado Potato Beetle (CPB, *Leptinotarsa decemlineata*), Red Flour Beetle (RFB, *Tribolium castaneum*), and Mexican Bean Beetle (*Epilachna varivestis*). In other embodiments the pest is selected from among Lepidopteran insects including European Corn Borer (ECB, *Ostrinia nubilalis*), Black Cutworm (BCW, *Agrotis ipsilon*), Corn Earworm (CEW, *Helicoverpa zea*), Fall Armyworm (FAW, *Spodoptera frugiperda*), Cotton Ball Weevil (BWV, *Anthonomus grandis*), silkworms (*Bombyx mori*) and *Manduca sexta*, and from Dipteran insects including *Drosophila melanogaster*, *Anopheles gambiae*, and *Aedes aegypti*. Specific examples of such nucleic acids provided by the invention are given in the attached sequence listing as SEQ ID NO:1 through SEQ ID NO:906.

In yet another aspect, the invention provides a method for suppression of gene expression in a coleopteran pest such as a corn rootworm or related species that comprises the step of providing in the diet of the pest a gene suppressive amount of at least one dsRNA molecule transcribed from a nucleotide sequence as described herein, at least one segment of which is complementary to an mRNA sequence within the cells of the pest. The method may further comprise observing the death, inhibition, stunting, or cessation of feeding of the pest. A dsRNA molecule, including its modified form such as an siRNA molecule, fed to a pest in accordance with the invention may be at least from about 80, 81, 82, 83, 84, 85, 86, 87, 88 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, or about 100% identical to a RNA molecule transcribed from a nucleotide sequence selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:906. In particular embodiments, the nucleotide sequence may be selected from the group consisting of SEQ ID NO:697, SEQ ID NOs:813-819, SEQ ID NO:841, and SEQ ID NO:874.

Accordingly, in another aspect of the present invention, a set of isolated and purified nucleotide sequences as set forth in SEQ ID NO:1 through SEQ ID NO:906 is provided. The present invention provides a stabilized dsRNA molecule or the expression of one or more miRNAs for inhibition of expression of a target gene in a coleopteran pest expressed from these sequences and fragments thereof. A stabilized dsRNA, including a miRNA or siRNA molecule can comprise at least two coding sequences that are arranged in a sense and an antisense orientation relative to at least one promoter, wherein the nucleotide sequence that

comprises a sense strand and an antisense strand are linked or connected by a spacer sequence of at least from about five to about one thousand nucleotides, wherein the sense strand and the antisense strand may be a different length, and wherein each of the two coding sequences shares at least 80% sequence identity, at least 90%, at least 95%, at least 98%, or 100% sequence identity, to any one or more nucleotide sequence(s) set forth in set forth in SEQ ID NO:1 through SEQ ID NO:906.

Further provided by the invention is a fragment or concatemer of a nucleic acid sequence selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:906. In particular embodiments, the nucleotide sequence may comprise a fragment or concatemer of a sequence selected from the group consisting of SEQ ID NO:697, SEQ ID NOs:813-819, SEQ ID NO:841, and SEQ ID NO:874.

The fragment may be defined as causing a the death, inhibition, stunting, or cessation of feeding of a pest when expressed as a dsRNA and provided to the pest. The fragment may, for example, comprise at least about 19, 21, 23, 25, 40, 60, 80, 100, 125 or more contiguous nucleotides of any one or more of the sequences in SEQ ID NO:1 through SEQ ID NO:906, or a complement thereof. One beneficial DNA segment for use in the present invention is at least from about 19 to about 23, or about 23 to about 100 nucleotides up to about 2000 nucleotides or more in length. Particularly useful will be dsRNA sequences including about 23 to about 300 nucleotides homologous to a pest target sequence. The invention also provides a ribonucleic acid expressed from any of such sequences including a dsRNA. A sequence selected for use in expression of a gene suppression agent can be constructed from a single sequence derived from one or more target pests and intended for use in expression of an RNA that functions in the suppression of a single gene or gene family in the one or more target pests, or that the DNA sequence can be constructed as a chimera from a plurality of DNA sequences.

In yet another aspect, the invention provides recombinant DNA constructs comprising a nucleic acid molecule encoding a dsRNA molecule described herein. The dsRNA may be formed by transcription of one strand of the dsRNA molecule from a nucleotide sequence which is at least from about 80% to about 100% identical to a nucleotide sequence selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:906. Such recombinant DNA constructs may be defined as producing dsRNA molecules capable of inhibiting the expression of endogenous target gene(s) in a pest cell upon ingestion. The construct may comprise a nucleotide sequence of the invention operably linked to a promoter sequence that functions in the host cell. Such a promoter may be tissue-specific and may, for example, be

specific to a tissue type which is the subject of pest attack. In the case of rootworms, for example, it may be desired to use a promoter providing root-preferred expression.

Nucleic acid constructs in accordance with the invention may comprise at least one non-naturally occurring nucleotide sequence that can be transcribed into a single stranded RNA capable of forming a dsRNA molecule *in vivo* through hybridization. Such dsRNA sequences self assemble and can be provided in the diet of a coleopteran pest to achieve the desired inhibition.

A recombinant DNA construct may comprise two different non-naturally occurring sequences which, when expressed *in vivo* as dsRNA sequences and provided in the diet of a coleopteran pest, inhibit the expression of at least two different target genes in the cell of the coleopteran pest. In certain embodiments, at least 3, 4, 5, 6, 8 or 10 or more different dsRNAs are produced in a cell or plant comprising the cell that have a pest-inhibitory effect. The dsRNAs may expressed from multiple constructs introduced in different transformation events or could be introduced on a single nucleic acid molecule. The dsRNAs may be expressed using a single promoter or multiple promoters. In one embodiments of the invention, single dsRNAs are produced that comprise nucleic acids homologous to multiple loci within a pest.

In still yet another aspect, the invention provides a recombinant host cell having in its genome at least one recombinant DNA sequence that is transcribed to produce at least one dsRNA molecule that functions when ingested by a coleopteran pest to inhibit the expression of a target gene in the pest. The dsRNA molecule may be encoded by any of the nucleic acids described herein and as set forth in the sequence listing. The present invention also provides a transformed plant cell having in its genome at least one recombinant DNA sequence described herein. Transgenic plants comprising such a transformed plant cell are also provided, including progeny plants of any generation, seeds, and plant products, each comprising the recombinant DNA.

The methods and compositions of the present invention may be applied to any monocot and dicot plant, depending on the coleopteran pest control desired. Specifically, the plants are intended to include, without limitation, alfalfa, aneth, apple, apricot, artichoke, arugula, asparagus, avocado, banana, barley, beans, beet, blackberry, blueberry, broccoli, brussel sprouts, cabbage, canola, cantaloupe, carrot, cassava, cauliflower, celery, cherry, cilantro, citrus, clementine, coffee, corn, cotton, cucumber, Douglas fir, eggplant, endive, escarole, eucalyptus, fennel, figs, gourd, grape, grapefruit, honey dew, jicama, kiwifruit, lettuce, leeks, lemon, lime, Loblolly pine, mango, melon, mushroom, nut, oat, okra, onion,

orange, an ornamental plant, papaya, parsley, pea, peach, peanut, pear, pepper, persimmon, pine, pineapple, plantain, plum, pomegranate, poplar, potato, pumpkin, quince, radiata pine, radicchio, radish, raspberry, rice, rye, sorghum, Southern pine, soybean, spinach, squash, strawberry, sugarbeet, sugarcane, sunflower, sweet potato, sweetgum, tangerine, tea, tobacco, tomato, turf, a vine, watermelon, wheat, yams, and zucchini plants. Thus, a plant transformed with a recombinant DNA sequence as set forth in SEQ ID NO:1 through SEQ ID NO:906, or concatemer, fragment, or complement thereof, that is transcribed to produce at least one dsRNA molecule that functions when ingested by a coleopteran pest to inhibit the expression of a target gene in the pest is also provided by the invention. In particular embodiments, the recombinant DNA sequence may be selected from the group consisting of SEQ ID NO:697, SEQ ID NOs:813-819, SEQ ID NO:841, and SEQ ID NO:874, or fragment, complement, or concatemer thereof.

The invention also provides combinations of methods and compositions for controlling coleopteran pest infestations. One means provides a dsRNA method as described herein for protecting plants from insect infestation along with one or more insecticidal agents that exhibit features different from those exhibited by the dsRNA methods and compositions. For example, one or more Bt proteins may be provided in the diet of insect pests in combination with one or more dsRNAs as described herein. A composition formulated for topical application or derived using a transgenic approach that combines dsRNA methods and compositions with Bt may be used to provide synergies that were not known previously in the art for controlling insect infestation. One synergy is the reduction in the level of expression required for either the dsRNA(s) or the Bt protein(s). When combined together, a lower effective dose of each pest control agent could be used. It is believed that the Bt insecticidal proteins create entry pores through which the dsRNA molecules are able to penetrate more effectively into spaces remote from the gut of the insect pest, or more efficiently into the cells in the proximity of lesions created by the Bt proteins, thus requiring less of either the Bt or the dsRNA to achieve the desired insecticidal result or the desired inhibition or suppression of a targeted biological function in the target pest.

The present invention therefore provides a composition that contains two or more different pesticidal agents each toxic to the same pest or insect species, at least one of which comprises a dsRNA described herein. In certain embodiments, the second agent can be an agent selected from the group consisting of a patatin, a *Bacillus thuringiensis* insecticidal protein, a *Xenorhabdus* insecticidal protein, a *Photorhabdus* insecticidal protein, a *Bacillus laterosporous* insecticidal protein, a *Bacillus sphaericus* insecticidal protein, and a lignin. A

Bacillus thuringiensis insecticidal protein can be any of a number of insecticidal proteins including but not limited to a Cry1, a Cry3, a TIC851, a CryET70, a Cry22, a TIC901, a TIC1201, a TIC407, a TIC417, a binary insecticidal protein CryET33 and CryET34, a binary insecticidal protein CryET80 and CryET76, a binary insecticidal protein TIC100 and TIC101, a binary insecticidal protein PS149B1, a VIP insecticidal protein, a TIC900 or related protein, or combinations of the insecticidal proteins ET29 or ET37 with insecticidal proteins TIC810 or TIC812, and insecticidal chimeras of any of the preceding insecticidal proteins.

A ribonucleic acid that is provided in a diet can be provided in an artificial diet formulated to meet particular nutritional requirements for maintaining a pest on such diet. The diet may be supplemented with a pest controlling amount of an RNA that has been purified from a separate expression system to determine a pest controlling amount of RNA composition or to determine extent of suppressive activity upon ingestion of the supplemented diet by the pest. The diet can also be a recombinant cell transformed with a DNA sequence constructed for expression of the agent, the RNA, or the gene suppression agent. Upon ingestion of one or more such transformed cells by the pest, a desired phenotypic result is observed, indicating that the agent has functioned to inhibit the expression of a target nucleotide sequence that is within the cells of the pest.

A gene targeted for suppression can encode an essential protein, the predicted function of which is selected from the group consisting of muscle formation, juvenile hormone formation, juvenile hormone regulation, ion regulation and transport, protein synthesis and transport, digestive enzyme synthesis, maintenance of cell membrane potential, amino acid biosynthesis, amino acid degradation, sperm formation, pheromone synthesis, pheromone sensing, antennae formation, wing formation, leg formation, development and differentiation, egg formation, larval maturation, digestive enzyme formation, haemolymph synthesis, haemolymph maintenance, neurotransmission, cell division, energy metabolism, respiration, an unknown function, and apoptosis.

Another aspect of the present invention also provides methods for improving the yield of a crop produced from a crop plant subjected to insect pest infestation, said method comprising the steps of a) introducing a polynucleotide comprising a sequence selected from SEQ ID NO:1 through SEQ ID NO:906 or a complement or concatemer or fragment thereof into said crop plant; and b) cultivating the crop plant to allow the expression of said polynucleotide, wherein expression of the polynucleotide inhibits feeding by insect pests and loss of yield due to pest infestation.

In certain embodiments, the expression of the polynucleotide produces an RNA molecule that suppresses at least a first target gene in an insect pest that has ingested a portion of said crop plant, wherein the target gene performs at least one essential function selected from the group consisting of feeding by the pest, viability of the pest, pest cell apoptosis, differentiation and development of the pest or any pest cell, sexual reproduction by the pest, muscle formation, muscle twitching, muscle contraction, juvenile hormone formation and/or reduction, juvenile hormone regulation, ion regulation and transport, maintenance of cell membrane potential, amino acid biosynthesis, amino acid degradation, sperm formation, pheromone synthesis, pheromone sensing, antennae formation, wing formation, leg formation, egg formation, larval maturation, digestive enzyme formation, haemolymph synthesis, haemolymph maintenance, neurotransmission, larval stage transition, pupation, emergence from pupation, cell division, energy metabolism, respiration, cytoskeletal structure synthesis and maintenance, nucleotide metabolism, nitrogen metabolism, water use, water retention, and sensory perception.

In other embodiments, the insect pest is a corn rootworm pest selected from the group consisting of *Diabrotica undecimpunctata howardi* (Southern Corn Rootworm (SCR)), *Diabrotica virgifera virgifera* (Western Corn Rootworm (WCR)), *Diabrotica barberi* (Northern Corn Rootworm (NCR)), *Diabrotica virgifera zea* (Mexican Corn Rootworm (MCR)), *Diabrotica balteata* (Brazilian Corn Rootworm (BZR)), *Diabrotica viridula* (Brazilian Corn Rootworm (BZR)), and *Diabrotica speciosa* (Brazilian Corn Rootworm (BZR)).

Methods for improving the drought tolerance of a crop produced from a crop plant subjected to insect pest infestation, said method comprising the steps of a) introducing a polynucleotide sequence selected from SEQ ID NO:1 through SEQ ID NO:906, or a fragment thereof, into said crop plant; and b) cultivating the crop plant to allow the expression of said polynucleotide, wherein expression of the polynucleotide inhibits feeding by insects pests and loss of drought tolerance due to pest infestation, are also provided.

Yet another aspect of the invention further provides agronomically and commercially important products and/or compositions of matter including, but not limited to, animal feed, commodities, products and by-products that are intended for use as food for human consumption or for use in compositions and commodities that are intended for human consumption including but not limited to corn flour, corn meal, corn syrup, corn oil, corn starch, popcorn, corn cakes, cereals, and the like. Such compositions may be defined as containing detectable amounts of a nucleotide sequence set forth herein, and thus are also

diagnostic for any transgenic event containing such nucleotide sequences. These products are useful at least because they are likely to be derived from crops propagated with fewer pesticides and organophosphates as a result of their incorporation of the nucleotides of the present invention for controlling the infestation of coleopteran pests in plants. Such commodities and commodity products can be produced from seed produced from a transgenic plant, wherein the transgenic plant expresses RNA from one or more contiguous nucleotides of the present invention or nucleotides of one or more coleopteran pests and the complements thereof. Such commodities and commodity products may also be useful in controlling coleopteran pests of such commodity and commodity products, such as for example, control of flour weevils, because of the presence in the commodity or commodity product of the pest gene suppressive RNA expressed from a gene sequence as set forth in the present invention.

A method of producing such a commodity product comprising obtaining a plant transformed with a polynucleotide comprising a sequence selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:906, or a concatemer or fragment or complement thereof, and preparing a commodity product from the plant or part thereof is also provided. Further, a method of producing food or feed, comprising obtaining a plant transformed with a polynucleotide selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:906 or a fragment or complement thereof, and preparing food or feed from said plant or part thereof is yet another aspect of the invention.

The invention also provides a computer readable medium having recorded thereon one or more of the nucleotide sequences as set forth in SEQ ID NO:1 through SEQ ID NO:906, or complements thereof, for use in a number of computer based applications, including but not limited to DNA identity and similarity searching, protein identity and similarity searching, transcription profiling characterizations, comparisons between genomes, and artificial hybridization analyses.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1: Bioassay of F1 corn plant events transformed with pMON98503 (SEQ ID NO:820) and challenged with Western Corn Rootworm (WCR).

FIG. 2: Bioassay of F1 corn plant events transformed with pMON98504 comprising concatemer C1 (SEQ ID NO:821) and challenged with Western Corn Rootworm (WCR).

FIG. 3: Selection of Dv49 and Dv248 fragments and schematic design of Dv49-Dv248 concatemer C38.

FIG. 4: dsRNAs F1- F13 synthesized based on concatemer C38.

FIG. 5: DV49-DV248 concatemer 38 dose response (Fragments F1- F6).

FIG. 6: DV49-DV248 concatemer 38 dose response (Fragments F7- F10).

FIG. 7: DV49-DV248 concatemer 38 dose response (Fragments F11- F13).

DETAILED DESCRIPTION OF THE INVENTION

The following is a detailed description of the invention provided to aid those skilled in the art in practicing the present invention. Those of ordinary skill in the art may make modifications and variations in the embodiments described herein without departing from the spirit or scope of the present invention.

The present invention provides methods and compositions for genetic control of pest infestations. For example, the present invention provides recombinant DNA technologies to post-transcriptionally repress or inhibit expression of a target coding sequence in the cell of a pest to provide a pest-protective effect by feeding to the pest one or more double stranded or small interfering ribonucleic acid (RNA) molecules transcribed from all or a portion of a target coding sequence, thereby controlling the infestation. Therefore, the present invention relates to sequence-specific inhibition of expression of coding sequences using double-stranded RNA (dsRNA), including small interfering RNA (siRNA), to achieve the intended levels of pest control.

Isolated and substantially purified nucleic acid molecules including but not limited to non-naturally occurring nucleotide sequences and recombinant DNA constructs for transcribing dsRNA molecules of the present invention are provided that suppress or inhibit the expression of an endogenous coding sequence or a target coding sequence in the pest when introduced thereto. Transgenic plants that (a) contain nucleotide sequences encoding the isolated and substantially purified nucleic acid molecules and the non-naturally occurring recombinant DNA constructs for transcribing the dsRNA molecules for controlling plant pest infestations, and (b) display resistance and/or enhanced tolerance to the insect infestations, are also provided. Compositions containing the dsRNA nucleotide sequences of the present

invention for use in topical applications onto plants or onto animals or into the environment of an animal to achieve the elimination or reduction of pest infestation are also described.

The inventors have herein discovered that, contrary to the teachings in the prior art, feeding a composition containing double stranded RNA molecules consisting of sequences found within one or more expressed nucleotide sequences of a coleopteran species to the species from which the nucleotide sequences were obtained results in the inhibition of one or more biological functions within the coleopteran species. Particularly, the inventors have discovered that feeding the double stranded RNA molecules described herein to crop pest species such as corn rootworms results in the death or inhibition of development and differentiation of insect pests that ingest these compositions.

The inventors have identified the nucleotide sequences described herein as providing plant protective effects against coleopteran pest species. Amino acid sequences encoded by the cDNA sequences have been deduced and compared to known amino acid sequences. Many of the sequences are predicted to encode proteins that have some annotation information associated with them. The annotation information that is associated with a particular nucleotide sequence and protein sequence encoded therefrom is based on homology or similarity between the amino acid sequences deduced through translation of the coding sequences described herein as set forth and amino acid sequences that are known in the art in publicly available databases.

cDNA sequences encoding proteins or parts of proteins essential for survival, such as amino acid sequences involved in various metabolic or catabolic biochemical pathways, cell division, reproduction, energy metabolism, digestion, neurological function and the like were selected for use in preparing double stranded RNA molecules that were provided in the diet of coleopteran pests. As described herein, ingestion by a target pest of compositions containing one or more dsRNAs, at least one segment of which corresponds to at least a substantially identical segment of RNA produced in the cells of the target pest, resulted in death, stunting, or other inhibition of the target pest. These results indicated that a nucleotide sequence, either DNA or RNA, derived from a coleopteran pest can be used to construct plant cells resistant to infestation by the pest. The pest host, for example, can be transformed to contain one or more of the nucleotide sequences derived from the coleopteran pest. The nucleotide sequence transformed into the pest host or symbiont may encode one or more RNAs that form into a dsRNA sequence in the cells or biological fluids within the transformed host or symbiont, thus making the dsRNA available in the diet of the pest if/when the pest feeds upon the transgenic host or symbiont, resulting in the suppression of

expression of one or more genes in the cells of the pest and ultimately the death, stunting, or other inhibition of the pest

The present invention relates generally to genetic control of coleopteran pest infestations in host organisms. More particularly, the present invention includes the methods for delivery of pest control agents to a coleopteran pest. Such pest control agents cause, directly or indirectly, an impairment in the ability of the pest to maintain itself, grow or otherwise infest a target host or symbiont. The present invention provides methods for employing stabilized dsRNA molecules in the diet of the pest as a means for suppression of targeted genes in the pest, thus achieving desired control of pest infestations in, or about the host or symbiont targeted by the pest.

In accomplishing the foregoing, the present invention provides a method of inhibiting expression of a target gene in a coleopteran pest, including for example, corn rootworms or other coleopteran insect species, resulting in the cessation of feeding, growth, development, reproduction, infectivity, and eventually may result in the death of the pest. The method comprises in one embodiment introducing partial or fully stabilized double-stranded RNA (dsRNA) nucleotide molecules into a nutritional composition that the pest relies on as a food source, and making the nutritional composition available to the pest for feeding. Ingestion of the nutritional composition containing the double stranded or siRNA molecules results in the uptake of the molecules by the cells of the pest, resulting in the inhibition of expression of at least one target gene in the cells of the pest. Inhibition of the target gene exerts a deleterious effect upon the pest.

In certain embodiments, dsRNA molecules provided by the invention comprise nucleotide sequences complementary to a sequence as set forth in any of SEQ ID NO:1 through SEQ ID NO:906, the inhibition of which in a pest organism results in the reduction or removal of a protein or nucleotide sequence agent that is essential for the pests' growth and development or other biological function. The nucleotide sequence selected may exhibit from about 80% to at least about 100% sequence identity to one of the nucleotide sequences as set forth in SEQ ID NO:1 through SEQ ID NO:906, as set forth in the sequence listing, including the complement thereof. Such inhibition can be described as specific in that a nucleotide sequence from a portion of the target gene is chosen from which the inhibitory dsRNA or siRNA is transcribed. The method is effective in inhibiting the expression of at least one target gene and can be used to inhibit many different types of target genes in the pest. In particular embodiments, the nucleotide sequence may be selected from the group

consisting of SEQ ID NO:697, SEQ ID NOs:813-819, SEQ ID NO:841, and SEQ ID NO:874.

The sequences identified as having a pest protective effect may be readily expressed as dsRNA molecules through the creation of appropriate expression constructs. For example, such sequences can be expressed as a hairpin and stem and loop structure by taking a first segment corresponding to a sequence selected from SEQ ID NO:1 through SEQ ID NO:906 or a fragment thereof, linking this sequence to a second segment spacer region that is not homologous or complementary to the first segment, and linking this to a third segment that transcribes an RNA, wherein at least a portion of the third segment is substantially complementary to the first segment. Such a construct forms a stem and loop structure by hybridization of the first segment with the third segment and a loop structure forms comprising the second segment (WO94/01550, WO98/05770, US 2002/0048814A1, and US 2003/0018993A1).

A. Nucleic Acid Compositions and Constructs

The invention provides recombinant DNA constructs for use in achieving stable transformation of particular host or symbiont pest targets. Transformed host or symbiont pest targets may express pesticidally effective levels of preferred dsRNA or siRNA molecules from the recombinant DNA constructs, and provide the molecules in the diet of the pest. Pairs of isolated and purified nucleotide sequences may be provided from cDNA library and/or genomic library information. The pairs of nucleotide sequences may be derived from any preferred coleopteran pest for use as thermal amplification primers to generate DNA templates for the preparation of dsRNA and siRNA molecules of the present invention.

As used herein, the term "nucleic acid" refers to a single or double-stranded polymer of deoxyribonucleotide or ribonucleotide bases read from the 5' to the 3' end. The "nucleic acid" may also optionally contain non-naturally occurring or altered nucleotide bases that permit correct read through by a polymerase and do not reduce expression of a polypeptide encoded by that nucleic acid. The term "nucleotide sequence" or "nucleic acid sequence" refers to both the sense and antisense strands of a nucleic acid as either individual single strands or in the duplex. The term "ribonucleic acid" (RNA) is inclusive of RNAi (inhibitory RNA), dsRNA (double stranded RNA), siRNA (small interfering RNA), mRNA (messenger RNA), miRNA (micro-RNA), tRNA (transfer RNA, whether charged or discharged with a corresponding acylated amino acid), and cRNA (complementary RNA) and the term "deoxyribonucleic acid" (DNA) is inclusive of cDNA and genomic DNA and DNA-RNA

hybrids. The words "nucleic acid segment", "nucleotide sequence segment", or more generally "segment" will be understood by those in the art as a functional term that includes both genomic sequences, ribosomal RNA sequences, transfer RNA sequences, messenger RNA sequences, operon sequences and smaller engineered nucleotide sequences that express or may be adapted to express, proteins, polypeptides or peptides.

Provided according to the invention are nucleotide sequences, the expression of which results in an RNA sequence which is substantially homologous to an RNA molecule of a targeted gene in an insect that comprises an RNA sequence encoded by a nucleotide sequence within the genome of the insect. Thus, after ingestion of the stabilized RNA sequence down-regulation of the nucleotide sequence of the target gene in the cells of the insect may be obtained resulting in a deleterious effect on the maintenance, viability, proliferation, reproduction and infestation of the insect.

As used herein, the term "substantially homologous" or "substantial homology", with reference to a nucleic acid sequence, includes a nucleotide sequence that hybridizes under stringent conditions to the coding sequence as set forth in any of SEQ ID NO:1 through SEQ ID NO:906 as set forth in the sequence listing, or the complements thereof. Sequences that hybridize under stringent conditions to any of SEQ ID NO:1 through SEQ ID NO:906 as set forth in the sequence listing, or the complements thereof, are those that allow an antiparallel alignment to take place between the two sequences, and the two sequences are then able, under stringent conditions, to form hydrogen bonds with corresponding bases on the opposite strand to form a duplex molecule that is sufficiently stable under the stringent conditions to be detectable using methods well known in the art. Substantially homologous sequences have preferably from about 70% to about 80% sequence identity, or more preferably from about 80% to about 85% sequence identity, or most preferable from about 90% to about 95% sequence identity, to about 99% sequence identity, to the referent nucleotide sequences as set forth in any of SEQ ID NO:1 through SEQ ID NO:906 as set forth in the sequence listing, or the complements thereof.

As used herein, the term "sequence identity", "sequence similarity" or "homology" is used to describe sequence relationships between two or more nucleotide sequences. The percentage of "sequence identity" between two sequences is determined by comparing two optimally aligned sequences over a comparison window, wherein the portion of the sequence in the comparison window may comprise additions or deletions (*i.e.*, gaps) as compared to the reference sequence (which does not comprise additions or deletions) for optimal alignment of the two sequences. The percentage is calculated by determining the number of

positions at which the identical nucleic acid base or amino acid residue occurs in both sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the window of comparison, and multiplying the result by 100 to yield the percentage of sequence identity. A sequence that is identical at every position in comparison to a reference sequence is said to be identical to the reference sequence and vice-versa. A first nucleotide sequence when observed in the 5' to 3' direction is said to be a "complement" of, or complementary to, a second or reference nucleotide sequence observed in the 3' to 5' direction if the first nucleotide sequence exhibits complete complementarity with the second or reference sequence. As used herein, nucleic acid sequence molecules are said to exhibit "complete complementarity" when every nucleotide of one of the sequences read 5' to 3' is complementary to every nucleotide of the other sequence when read 3' to 5'. A nucleotide sequence that is complementary to a reference nucleotide sequence will exhibit a sequence identical to the reverse complement sequence of the reference nucleotide sequence. These terms and descriptions are well defined in the art and are easily understood by those of ordinary skill in the art.

As used herein, a "comparison window" refers to a conceptual segment of at least 6 contiguous positions, usually about 50 to about 100, more usually about 100 to about 150, in which a sequence is compared to a reference sequence of the same number of contiguous positions after the two sequences are optimally aligned. The comparison window may comprise additions or deletions (*i.e.* gaps) of about 20% or less as compared to the reference sequence (which does not comprise additions or deletions) for optimal alignment of the two sequences Those skilled in the art should refer to the detailed methods used for sequence alignment in the Wisconsin Genetics Software Package Release 7.0, Genetics Computer Group, 575 Science Drive Madison, Wis., USA) or refer to Ausubel *et al.* (1998) for a detailed discussion of sequence analysis.

The present invention provides DNA sequences capable of being expressed as an RNA in a cell or microorganism to inhibit target gene expression in a cell, tissue or organ of an insect. The sequences comprises a DNA molecule coding for one or more different nucleotide sequences, wherein each of the different nucleotide sequences comprises a sense nucleotide sequence and an antisense nucleotide sequence connected by a spacer sequence coding for a dsRNA molecule of the present invention. The spacer sequence constitutes part of the sense nucleotide sequence or the antisense nucleotide sequence and forms within the dsRNA molecule between the sense and antisense sequences. The sense nucleotide sequence or the antisense nucleotide sequence is substantially identical to the nucleotide sequence of

the target gene or a derivative thereof or a complementary sequence thereto. The dsDNA molecule may be placed operably under the control of a promoter sequence that functions in the cell, tissue or organ of the host expressing the dsDNA to produce dsRNA molecules. In one embodiment, the DNA sequence may be derived from a nucleotide sequence as set forth in SEQ ID NO:1 through SEQ ID NO:906 in the sequence listing.

The invention also provides a DNA sequence for expression in a cell of a plant that, upon expression of the DNA to RNA and ingestion by a target pest achieves suppression of a target gene in a cell, tissue or organ of an insect pest. The dsRNA at least comprises one or multiple structural gene sequences, wherein each of the structural gene sequences comprises a sense nucleotide sequence and an antisense nucleotide sequence connected by a spacer sequence that forms a loop within the complementary and antisense sequences. The sense nucleotide sequence or the antisense nucleotide sequence is substantially identical to the nucleotide sequence of the target gene, derivative thereof, or sequence complementary thereto. The one or more structural gene sequences is placed operably under the control of one or more promoter sequences, at least one of which is operable in the cell, tissue or organ of a prokaryotic or eukaryotic organism, particularly a plant.

A gene sequence or fragment for pest control according to the invention may be cloned between two tissue specific promoters, such as two root specific promoters which are operable in a transgenic plant cell and therein expressed to produce mRNA in the transgenic plant cell that form dsRNA molecules thereto. The dsRNA molecules contained in plant tissues are ingested by an insect so that the intended suppression of the target gene expression is achieved.

A nucleotide sequence provided by the present invention may comprise an inverted repeat separated by a "spacer sequence." The spacer sequence may be a region comprising any sequence of nucleotides that facilitates secondary structure formation between each repeat, where this is required. In one embodiment of the present invention, the spacer sequence is part of the sense or antisense coding sequence for mRNA. The spacer sequence may alternatively comprise any combination of nucleotides or homologues thereof that are capable of being linked covalently to a nucleic acid molecule. The spacer sequence may comprise a sequence of nucleotides of at least about 10-100 nucleotides in length, or alternatively at least about 100-200 nucleotides in length, at least 200-400 about nucleotides in length, or at least about 400-500 nucleotides in length.

The nucleic acid molecules or fragment of the nucleic acid molecules or other nucleic acid molecules in the sequence listing are capable of specifically hybridizing to other nucleic

acid molecules under certain circumstances. As used herein, two nucleic acid molecules are said to be capable of specifically hybridizing to one another if the two molecules are capable of forming an anti-parallel, double-stranded nucleic acid structure. A nucleic acid molecule is said to be the complement of another nucleic acid molecule if they exhibit complete complementarity. Two molecules are said to be "minimally complementary" if they can hybridize to one another with sufficient stability to permit them to remain annealed to one another under at least conventional "low-stringency" conditions. Similarly, the molecules are said to be complementary if they can hybridize to one another with sufficient stability to permit them to remain annealed to one another under conventional "high-stringency" conditions. Conventional stringency conditions are described by Sambrook, *et al.* (1989), and by Haymes *et al.* (1985).

Departures from complete complementarity are therefore permissible, as long as such departures do not completely preclude the capacity of the molecules to form a double-stranded structure. Thus, in order for a nucleic acid molecule or a fragment of the nucleic acid molecule to serve as a primer or probe it needs only be sufficiently complementary in sequence to be able to form a stable double-stranded structure under the particular solvent and salt concentrations employed.

Appropriate stringency conditions which promote DNA hybridization are, for example, 6.0 x sodium chloride/sodium citrate (SSC) at about 45°C, followed by a wash of 2.0 x SSC at 50°C, are known to those skilled in the art or can be found in Current Protocols in Molecular Biology (1989). For example, the salt concentration in the wash step can be selected from a low stringency of about 2.0 x SSC at 50°C to a high stringency of about 0.2 x SSC at 50°C. In addition, the temperature in the wash step can be increased from low stringency conditions at room temperature, about 22°C, to high stringency conditions at about 65°C. Both temperature and salt may be varied, or either the temperature or the salt concentration may be held constant while the other variable is changed. A nucleic acid for use in the present invention may specifically hybridize to one or more of nucleic acid molecules from WCR or complements thereof under such conditions. Preferably, a nucleic acid for use in the present invention will exhibit at least from about 80%, or at least from about 90%, or at least from about 95%, or at least from about 98% or even about 100% sequence identity with one or more nucleic acid molecules as set forth in SEQ ID NO:1 through SEQ ID NO:906 as set forth in the sequence listing.

Nucleic acids of the present invention may also be synthesized, either completely or in part, especially where it is desirable to provide plant-preferred sequences, by methods

known in the art. Thus, all or a portion of the nucleic acids of the present invention may be synthesized using codons preferred by a selected host. Species-preferred codons may be determined, for example, from the codons used most frequently in the proteins expressed in a particular host species. Other modifications of the nucleotide sequences may result in mutants having slightly altered activity.

dsRNA or siRNA nucleotide sequences comprise double strands of polymerized ribonucleotide and may include modifications to either the phosphate-sugar backbone or the nucleoside. Modifications in RNA structure may be tailored to allow specific genetic inhibition. In one embodiment, the dsRNA molecules may be modified through an enzymatic process so that siRNA molecules may be generated. The siRNA can efficiently mediate the down-regulation effect for some target genes in some insects. This enzymatic process may be accomplished by utilizing an RNAse III enzyme or a DICER enzyme, present in the cells of an insect, a vertebrate animal, a fungus or a plant in the eukaryotic RNAi pathway (Elbashir *et al.*, 2002; Hamilton and Baulcombe, 1999). This process may also utilize a recombinant DICER or RNAse III introduced into the cells of a target insect through recombinant DNA techniques that are readily known to the skilled in the art. Both the DICER enzyme and RNAse III, being naturally occurring in an insect or being made through recombinant DNA techniques, cleave larger dsRNA strands into smaller oligonucleotides. The DICER enzymes specifically cut the dsRNA molecules into siRNA pieces each of which is about 19-25 nucleotides in length while the RNAse III enzymes normally cleave the dsRNA molecules into 12-15 base-pair siRNA. The siRNA molecules produced by the either of the enzymes have 2 to 3 nucleotide 3' overhangs, and 5' phosphate and 3' hydroxyl termini. The siRNA molecules generated by RNAse III enzyme are the same as those produced by Dicer enzymes in the eukaryotic RNAi pathway and are hence then targeted and degraded by an inherent cellular RNA-degrading mechanism after they are subsequently unwound, separated into single-stranded RNA and hybridize with the RNA sequences transcribed by the target gene. This process results in the effective degradation or removal of the RNA sequence encoded by the nucleotide sequence of the target gene in the insect. The outcome is the silencing of a particularly targeted nucleotide sequence within the insect. Detailed descriptions of enzymatic processes can be found in Hannon (2002).

A nucleotide sequence of the present invention can be recorded on computer readable media. As used herein, "computer readable media" refers to any tangible medium of expression that can be read and accessed directly by a computer. Such media include, but are not limited to: magnetic storage media, such as floppy discs, hard disc, storage medium, and

magnetic tape: optical storage media such as CD-ROM; electrical storage media such as RAM and ROM; optical character recognition formatted computer files, and hybrids of these categories such as magnetic/optical storage media. A skilled artisan can readily appreciate that any of the presently known computer readable mediums can be used to create a manufacture comprising computer readable medium having recorded thereon a nucleotide sequence of the present invention.

As used herein, "recorded" refers to a process for storing information on computer readable medium. A skilled artisan can readily adopt any of the presently known methods for recording information on computer readable medium to generate media comprising the nucleotide sequence information of the present invention. A variety of data storage structures are available to a skilled artisan for creating a computer readable medium having recorded thereon a nucleotide sequence of the present invention. The choice of the data storage structure will generally be based on the means chosen to access the stored information. In addition, a variety of data processor programs and formats can be used to store the nucleotide sequence information of the present invention on computer readable medium. The sequence information can be represented in a word processing text file, formatted in commercially-available software such as WordPerfect and Microsoft Word, or represented in the form of an ASCII text file, stored in a database application, such as DB2, Sybase, Oracle, or the like. The skilled artisan can readily adapt any number of data processor structuring formats (*e.g.* text file or database) in order to obtain computer readable medium having recorded thereon the nucleotide sequence information of the present invention.

Computer software is publicly available which allows a skilled artisan to access sequence information provided in a computer readable medium. Software that implements the BLAST (Altschul *et al.*, 1990) and BLAZE (Brutlag, *et al.*, 1993) search algorithms on a Sybase system can be used to identify open reading frames (ORFs) within sequences such as the Unigenes and EST's that are provided herein and that contain homology to ORFs or proteins from other organisms. Such ORFs are protein-encoding fragments within the sequences of the present invention and are useful in producing commercially important proteins such as enzymes used in amino acid biosynthesis, metabolism, transcription, translation, RNA processing, nucleic acid and a protein degradation, protein modification, and DNA replication, restriction, modification, recombination, and repair.

The present invention further provides systems, particularly computer-based systems, which contain the sequence information described herein. Such systems are designed to identify commercially important fragments of the nucleic acid molecule of the present

invention. As used herein, "a computer-based system" refers to the hardware means, software means, and data storage means used to analyze the nucleotide sequence information of the present invention. The minimum hardware means of the computer-based systems of the present invention comprises a central processing unit (CPU), input means, output means, and data storage means. A skilled artisan can readily appreciate that any one of the currently available computer-based system are suitable for use in the present invention.

As used herein, "a target structural motif," or "target motif," refers to any rationally selected sequence or combination of sequences in which the sequences or sequence(s) are chosen based on a three-dimensional configuration that is formed upon the folding of the target motif. There are a variety of target motifs known in the art. Protein target motifs include, but are not limited to, enzymatic active sites and signal sequences. Nucleic acid target motifs include, but are not limited to, promoter sequences, cis elements, hairpin structures and inducible expression elements (protein binding sequences).

B. Recombinant Vectors and Host Cell Transformation

A recombinant DNA vector may, for example, be a linear or a closed circular plasmid. The vector system may be a single vector or plasmid or two or more vectors or plasmids that together contain the total DNA to be introduced into the genome of the bacterial host. In addition, a bacterial vector may be an expression vector. Nucleic acid molecules as set forth in SEQ ID NO:1 through SEQ ID NO:906 or fragments or complements thereof can, for example, be suitably inserted into a vector under the control of a suitable promoter that functions in one or more microbial hosts to drive expression of a linked coding sequence or other DNA sequence. Many vectors are available for this purpose, and selection of the appropriate vector will depend mainly on the size of the nucleic acid to be inserted into the vector and the particular host cell to be transformed with the vector. Each vector contains various components depending on its function (amplification of DNA or expression of DNA) and the particular host cell with which it is compatible. The vector components for bacterial transformation generally include, but are not limited to, one or more of the following: a signal sequence, an origin of replication, one or more selectable marker genes, and an inducible promoter allowing the expression of exogenous DNA.

Expression and cloning vectors generally contain a selection gene, also referred to as a selectable marker. This gene encodes a protein necessary for the survival or growth of transformed host cells grown in a selective culture medium. Typical selection genes encode proteins that (a) confer resistance to antibiotics or other toxins, *e.g.*, ampicillin, neomycin,

methotrexate, or tetracycline, (b) complement auxotrophic deficiencies, or (c) supply critical nutrients not available from complex media, *e.g.*, the gene encoding D-alanine racemase for Bacilli. Those cells that are successfully transformed with a heterologous protein or fragment thereof produce a protein conferring drug resistance and thus survive the selection regimen.

An expression vector for producing a mRNA can also contain an inducible promoter that is recognized by the host bacterial organism and is operably linked to the nucleic acid encoding, for example, the nucleic acid molecule coding the *D. v. virgifera* mRNA or fragment thereof of interest. Inducible promoters suitable for use with bacterial hosts include β-lactamase promoter, *E. coli* λ phage PL and PR promoters, and *E. coli* galactose promoter, arabinose promoter, alkaline phosphatase promoter, tryptophan (trp) promoter, and the lactose operon promoter and variations thereof and hybrid promoters such as the tac promoter. However, other known bacterial inducible promoters are suitable.

The term "operably linked", as used in reference to a regulatory sequence and a structural nucleotide sequence, means that the regulatory sequence causes regulated expression of the linked structural nucleotide sequence. "Regulatory sequences" or "control elements" refer to nucleotide sequences located upstream (5' noncoding sequences), within, or downstream (3' non-translated sequences) of a structural nucleotide sequence, and which influence the timing and level or amount of transcription, RNA processing or stability, or translation of the associated structural nucleotide sequence. Regulatory sequences may include promoters, translation leader sequences, introns, enhancers, stem-loop structures, repressor binding sequences, and polyadenylation recognition sequences and the like.

Alternatively, the expression constructs can be integrated into the bacterial genome with an integrating vector. Integrating vectors typically contain at least one sequence homologous to the bacterial chromosome that allows the vector to integrate. Integrations appear to result from recombinations between homologous DNA in the vector and the bacterial chromosome. For example, integrating vectors constructed with DNA from various Bacillus strains integrate into the Bacillus chromosome (EP 0 127,328). Integrating vectors may also be comprised of bacteriophage or transposon sequences. Suicide vectors are also known in the art.

Construction of suitable vectors containing one or more of the above-listed components employs standard recombinant DNA techniques. Isolated plasmids or DNA fragments are cleaved, tailored, and re-ligated in the form desired to generate the plasmids required. Examples of available bacterial expression vectors include, but are not limited to, the multifunctional *E. coli* cloning and expression vectors such as Bluescript™ (Stratagene,

La Jolla, CA), in which, for example, a *D. v. virgifera* protein or fragment thereof, may be ligated into the vector in frame with sequences for the amino-terminal Met and the subsequent 7 residues of β-galactosidase so that a hybrid protein is produced; pIN vectors (Van Heeke and Schuster, 1989); and the like.

A yeast recombinant construct can typically include one or more of the following: a promoter sequence, fusion partner sequence, leader sequence, transcription termination sequence, a selectable marker. These elements can be combined into an expression cassette, which may be maintained in a replicon, such as an extrachromosomal element (*e.g.*, plasmids) capable of stable maintenance in a host, such as yeast or bacteria. The replicon may have two replication systems, thus allowing it to be maintained, for example, in yeast for expression and in a prokaryotic host for cloning and amplification. Examples of such yeast-bacteria shuttle vectors include YEp24 (Botstein *et al.*, 1979), pCl/1 (Brake *et al.*, 1984), and YRp17 (Stinchcomb *et al.*, 1982). In addition, a replicon may be either a high or low copy number plasmid. A high copy number plasmid will generally have a copy number ranging from about 5 to about 200, and typically about 10 to about 150. A host containing a high copy number plasmid will preferably have at least about 10, and more preferably at least about 20.

Useful yeast promoter sequences can be derived from genes encoding enzymes in the metabolic pathway. Examples of such genes include alcohol dehydrogenase (ADH) (EP 0 284044), enolase, glucokinase, glucose-6-phosphate isomerase, glyceraldehyde-3-phosphate-dehydrogenase (GAP or GAPDH), hexokinase, phosphofructokinase, 3-phosphoglycerate mutase, and pyruvate kinase (PyK) (EP 0 3215447). The yeast PHO5 gene, encoding acid phosphatase, also provides useful promoter sequences (Myanohara *et al.*, 1983). In addition, synthetic promoters that do not occur in nature also function as yeast promoters. Examples of such hybrid promoters include the ADH regulatory sequence linked to the GAP transcription activation region (U.S. Patent No. 4,876,197 and 4,880,734). Examples of transcription terminator sequences and other yeast-recognized termination sequences, such as those coding for glycolytic enzymes, are known to those of skill in the art.

Alternatively, the expression constructs can be integrated into the yeast genome with an integrating vector. Integrating vectors typically contain at least one sequence homologous to a yeast chromosome that allows the vector to integrate, and preferably contain two homologous sequences flanking the expression construct. Integrations appear to result from recombinations between homologous DNA in the vector and the yeast chromosome (Orr-Weaver *et al.*, 1983). An integrating vector may be directed to a specific locus in yeast by selecting the appropriate homologous sequence for inclusion in the vector. See Orr-Weaver *et*

al., supra. One or more expression constructs may integrate, possibly affecting levels of recombinant protein produced (Rine *et al.*, 1983).

The present invention also contemplates transformation of a nucleotide sequence of the present invention into a plant to achieve pest inhibitory levels of expression of one or more dsRNA molecules. A transformation vector can be readily prepared using methods available in the art. The transformation vector comprises one or more nucleotide sequences that is/are capable of being transcribed to an RNA molecule and that is/are substantially homologous and/or complementary to one or more nucleotide sequences encoded by the genome of the insect, such that upon uptake of the RNA there is down-regulation of expression of at least one of the respective nucleotide sequences of the genome of the insect.

The transformation vector may be termed a dsDNA construct and may also be defined as a recombinant molecule, an insect control agent, a genetic molecule or a chimeric genetic construct. A chimeric genetic construct of the present invention may comprise, for example, nucleotide sequences encoding one or more antisense transcripts, one or more sense transcripts, one or more of each of the aforementioned, wherein all or part of a transcript therefrom is homologous to all or part of an RNA molecule comprising an RNA sequence encoded by a nucleotide sequence within the genome of an insect.

In one embodiment the plant transformation vector comprises an isolated and purified DNA molecule comprising a promoter operatively linked to one or more nucleotide sequences of the present invention. The nucleotide sequence is selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:906 as set forth in the sequence listing. The nucleotide sequence includes a segment coding all or part of an RNA present within a targeted pest RNA transcript and may comprise inverted repeats of all or a part of a targeted pest RNA. The DNA molecule comprising the expression vector may also contain a functional intron sequence positioned either upstream of the coding sequence or even within the coding sequence, and may also contain a five prime (5') untranslated leader sequence (*i.e.*, a UTR or 5'-UTR) positioned between the promoter and the point of translation initiation.

A plant transformation vector may contain sequences from more than one gene, thus allowing production of more than one dsRNA for inhibiting expression of two or more genes in cells of a target pest. One skilled in the art will readily appreciate that segments of DNA whose sequence corresponds to that present in different genes can be combined into a single composite DNA segment for expression in a transgenic plant. Alternatively, a plasmid of the present invention already containing at least one DNA segment can be modified by the

sequential insertion of additional DNA segments between the enhancer and promoter and terminator sequences. In the insect control agent of the present invention designed for the inhibition of multiple genes, the genes to be inhibited can be obtained from the same insect species in order to enhance the effectiveness of the insect control agent. In certain embodiments, the genes can be derived from different insects in order to broaden the range of insects against which the agent is effective. When multiple genes are targeted for suppression or a combination of expression and suppression, a polycistronic DNA element can be fabricated as illustrated and disclosed in Fillatti, Application Publication No. US 2004-0029283.

Promoters that function in different plant species are also well known in the art. Promoters useful for expression of polypeptides in plants include those that are inducible, viral, synthetic, or constitutive as described in Odell *et al.* (1985), and/or promoters that are temporally regulated, spatially regulated, and spatio-temporally regulated. Preferred promoters include the enhanced CaMV35S promoters, and the FMV35S promoter. For the purpose of the present invention, *e.g.*, for optimum control of species that feed on roots, it may be preferable to achieve the highest levels of expression of these genes within the roots of plants. A number of root-enhanced promoters have been identified and are known in the art (Lu *et al.*, 2000; U.S. Patent No. 5,837,848 and 6,489,542).

A recombinant DNA vector or construct of the present invention will typically comprise a selectable marker that confers a selectable phenotype on plant cells. Selectable markers may also be used to select for plants or plant cells that contain the exogenous nucleic acids encoding polypeptides or proteins of the present invention. The marker may encode biocide resistance, antibiotic resistance (*e.g.*, kanamycin, G418 bleomycin, hygromycin, *etc.*), or herbicide resistance (*e.g.*, glyphosate, *etc.*). Examples of selectable markers include, but are not limited to, a neo gene which codes for kanamycin resistance and can be selected for using kanamycin, G418, *etc.*, a bar gene which codes for bialaphos resistance; a mutant EPSP synthase gene which encodes glyphosate resistance; a nitrilase gene which confers resistance to bromoxynil; a mutant acetolactate synthase gene (ALS) which confers imidazolinone or sulfonylurea resistance; and a methotrexate resistant DHFR gene. Examples of such selectable markers are illustrated in U.S. Patents 5,550,318; 5,633,435; 5,780,708 and 6,118,047.

A recombinant vector or construct of the present invention may also include a screenable marker. Screenable markers may be used to monitor expression. Exemplary screenable markers include a β-glucuronidase or *uid*A gene (GUS) which encodes an enzyme

for which various chromogenic substrates are known (Jefferson, 1987; Jefferson *et al.*, 1987); an R-locus gene, which encodes a product that regulates the production of anthocyanin pigments (red color) in plant tissues (Dellaporta *et al.*, 1988); a β-lactamase gene (Sutcliffe *et al.*, 1978), a gene which encodes an enzyme for which various chromogenic substrates are known (*e.g.*, PADAC, a chromogenic cephalosporin); a luciferase gene (Ow *et al.*, 1986) a *xylE* gene (Zukowsky *et al.*, 1983) which encodes a catechol dioxygenase that can convert chromogenic catechols; an α-amylase gene (Ikatu *et al.*, 1990); a tyrosinase gene (Katz *et al.*, 1983) which encodes an enzyme capable of oxidizing tyrosine to DOPA and dopaquinone which in turn condenses to melanin; an α -galactosidase, which catalyzes a chromogenic α-galactose substrate.

Preferred plant transformation vectors include those derived from a Ti plasmid of Agrobacterium tumefaciens (*e.g.* U.S. Patent Nos. 4,536,475, 4,693,977, 4,886,937, 5,501,967 and EP 0 122 791). *Agrobacterium rhizogenes* plasmids (or "Ri") are also useful and known in the art. Other preferred plant transformation vectors include those disclosed, *e.g.*, by Herrera-Estrella (1983); Bevan (1983), Klee (1985) and EP 0 120 516.

In general it is preferred to introduce a functional recombinant DNA at a non-specific location in a plant genome. In special cases it may be useful to insert a recombinant DNA construct by site-specific integration. Several site-specific recombination systems exist which are known to function implants include cre-lox as disclosed in U.S. Patent 4,959,317 and FLP-FRT as disclosed in U.S. Patent 5,527,695.

Suitable methods for transformation of host cells for use with the current invention are believed to include virtually any method by which DNA can be introduced into a cell, such as by direct delivery of DNA such as by PEG-mediated transformation of protoplasts (Omirulleh *et al.*, 1993), by desiccation/inhibition-mediated DNA uptake (Potrykus *et al.*, 1985), by electroporation (U.S. Patent No. 5,384,253), by agitation with silicon carbide fibers (Kaeppler *et al.*, 1990; U.S. Patent No. 5,302,523; and U.S. Patent No. 5,464,765), by Agrobacterium-mediated transformation (U.S. Patent No. 5,591,616 and U.S. Patent No. 5,563,055) and by acceleration of DNA coated particles (U.S. Patent No. 5,550,318; U.S. Patent No. 5,538,877; and U.S. Patent No. 5,538,880), etc. Through the application of techniques such as these, the cells of virtually any species may be stably transformed. In the case of multicellular species, the transgenic cells may be regenerated into transgenic organisms.

Methods for the creation of transgenic plants and expression of heterologous nucleic acids in plants in particular are known and may be used with the nucleic acids provided herein to prepare transgenic plants that exhibit reduced susceptibility to feeding by a target pest organism such as corn rootworms. Plant transformation vectors can be prepared, for example, by inserting the dsRNA producing nucleic acids disclosed herein into plant transformation vectors and introducing these into plants. One known vector system has been derived by modifying the natural gene transfer system of *Agrobacterium tumefaciens*. The natural system comprises large Ti (tumor-inducing)-plasmids containing a large segment, known as T-DNA, which is transferred to transformed plants. Another segment of the Ti plasmid, the vir region, is responsible for T-DNA transfer. The T-DNA region is bordered by terminal repeats. In the modified binary vectors the tumor-inducing genes have been deleted and the functions of the vir region are utilized to transfer foreign DNA bordered by the T-DNA border sequences. The T-region may also contain a selectable marker for efficient recovery of transgenic plants and cells, and a multiple cloning site for inserting sequences for transfer such as a dsRNA encoding nucleic acid.

A transgenic plant formed using *Agrobacterium* transformation methods typically contains a single simple recombinant DNA sequence inserted into one chromosome and is referred to as a transgenic event. Such transgenic plants can be referred to as being heterozygous for the inserted exogenous sequence. A transgenic plant homozygous with respect to a transgene can be obtained by selfing an independent segregant transgenic plant to produce F1 seed. One fourth of the F1 seed produced will be homozygous with respect to the transgene. Germinating F1 seed results in plants that can be tested for heterozygosity or homozygosity, typically using a SNP assay or a thermal amplification assay that allows for the distinction between heterozygotes and homozygotes (*i.e.*, a zygosity assay).

C. Nucleic Acid Expression and Target Gene Suppression

The present invention provides, as an example, a transformed host or symbiont pest target organism, transformed plant cells and transformed plants and their progeny. The transformed plant cells and transformed plants may be engineered to express one or more of the dsRNA or siRNA sequences described herein to provide a pest-protective effect. These sequences may be used for gene suppression in a pest organism, thereby reducing the predation by the pest on a protected transformed host or symbiont organism. As used herein the words "gene suppression" are intended to refer to any of the well-known methods for

reducing the levels of gene transcription to mRNA and/or subsequent translation of the mRNA.

Gene suppression is also intended to mean the reduction of protein expression from a gene or a coding sequence including posttranscriptional gene suppression and transcriptional suppression. Posttranscriptional gene suppression is mediated by the homology between of all or a part of a mRNA transcribed from a gene or coding sequence targeted for suppression and the corresponding double stranded RNA used for suppression, and refers to the substantial and measurable reduction of the amount of available mRNA available in the cell for binding by ribosomes. The transcribed RNA can be in the sense orientation to effect what is called co-suppression, in the anti-sense orientation to effect what is called anti-sense suppression, or in both orientations producing a dsRNA to effect what is called RNA interference (RNAi).

Transcriptional suppression is mediated by the presence in the cell of a dsRNA gene suppression agent exhibiting substantial sequence identity to a promoter DNA sequence or the complement thereof to effect what is referred to as promoter *trans* suppression. Gene suppression may be effective against a native plant gene associated with a trait, *e.g.*, to provide plants with reduced levels of a protein encoded by the native gene or with enhanced or reduced levels of an affected metabolite. Gene suppression can also be effective against target genes in plant pests that may ingest or contact plant material containing gene suppression agents, specifically designed to inhibit or suppress the expression of one or more homologous or complementary sequences in the cells of the pest. Post-transcriptional gene suppression by anti-sense or sense oriented RNA to regulate gene expression in plant cells is disclosed in U.S. Pat. Nos. 5,107,065, 5,759,829, 5,283,184, and 5,231,020. The use of dsRNA to suppress genes in plants is disclosed in WO 99/53050, WO 99/49029, U.S. Patent Application Publication No. 2003/0175965, and 2003/0061626, U.S. Patent Application No.10/465,800, and U.S. Patent Nos. 6,506,559, and 6,326,193.

A beneficial method of post transcriptional gene suppression in plants employs both sense-oriented and anti-sense-oriented, transcribed RNA which is stabilized, *e.g.*, as a hairpin and stem and loop structure. A preferred DNA construct for effecting post transcriptional gene suppression is one in which a first segment encodes an RNA exhibiting an anti-sense orientation exhibiting substantial identity to a segment of a gene targeted for suppression, which is linked to a second segment in sense orientation encoding an RNA exhibiting substantial complementarity to the first segment. Such a construct forms a stem and loop structure by hybridization of the first segment with the second segment and a loop structure

from the nucleotide sequences linking the two segments (see WO94/01550, WO98/05770, US 2002/0048814, and US 2003/0018993).

According to one embodiment of the present invention, there is provided a nucleotide sequence, for which *in vitro* expression results in transcription of a stabilized RNA sequence that is substantially homologous to an RNA molecule of a targeted gene in an insect that comprises an RNA sequence encoded by a nucleotide sequence within the genome of the insect. Thus, after the insect ingests the stabilized RNA sequence incorporated in a diet or sprayed on a plant surface, a down-regulation of the nucleotide sequence corresponding to the target gene in the cells of a target insect is affected.

Inhibition of a target gene using the stabilized dsRNA technology of the present invention is sequence-specific in that nucleotide sequences corresponding to the duplex region of the RNA are targeted for genetic inhibition. RNA containing a nucleotide sequences identical to a portion of the target gene is preferred for inhibition. RNA sequences with insertions, deletions, and single point mutations relative to the target sequence have also been found to be effective for inhibition. In performance of the present invention, it is preferred that the inhibitory dsRNA and the portion of the target gene share at least from about 80% sequence identity, or from about 90% sequence identity, or from about 95% sequence identity, or from about 99% sequence identity, or even about 100% sequence identity. Alternatively, the duplex region of the RNA may be defined functionally as a nucleotide sequence that is capable of hybridizing with a portion of the target gene transcript. A less than full length sequence exhibiting a greater homology compensates for a longer less homologous sequence. The length of the identical nucleotide sequences may be at least about 25, 50, 100, 200, 300, 400, 500 or at least about 1000 bases. Normally, a sequence of greater than 20-100 nucleotides should be used, though a sequence of greater than about 200-300 nucleotides would be preferred, and a sequence of greater than about 500-1000 nucleotides would be especially preferred depending on the size of the target gene. The invention has the advantage of being able to tolerate sequence variations that might be expected due to genetic mutation, strain polymorphism, or evolutionary divergence. The introduced nucleic acid molecule may not need to be absolute homology, may not need to be full length, relative to either the primary transcription product or fully processed mRNA of the target gene. Therefore, those skilled in the art need to realize that, as disclosed herein, 100% sequence identity between the RNA and the target gene is not required to practice the present invention.

Inhibition of target gene expression may be quantified by measuring either the endogenous target RNA or the protein produced by translation of the target RNA and the consequences of inhibition can be confirmed by examination of the outward properties of the cell or organism. Techniques for quantifying RNA and proteins are well known to one of ordinary skill in the art. Multiple selectable markers are available that confer resistance to ampicillin, bleomycin, chloramphenicol, gentamycin, hygromycin, kanamycin, lincomycin, methotrexate, phosphinothricin, puromycin, spectinomycin, rifampicin, and tetracyclin, and the like.

In certain embodiments gene expression is inhibited by at least 10%, preferably by at least 33%, more preferably by at least 50%, and yet more preferably by at least 80%. In particularly preferred embodiments of the invention gene expression is inhibited by at least 80%, more preferably by at least 90%, more preferably by at least 95%, or by at least 99% within cells in the insect so a significant inhibition takes place. Significant inhibition is intended to refer to sufficient inhibition that results in a detectable phenotype (*e.g.*, cessation of larval growth, paralysis or mortality, *etc.*) or a detectable decrease in RNA and/or protein corresponding to the target gene being inhibited. Although in certain embodiments of the invention inhibition occurs in substantially all cells of the insect, in other preferred embodiments inhibition occurs in only a subset of cells expressing the gene. For example, if the gene to be inhibited plays an essential role in cells in the insect alimentary tract, inhibition of the gene within these cells is sufficient to exert a deleterious effect on the insect.

dsRNA molecules may be synthesized either *in vivo* or *in vitro*. The dsRNA may be formed by a single self-complementary RNA strand or from two complementary RNA strands. Endogenous RNA polymerase of the cell may mediate transcription *in vivo*, or cloned RNA polymerase can be used for transcription *in vivo* or *in vitro*. Inhibition may be targeted by specific transcription in an organ, tissue, or cell type; stimulation of an environmental condition (*e.g.*, infection, stress, temperature, chemical inducers); and/or engineering transcription at a developmental stage or age. The RNA strands may or may not be polyadenylated; the RNA strands may or may not be capable of being translated into a polypeptide by a cell's translational apparatus.

A RNA, dsRNA, siRNA, or miRNA of the present invention may be produced chemically or enzymatically by one skilled in the art through manual or automated reactions or *in vivo* in another organism. RNA may also be produced by partial or total organic synthesis; any modified ribonucleotide can be introduced by *in vitro* enzymatic or organic synthesis. The RNA may be synthesized by a cellular RNA polymerase or a bacteriophage

RNA polymerase (*e.g.*, T3, T7, SP6). The use and production of an expression construct are known in the art (see, for example, WO 97/32016; U.S. Pat. No's. 5,593, 874, 5,698,425, 5,712,135, 5,789,214, and 5,804,693). If synthesized chemically or by *in vitro* enzymatic synthesis, the RNA may be purified prior to introduction into the cell. For example, RNA can be purified from a mixture by extraction with a solvent or resin, precipitation, electrophoresis, chromatography, or a combination thereof. Alternatively, the RNA may be used with no or a minimum of purification to avoid losses due to sample processing. The RNA may be dried for storage or dissolved in an aqueous solution. The solution may contain buffers or salts to promote annealing, and/or stabilization of the duplex strands.

For transcription from a transgene *in vivo* or an expression construct, a regulatory region (*e.g.*, promoter, enhancer, silencer, and polyadenylation) may be used to transcribe the RNA strand (or strands). Therefore, in one embodiment, the nucleotide sequences for use in producing RNA molecules may be operably linked to one or more promoter sequences functional in a microorganism, a fungus or a plant host cell. Ideally, the nucleotide sequences are placed under the control of an endogenous promoter, normally resident in the host genome. The nucleotide sequence of the present invention, under the control of an operably linked promoter sequence, may further be flanked by additional sequences that advantageously affect its transcription and/or the stability of a resulting transcript. Such sequences are generally located upstream of the operably linked promoter and/or downstream of the 3' end of the expression construct and may occur both upstream of the promoter and downstream of the 3' end of the expression construct, although such an upstream sequence only is also contemplated.

As used herein, the term "insect control agent", or "gene suppression agent" refers to a particular RNA molecule comprising a first RNA segment and a second RNA segment, wherein the complementarity between the first and the second RNA segments results in the ability of the two segments to hybridize *in vivo* and *in vitro* to form a double stranded molecule. It may generally be preferable to include a third RNA segment linking and stabilizing the first and second sequences such that the entire structure forms into a stem and loop structure, or even more tightly hybridizing structures may form into a stem-loop knotted structure. Alternatively, a symmetrical hairpin could be formed without a third segment in which there is no designed loop, but for steric reasons a hairpin would create its own loop when the stem is long enough to stabilize itself. The first and the second RNA segments will generally lie within the length of the RNA molecule and be substantially inverted repeats of each other and linked together by the third RNA segment. The first and the second segments

correspond invariably and not respectively to a sense and an antisense sequence with respect to the target RNA transcribed from the target gene in the target insect pest that is suppressed by the ingestion of the dsRNA molecule. The insect control agent can also be a substantially purified (or isolated) nucleic acid molecule and more specifically nucleic acid molecules or nucleic acid fragment molecules thereof from a genomic DNA (gDNA) or cDNA library. Alternatively, the fragments may comprise smaller oligonucleotides having from about 15 to about 250 nucleotide residues, and more preferably, about 15 to about 30 nucleotide residues.

As used herein, the term "genome" as it applies to cells of an insect or a host encompasses not only chromosomal DNA found within the nucleus, but organelle DNA found within subcellular components of the cell. The DNA's of the present invention introduced into plant cells can therefore be either chromosomally integrated or organelle-localized. The term "genome" as it applies to bacteria encompasses both the chromosome and plasmids within a bacterial host cell. The DNA's of the present invention introduced into bacterial host cells can therefore be either chromosomally integrated or plasmid-localized.

As used herein, the term "pest" refers to insects, arachnids, crustaceans, fungi, bacteria, viruses, nematodes, flatworms, roundworms, pinworms, hookworms, tapeworms, trypanosomes, schistosomes, botflies, fleas, ticks, mites, and lice and the like that are pervasive in the human environment and that may ingest or contact one or more cells, tissues, or fluids produced by a pest host or symbiont transformed to express or coated with a double stranded gene suppression agent or that may ingest plant material containing the gene suppression agent. As used herein, a "pest resistance" trait is a characteristic of a transgenic plant, transgenic animal, transgenic host or transgenic symbiont that causes the plant, animal, host, or symbiont to be resistant to attack from a pest that typically is capable of inflicting damage or loss to the plant, animal, host or symbiont. Such pest resistance can arise from a natural mutation or more typically from incorporation of recombinant DNA that confers pest resistance. To impart insect resistance to a transgenic plant a recombinant DNA can, for example, be transcribed into a RNA molecule that forms a dsRNA molecule within the tissues or fluids of the recombinant plant. The dsRNA molecule is comprised in part of a segment of RNA that is identical to a corresponding RNA segment encoded from a DNA sequence within an insect pest that prefers to feed on the recombinant plant. Expression of the gene within the target insect pest is suppressed by the dsRNA, and the suppression of expression of the gene in the target insect pest results in the plant being insect resistant. Fire *et al.* (U.S. Patent No. 6,506,599) generically described inhibition of pest infestation, providing specifics only about several nucleotide sequences that were effective for inhibition

of gene function in the nematode species *Caenorhabditis elegans*. Similarly, Plaetinck *et al.* (US 2003/0061626) describe the use of dsRNA for inhibiting gene function in a variety of nematode pests. Mesa *et al.* (US 2003/0150017) describe using dsDNA sequences to transform host cells to express corresponding dsRNA sequences that are substantially identical to target sequences in specific pathogens, and particularly describe constructing recombinant plants expressing such dsRNA sequences for ingestion by various plant pests, facilitating down-regulation of a gene in the genome of the pest and improving the resistance of the plant to the pest infestation.

The present invention provides for inhibiting gene expression of one or multiple target genes in a target pest using stabilized dsRNA methods. The invention is particularly useful in the modulation of eukaryotic gene expression, in particular the modulation of expression of genes present in pests that exhibit a digestive system pH level that is from about 4.5 to about 9.5, more preferably from about 5.0 to about 8.0, and even more preferably from about 6.5 to about 7.5. For plant pests with a digestive system that exhibits pH levels outside of these ranges, delivery methods may be desired for use that do not require ingestion of dsRNA molecules.

The modulatory effect of dsRNA is applicable to a variety of genes expressed in the pests including, for example, endogenous genes responsible for cellular metabolism or cellular transformation, including house keeping genes, transcription factors and other genes which encode polypeptides involved in cellular metabolism.

As used herein, the phrase "inhibition of gene expression" or "inhibiting expression of a target gene in the cell of an insect" refers to the absence (or observable decrease) in the level of protein and/or mRNA product from the target gene. Specificity refers to the ability to inhibit the target gene without manifest effects on other genes of the cell and without any effects on any gene within the cell that is producing the dsRNA molecule. The inhibition of gene expression of the target gene in the insect pest may result in novel phenotypic traits in the insect pest.

The present invention provides in part a delivery system for the delivery of the insect control agents to insects through their exposure to a diet containing the insect control agents of the present invention. In accordance with one of the embodiments, the stabilized dsRNA or siRNA molecules may be incorporated in the insect diet or may be overlaid on the top of the diet for consumption by an insect. The present invention also provides in part a delivery system for the delivery of the insect control agents to insects through their exposure to a microorganism or host such as a plant containing the insect control agents of the present

invention by ingestion of the microorganism or the host cells or the contents of the cells. In accordance with another embodiment, the present invention involves generating a transgenic plant cell or a plant that contains a recombinant DNA construct transcribing the stabilized dsRNA molecules of the present invention. As used herein, the phrase "generating a transgenic plant cell or a plant" refers to the methods of employing the recombinant DNA technologies readily available in the art (*e.g.*, by Sambrook, *et al.*, 1989) to construct a plant transformation vector transcribing the stabilized dsRNA molecules of the present invention, to transform the plant cell or the plant and to generate the transgenic plant cell or the transgenic plant that contain the transcribed, stabilized dsRNA molecules.

In still another embodiment, non-pathogenic, attenuated strains of microorganisms may be used as a carrier for the insect control agents and, in this perspective, the microorganisms carrying such agents are also referred to as insect control agents. The microorganisms may be engineered to express a nucleotide sequence of a target gene to produce RNA molecules comprising RNA sequences homologous or complementary to RNA sequences typically found within the cells of an insect. Exposure of the insects to the microorganisms result in ingestion of the microorganisms and down-regulation of expression of target genes mediated directly or indirectly by the RNA molecules or fragments or derivatives thereof.

The present invention alternatively provides exposure of an insect to the insect control agents of the present invention incorporated in a spray mixer and applied to the surface of a host, such as a host plant. In an exemplary embodiment, ingestion of the insect control agents by an insect delivers the insect control agents to the gut of the insect and subsequently to the cells within the body of the insect. In another embodiment, infection of the insect by the insect control agents through other means such as by injection or other physical methods also permits delivery of the insect control agents. In yet another embodiment, the RNA molecules themselves are encapsulated in a synthetic matrix such as a polymer and applied to the surface of a host such as a plant. Ingestion of the host cells by an insect permits delivery of the insect control agents to the insect and results in down-regulation of a target gene in the host.

It is envisioned that the compositions of the present invention can be incorporated within the seeds of a plant species either as a product of expression from a recombinant gene incorporated into a genome of the plant cells, or incorporated into a coating or seed treatment that is applied to the seed before planting. The plant cell containing a recombinant gene is considered herein to be a transgenic event.

It is believed that a pesticidal seed treatment can provide significant advantages when combined with a transgenic event that provides protection from coleopteran pest infestation that is within the preferred effectiveness range against a target pest. In addition, it is believed that there are situations that are well known to those having skill in the art, where it is advantageous to have such transgenic events within the preferred range of effectiveness.

The present invention provides in part a delivery system for the delivery of insect control agents to insects. The stabilized dsRNA or siRNA molecules of the present invention may be directly introduced into the cells of an insect, or introduced into an extracellular cavity, interstitial space, lymph system, digestive system, into the circulation of the insect through oral ingestion or other means that one skilled in the art may employ. Methods for oral introduction may include direct mixing of RNA with food of the insect, as well as engineered approaches in which a species that is used as food is engineered to express the dsRNA or siRNA, then fed to the insect to be affected. In one embodiment, for example, the dsRNA or siRNA molecules may be incorporated into, or overlaid on the top of, the insect's diet. In another embodiment, the RNA may be sprayed onto a plant surface. In still another embodiment, the dsRNA or siRNA may be expressed by microorganisms and the microorganisms may be applied onto a plant surface or introduced into a root, stem by a physical means such as an injection. In still another embodiment, a plant may be genetically engineered to express the dsRNA or siRNA in an amount sufficient to kill the insects known to infect the plant.

Specifically, in practicing the present invention in WCR, the stabilized dsRNA or siRNA may be introduced in the midgut inside the insect and achieve the desired inhibition of the targeted genes. The dsRNA or siRNA molecules may be incorporated into a diet or be overlaid on the diet as discussed above and may be ingested by the insects. In any event, the dsRNA's of the present invention are provided in the diet of the target pest. The target pest of the present invention will exhibit a digestive tract pH from about 4.5 to about 9.5, or from about 5 to about 8.5, or from about 6 to about 8, or from about 6.5 to about 7.7, or about 7.0. The digestive tract of a target pest is defined herein as the location within the pest that food that is ingested by the target pest is exposed to an environment that is favorable for the uptake of the dsRNA molecules of the present invention without suffering a pH so extreme that the hydrogen bonding between the double-strands of the dsRNA are caused to dissociate and form single stranded molecules.

It is also anticipated that dsRNA's produced by chemical or enzymatic synthesis may be formulated in a manner consistent with common agricultural practices and used as spray-

on products for controlling insect infestations. The formulations may include the appropriate stickers and wetters required for efficient foliar coverage as well as UV protectants to protect dsRNAs from UV damage. Such additives are commonly used in the bioinsecticide industry and are well known to those skilled in the art. Such applications could be combined with other spray-on insecticide applications, biologically based or not, to enhance plant protection from insect feeding damage.

The present inventors contemplate that bacterial strains producing insecticidal proteins may be used to produce dsRNAs for insect control purposes. These strains may exhibit improved insect control properties. A variety of different bacterial hosts may be used to produce insect control dsRNAs. Exemplary bacteria may include *E. coli*, *B. thuringiensis*, *Pseudomonas sp.*, *Photorhabdus sp.*, *Xenorhabdus sp.*, *Serratia entomophila* and related *Serratia sp.*, *B. sphaericus*, *B. cereus*, *B. laterosporus*, *B. popilliae*, *Clostridium bifermentans* and other *Clostridium* species, or other spore-forming gram-positive bacteria. In certain embodiments, bacteria may be engineered for control of pests such as mosquitoes.

The present invention also relates to recombinant DNA constructs for expression in a microorganism. Exogenous nucleic acids from which an RNA of interest is transcribed can be introduced into a microbial host cell, such as a bacterial cell or a fungal cell, using methods known in the art.

The nucleotide sequences of the present invention may be introduced into a wide variety of prokaryotic and eukaryotic microorganism hosts to produce the stabilized dsRNA or siRNA molecules. The term "microorganism" includes prokaryotic and eukaryotic microbial species such as bacteria, fungi and algae. Fungi include yeasts and filamentous fungi, among others. Illustrative prokaryotes, both Gram-negative and Gram-positive, include *Enterobacteriaceae*, such as *Escherichia*, *Erwinia*, *Shigella*, *Salmonella*, and *Proteus*; *Bacillaceae*; *Rhizobiceae*, such as *Rhizobium*; *Spirillaceae*, such as photobacterium, *Zymomonas*, *Serratia*, *Aeromonas*, *Vibrio*, *Desulfovibrio*, *Spirillum*; *Lactobacillaceae*; *Pseudomonadaceae*, such as *Pseudomonas* and *Acetobacter*; *Azotobacteraceae*, *Actinomycetales*, and *Nitrobacteraceae*. Among eukaryotes are fungi, such as *Phycomycetes* and *Ascomycetes*, which includes yeast, such as *Saccharomyces* and *Schizosaccharomyces*; and *Basidiomycetes*, such as *Rhodotorula*, *Aureobasidium*, *Sporobolomyces*, and the like.

For the purpose of plant protection against insects, a large number of microorganisms known to inhabit the phylloplane (the surface of the plant leaves) and/or the rhizosphere (the soil surrounding plant roots) of a wide variety of important crops may also be desirable host cells for manipulation, propagation, storage, delivery and/or mutagenesis of the disclosed

recombinant constructs. These microorganisms include bacteria, algae, and fungi. Of particular interest are microorganisms, such as bacteria, *e.g.*, genera *Bacillus* (including the species and subspecies *B. thuringiensis kurstaki HD-1*, *B. thuringiensis kurstaki HD-73*, *B. thuringiensis sotto*, *B. thuringiensis berliner*, B. *thuringiensis thuringiensis*, *B. thuringiensis tolworthi*, *B. thuringiensis dendrolimus*, *B. thuringiensis alesti*, *B. thuringiensis galleriae*, *B. thuringiensis aizawai*, *B. thuringiensis subtoxicus*, *B. thuringiensis entomocidus*, *B. thuringiensis tenebrionis* and *B. thuringiensis san diego); Pseudomonas*, *Erwinia*, *Serratia*, *Klebsiella*, *Zanthomonas*, *Streptomyces*, *Rhizobium*, *Rhodopseudomonas*, *Methylophilius*, *Agrobacterium*, *Acetobacter*, *Lactobacillus*, *Arthrobacter*, *Azotobacter*, *Leuconostoc*, and *Alcaligenes;* fungi, particularly yeast, *e.g.*, genera *Saccharomyces*, *Cryptococcus*, *Kluyveromyces*, *Sporobolomyces*, *Rhodotorula*, and *Aureobasidium.* Of particular interest are such phytosphere bacterial species as *Pseudomonas syringae*, *Pseudomonas fluorescens*, *Serratia marcescens*, *Acetobacter xylinum*, *Agrobacterium tumefaciens*, *Rhodobacter sphaeroides*, *Xanthomonas campestris*, *Rhizobium melioti*, *Alcaligenes eutrophus*, and *Azotobacter vinlandii;* and phytosphere yeast species such as *Rhodotorula rubra*, *R. glutinis*, *R. marina*, *R. aurantiaca*, *Cryptococcus albidus*, *C. diffluens*, *C. laurentii*, *Saccharomyces rosei*, *S. pretoriensis*, *S. cerevisiae*, *Sporobolomyces roseus*, *S. odorus*, *Kluyveromyces veronae*, and *Aureobasidium pollulans.*

D. Transgenic Plants

The present invention provides seeds and plants having one or more transgenic event. Combinations of events are referred to as "stacked" transgenic events. These stacked transgenic events can be events that are directed at the same target pest, or they can be directed at different target pests. In one embodiment, a seed having the ability to express a nucleic acid provided herein also has the ability to express at least one other insecticidal agent, including, but not limited to, an RNA molecule the sequence of which is derived from the sequence of an RNA expressed in a target pest and that forms a double stranded RNA structure upon expressing in the seed or cells of a plant grown from the seed, wherein the ingestion of one or more cells of the plant by the target pest results in the suppression of expression of the RNA in the cells of the target pest.

In certain embodiments, a seed having the ability to express a dsRNA the sequence of which is derived from a target pest also has a transgenic event that provides herbicide tolerance. One beneficial example of a herbicide tolerance gene provides resistance to

glyphosate, N- (phosphonomethyl) glycine, including the isopropylamine salt form of such herbicide.

In the present method, combination of expression of an insecticidal amount of a dsRNA within the cells of a transgenic seed or plant grown from the seed coupled with treatment of the seed or plant with certain chemical or protein pesticides may be used to provide unexpected synergistic advantages, including unexpectedly superior efficacy for protection against damage to the resulting transgenic plant by the target pest. In particular embodiments, treatment of a transgenic seed that is capable of expressing certain constructs that form dsRNA molecules, the sequence of which are derived from one or more sequences expressed in a corn rootworm, with from about 100 gm to about 400 gm of pesticide per 100 kg of seed provides unexpectedly superior protection against corn rootworm. In addition, it is believed that such combinations are also effective to protect the emergent plants against predation by other pests. The seeds of the present invention may also be used to decrease the cost of pesticide use, because less pesticide can be used to obtain a required amount of protection than when such methods are not used. Moreover, because less pesticide is used and because it is applied prior to planting and without a separate field application, it is believed that the subject method is therefore safer to the operator and to the environment, and is potentially less expensive than conventional methods.

By "synergistic" it is meant to include the synergistic effects of the combination on the pesticidal activity (or efficacy) of the combination of the transgenic event and the pesticide. However, it is not intended that such synergistic effects be limited to the pesticidal activity, but that they should also include such unexpected advantages as increased scope of activity, advantageous activity profile as related to type and amount of damage reduction, decreased cost of pesticide and application, decreased pesticide distribution in the environment, decreased pesticide exposure of personnel who produce, handle and plant corn seeds, and other advantages known to those skilled in the art.

Pesticides and insecticides that are useful in compositions in combination with the methods and compositions of the present invention, including as seed treatments and coatings as well as methods for using such compositions can be found, for example, in U.S. Patent 6,551,962, the entirety of which is incorporated herein by reference.

Although it is believed that the seed treatments can be applied to a transgenic seed in any physiological state, it may be preferred that the seed be in a sufficiently durable state that it incurs no damage during the treatment process. Typically, the seed would be a seed that had been harvested from the field; removed from the transgenic plant; and separated from any

other non-seed plant material. The seed would preferably also be biologically stable to the extent that the treatment would cause no biological damage to the seed. In one embodiment, for example, the treatment can be applied to seed corn that has been harvested, cleaned and dried to a moisture content below about 15% by weight. In an alternative embodiment, the seed can be one that has been dried and then primed with water and/or another material and then re-dried before or during the treatment with the pesticide. Within the limitations described, it is believed that the treatment can be applied to the seed at any time between harvest of the seed and sowing of the seed. As used herein, the term "unsown seed" is meant to include seed at any period between the harvest of the seed and the sowing of the seed in the ground for the purpose of germination and growth of the plant. When it is said that unsown seed is "treated" with the pesticide, such treatment is not meant to include those practices in which the pesticide is applied to the soil, rather than to the seed. For example, such treatments as the application of the pesticide in bands, "T"-bands, or in-furrow, at the same time as the seed is sowed are not considered to be included in the present invention.

The pesticide, or combination of pesticides, can be applied "neat", that is, without any diluting or additional components present. However, the pesticide is typically applied to the seeds in the form of a pesticide formulation. This formulation may contain one or more other desirable components including but not limited to liquid diluents, binders to serve as a matrix for the pesticide, fillers for protecting the seeds during stress conditions, and plasticizers to improve flexibility, adhesion and/or spreadability of the coating.

The subject pesticides can be applied to a seed as a component of a seed coating. Seed coating methods and compositions that are known in the art are useful when they are modified by the addition of one of the embodiments of the combination of pesticides of the present invention. Such coating methods and apparatus for their application are disclosed in, for example, U.S. Patent Nos. 5,918,413, 5,891,246, 5,554,445, 5,389,399, 5,107,787, 5,080,925, 4,759,945 and 4,465,017. Seed coating compositions are disclosed, for example, in U.S. Patent Nos. 5,939,356, 5,882,713, 5,876,739, 5,849,320, 5,834,447, 5,791,084, 5,661,103, 5,622,003, 5,580,544, 5,328,942, 5,300,127, 4,735,015, 4,634,587, 4,383,391, 4,372,080, 4,339,456, 4,272,417 and 4,245,432, among others.

The pesticides that are useful in the coating are those pesticides that are described herein. The amount of pesticide that is used for the treatment of the seed will vary depending upon the type of seed and the type of active ingredients, but the treatment will comprise contacting the seeds with an amount of the combination of pesticides that is pesticidally effective. When insects are the target pest, that amount will be an amount of the insecticide

that is insecticidally effective. As used herein, an insecticidally effective amount means that amount of insecticide that will kill insect pests in the larvae or pupal state of growth, or will consistently reduce or retard the amount of damage produced by insect pests.

In general, the amount of pesticide that is applied to the seed in the treatment will range from about 10 gm to about 2000 gm of the active ingredient of the pesticide per 100 kg of the weight of the seed. Preferably, the amount of pesticide will be within the range of about 50 gm to about 1000 gm active per 100 kg of seed, more preferably within the range of about 100 gm to about 600 gm active per 100 kg of seed, and even more preferably within the range of about 200 gm to about 500 gm of active per 100 kg of seed weight. Alternatively, it has been found to be preferred that the amount of the pesticide be over about 60 gm of the active ingredient of the pesticide per 100 kg of the seed, and more preferably over about 80 gm per 100 kg of seed.

The pesticides that are used in the treatment must not inhibit germination of the seed and should be efficacious in protecting the seed and/or the plant during that time in the target insect's life cycle in which it causes injury to the seed or plant. In general, the coating will be efficacious for approximately 0 to 120 days after sowing. The pesticides of the subject invention can be applied to the seed in the form of a coating.

Benefits provided by the present invention may include, but are not limited to: the ease of introducing dsRNA into the insect cells, the low concentration of dsRNA which can be used, the stability of dsRNA, and the effectiveness of the inhibition. The ability to use a low concentration of a stabilized dsRNA avoids several disadvantages of anti-sense interference. The present invention is not limited to *in vitro* use or to specific sequence compositions, to a particular set of target genes, a particular portion of the target gene's nucleotide sequence, or a particular transgene or to a particular delivery method, as opposed to the some of the available techniques known in the art, such as antisense and co-suppression. Furthermore, genetic manipulation becomes possible in organisms that are not classical genetic models.

In practicing the present invention, selections can be carried out to ensure that the presence of the nucleotide sequences that are transcribed from the recombinant construct are not harmful to non-pest cells. This can be achieved by targeting genes that exhibit a low degree of sequence identity with corresponding genes in a plant or a vertebrate animal. Preferably the degree of the sequence identity is less than approximately 80%. More preferably the degree of the sequence identity is less than approximately 70%. Most preferably the degree of the sequence identity is less than approximately 60%.

In addition to direct transformation of a plant with a recombinant DNA construct, transgenic plants can be prepared by crossing a first plant having a recombinant DNA construct with a second plant lacking the construct. For example, recombinant DNA for gene suppression can be introduced into first plant line that is amenable to transformation to produce a transgenic plant that can be crossed with a second plant line to introgress the recombinant DNA for gene suppression into the second plant line.

The present invention can be, in practice, combined with other insect control traits in a plant to achieve desired traits for enhanced control of insect infestation. Combining insect control traits that employ distinct modes-of-action can provide insect-protected transgenic plants with superior durability over plants harboring a single insect control trait because of the reduced probability that resistance will develop in the field.

The mechanism of insecticidal activity of *B. thuringiensis* crystal proteins has been studied extensively in the past decade. It has been shown that the crystal proteins are toxic to the larval form of the insect only after ingestion of the protein. In lepidopteran larvae, an alkaline pH and proteolytic enzymes in the insect mid-gut solubilize the proteins, thereby allowing the release of components that are toxic to the insect. These toxic components disrupt the mid-gut cells, cause the insect to cease feeding, and, eventually, bring about insect death. For this reason, *B. thuringiensis* toxins have proven themselves to be effective and environmentally safe insecticides in dealing with various insect pests. Coleopteran and hemipteran insects, and likely dipteran, lygus and other piercing and sucking insects exhibit a gut pH that is slightly acidic, and so the Bt toxins that are effective against lepidopteran larvae are ineffective against these pests. The slightly acidic pH of the gut of these insects is also believed to be more hospitable to the compositions of the present invention, and without intending to be limited to a particular theory, it is likely that the alkaline pH of the gut of lepidopteran larvae is a contributing reason that prior attempts to exhibit dsRNA efficacy has failed (Fire *et al.* U.S. Patent No. 6,506,559; Mesa *et al.* Patent Publication No. US2003/0150017; Rajagopal *et al.*, 2002; Tabara *et al.*, 1998). It is believed therefore that the dsRNA methods disclosed herein should be preferentially used in compositions and in plants to control coleopteran, dipteran, hemipteran, lygus, and piercing and sucking insects. The methods and compositions set forth herein are particularly useful for targeting genes for suppression in insects exhibiting a gut pH of from about 4.5 to about 9.5, or from about 5.0 to about 9.0, or from about 5.5 to about 8.5, or from about 6.0 to about 8.0, or from about 6.5 to about 7.7, or from about 6.8 to about 7.6, or about 7.0. However, insects and other pest species that exhibit a gut pH of from about 7.5 to about 11.5, or from about 8.0 to about 11.0,

or from about 9.0 to about 10.0, such as lepidopteran insect larvae, are also intended to be within the scope of the present invention. This is particularly true when a dsRNA specific for inhibiting a gene in a lepidopteran larvae is provided in the diet of the larvae along with one or more Bt proteins, that, with respect to the Bt protein would ordinarily be toxic to that lepidopteran larvae when provided at or above a threshold level. The presence of one or more Bt toxins toxic to the same insect species would effectively reduce the gut pH, providing a stable environment for the double stranded RNA molecules to exert their effects in suppressing a target gene in the insect pest.

It is anticipated that the combination of certain stabilized dsRNA constructs with one or more insect control protein genes will result in synergies that enhance the insect control phenotype of a transgenic plant. Insect bioassays employing artificial diet- or whole plant tissue can be used to define dose-responses for larval mortality or growth inhibition using both dsRNAs and insect control proteins. One skilled in the art can test mixtures of dsRNA molecules and insect control proteins in bioassay to identify combinations of actives that are synergistic and desirable for deployment in insect-protected plants (Tabashnik, 1992). Synergy in killing insect pests has been reported between different insect control proteins (for review, see Schnepf *et al.*, 1998). It is anticipated that synergies will exist between certain dsRNAs and between certain dsRNAs and certain insect control proteins.

The invention also relates to commodity products containing one or more of the sequences of the present invention, and produced from a recombinant plant or seed containing one or more of the nucleotide sequences of the present invention are specifically contemplated as embodiments of the present invention. A commodity product containing one or more of the sequences of the present invention is intended to include, but not be limited to, meals, oils, crushed or whole grains or seeds of a plant, or any food product comprising any meal, oil, or crushed or whole grain of a recombinant plant or seed containing one or more of the sequences of the present invention. The detection of one or more of the sequences of the present invention in one or more commodity or commodity products contemplated herein is defacto evidence that the commodity or commodity product is composed of a transgenic plant designed to express one or more of the nucleotides sequences of the present invention for the purpose of controlling insect infestation using dsRNA mediated gene suppression methods.

D. Obtaining Nucleic acids

The present invention provides a method for obtaining a nucleic acid comprising a nucleotide sequence for producing a dsRNA or siRNA. In one embodiment, such a method

comprises: (a) probing a cDNA or gDNA library with a hybridization probe comprising all or a portion of a nucleotide sequence or a homolog thereof from a targeted insect; (b) identifying a DNA clone that hybridizes with the hybridization probe; (c) isolating the DNA clone identified in step (b); and (d) sequencing the cDNA or gDNA fragment that comprises the clone isolated in step (c) wherein the sequenced nucleic acid molecule transcribes all or a substantial portion of the RNA nucleotide acid sequence or a homolog thereof.

In another embodiment, a method of the present invention for obtaining a nucleic acid fragment comprising a nucleotide sequence for producing a substantial portion of a dsRNA or siRNA comprises: (a) synthesizing first and a second oligonucleotide primers corresponding to a portion of one of the nucleotide sequences from a targeted insect; and (b) amplifying a cDNA or gDNA template in a cloning vector using the first and second oligonucleotide primers of step (a) wherein the amplified nucleic acid molecule transcribes a substantial portion of a dsRNA or siRNA of the present invention.

In practicing the present invention, a target gene may be derived from a corn rootworm (CRW), such as a WCR or a SCR, or any insect species that causes damage to the crop plants and subsequent yield losses. It is contemplated that several criteria may be employed in the selection of preferred target genes. The gene is one whose protein product has a rapid turnover rate, so that dsRNA inhibition will result in a rapid decrease in protein levels. In certain embodiments it is advantageous to select a gene for which a small drop in expression level results in deleterious effects for the insect. If it is desired to target a broad range of insect species a gene is selected that is highly conserved across these species. Conversely, for the purpose of conferring specificity, in certain embodiments of the invention, a gene is selected that contains regions that are poorly conserved between individual insect species, or between insects and other organisms. In certain embodiments it may be desirable to select a gene that has no known homologs in other organisms.

As used herein, the term "derived from" refers to a specified nucleotide sequence that may be obtained from a particular specified source or species, albeit not necessarily directly from that specified source or species.

In one embodiment, a gene is selected that is expressed in the insect gut. Targeting genes expressed in the gut avoids the requirement for the dsRNA to spread within the insect. Target genes for use in the present invention may include, for example, those that share substantial homologies to the nucleotide sequences of known gut-expressed genes that encode protein components of the vacuolar and plasma membrane proton V-ATPase (Dow *et al.*, 1997; Dow, 1999). This protein complex is the sole energizer of epithelial ion transport

and is responsible for alkalinization of the midgut lumen. The V-ATPase is also expressed in the Malpighian tubule, an outgrowth of the insect hindgut that functions in fluid balance and detoxification of foreign compounds in a manner analogous to a kidney organ of a mammal. In another embodiment, the V-ATPase may be Vha68-2, or a homolog or ortholog thereof (*e.g.* as found in SEQ ID NO:821).

In another embodiment, a gene is selected that is essentially involved in the growth, development, and reproduction of an insect. Exemplary genes include but are not limited to a CHD3 gene, a ß-tubulin gene, and a gene encoding a protein predicted to be involved in transport. The CHD3 gene in *Drosophila melanogaster* encodes a protein with ATP-dependent DNA helicase activity that is involved in chromatin assembly/disassembly in the nucleus. Similar sequences have been found in diverse organisms such as *Arabidopsis thaliana*, *Caenorhabditis elegans*, and *Saccharomyces cerevisiae*. The beta-tubulin gene family encodes microtubule-associated proteins that are a constituent of the cellular cytoskeleton. Related sequences are found in such diverse organisms as *C. elegans*, and *Manduca sexta*. Proteins predicted to be subunits of the endosomal sorting complex required for transport (ESCRT)-III (Babst *et al.*, 2002), *e.g.* Dv49, are found in diverse organisms including mammals, yeast, and insects such as *D. virgifera*. Another transport-related protein is the β'-coatomer protein, abbreviated as β'Cop, that encodes a product involved in retrograde (Golgi to ER) transport. Similar or predicted sequences have been identified in *C. elegans* and *D. virgifera, e.g.* Dv248 (SEQ ID NO:.

Other target genes for use in the present invention may include, for example, those that play important roles in the viability, growth, development, reproduction and infectivity. These target genes may be one of the house keeping genes, transcription factors and insect specific genes or lethal knockout mutations in *Drosophila*. The target genes for use in the present invention may also be those that are from other organisms, *e.g.*, from a nematode (*e.g.*, *C. elegans*). Additionally, the nucleotide sequences for use in the present invention may also be derived from plant, viral, bacterial or fungal genes whose functions have been established from literature and the nucleotide sequences of which share substantial similarity with the target genes in the genome of an insect. According to one aspect of the present invention for WCR control, the target sequences may essentially be derived from the targeted WCR insect. Some of the exemplary target sequences from cDNA library from WCR that encode *D. virgifera* proteins or fragments thereof which are homologues of known proteins may be found in the Sequence Listing. Nucleic acid molecules from *D. virgifera* encoding

homologs of known proteins are known (Andersen *et al.*, U.S. Patent Application Serial No. 10/205,189).

For the purpose of the present invention, the dsRNA or siRNA molecules may be obtained from the CRW by polymerase chain (PCR™) amplification of a target CRW gene sequences derived from a corn rootworm gDNA or cDNA library or portions thereof. The WCR larvae may be prepared using methods known to the ordinary skilled in the art and DNA/RNA may be extracted. Larvae with various sizes ranging from 1st instars to fully-grown CRWs may be used for the purpose of the present invention for DNA/RNA extraction. Genomic DNA or cDNA libraries generated from WCR may be used for PCR™ amplification for production of the dsRNA or siRNA.

The target genes may be then be PCR™ amplified and sequenced using the methods readily available in the art. One skilled in the art may be able to modify the PCR™ conditions to ensure optimal PCR™ product formation. The confirmed PCR™ product may be used as a template for *in vitro* transcription to generate sense and antisense RNA with the included minimal promoters.

The present inventors contemplate that nucleic acid sequences identified and isolated from any insect species in the insect kingdom may be used in the present invention for control of WCR and another targeted insects. In one aspect of the present invention, the nucleic acid may be derived from a coleopteran species. Specifically, the nucleic acid may be derived from leaf beetles belonging to the genus *Diabrotica* (*Coleoptera, Chrysomelidae*) and more specifically the nucleic acid molecules of the present invention may be derived from species in the virgifera group. Most specifically, the nucleic acid molecules of the present invention may be derived from *Diabrotica virgifera virgifera* LeConte that is normally referred to as WCR. The isolated nucleic acids may be useful, for example, in identifying a target gene and in constructing a recombinant vector that produce stabilized dsRNAs or siRNAs of the present invention for protecting plants from WCR insect infestations.

Therefore, in one embodiment, the present invention comprises isolated and purified nucleotide sequences from WCR or Lygus that may be used as the insect control agents. The isolated and purified nucleotide sequences may comprise those as set forth in the sequence listing.

The nucleic acids from WCR or other insects that may be used in the present invention may also comprise isolated and substantially purified Unigenes and EST nucleic acid molecules or nucleic acid fragment molecules thereof. EST nucleic acid molecules may

encode significant portions of, or indeed most of, the polypeptides. Alternatively, the fragments may comprise smaller oligonucleotides having from about 15 to about 250 nucleotide residues, and more preferably, about 15 to about 30 nucleotide residues. Alternatively, the nucleic acid molecules for use in the present invention may be from cDNA libraries from WCR, or from any other coleopteran pest species.

Nucleic acid molecules and fragments thereof from WCR, or other coleopteran pest species may be employed to obtain other nucleic acid molecules from other species for use in the present invention to produce desired dsRNA and siRNA molecules. Such nucleic acid molecules include the nucleic acid molecules that encode the complete coding sequence of a protein and promoters and flanking sequences of such molecules. In addition, such nucleic acid molecules include nucleic acid molecules that encode for gene family members. Such molecules can be readily obtained by using the above-described nucleic acid molecules or fragments thereof to screen, for instance, cDNA or gDNA libraries obtained from *D. v. virgifera* or other coleopterans, or from *Lygus hesperus*. Methods for forming such libraries are well known in the art.

As used herein, the phrase "coding sequence", "structural nucleotide sequence" or "structural nucleic acid molecule" refers to a nucleotide sequence that is translated into a polypeptide, usually via mRNA, when placed under the control of appropriate regulatory sequences. The boundaries of the coding sequence are determined by a translation start codon at the 5'-terminus and a translation stop codon at the 3'-terminus. A coding sequence can include, but is not limited to, genomic DNA, cDNA, EST and recombinant nucleotide sequences.

The term "recombinant DNA" or "recombinant nucleotide sequence" refers to DNA that contains a genetically engineered modification through manipulation via mutagenesis, restriction enzymes, and the like.

For many of the insects that are potential targets for control by the present invention, there may be limited information regarding the sequences of most genes or the phenotype resulting from mutation of particular genes. Therefore, the present inventors contemplate that selection of appropriate genes from insect pests for use in the present invention may be accomplished through use of information available from study of the corresponding genes in a model organism such in *Drosophila*, in some other insect species, or even in a nematode species, in a fungal species, in a plant species, in which the genes have been characterized. In some cases it will be possible to obtain the sequence of a corresponding gene from a target insect by searching databases such as GenBank using either the name of the gene or the

sequence from, for example, *Drosophila*, another insect, a nematode, a fungus, or a plant from which the gene has been cloned. Once the sequence is obtained, PCR™ may be used to amplify an appropriately selected segment of the gene in the insect for use in the present invention.

In order to obtain a DNA segment from the corresponding gene in an insect species, PCR™ primers may be designed based on the sequence as found in WCR or other insects from which the gene has been cloned. The primers are designed to amplify a DNA segment of sufficient length for use in the present invention. DNA (either genomic DNA or cDNA) is prepared from the insect species, and the PCR™ primers are used to amplify the DNA segment. Amplification conditions are selected so that amplification will occur even if the primers do not exactly match the target sequence. Alternately, the gene (or a portion thereof) may be cloned from a gDNA or cDNA library prepared from the insect pest species, using the WCR gene or another known insect gene as a probe. Techniques for performing PCR™ and cloning from libraries are known. Further details of the process by which DNA segments from target insect pest species may be isolated based on the sequence of genes previously cloned from WCR or other insect species are provided in the Examples. One of ordinary skill in the art will recognize that a variety of techniques may be used to isolate gene segments from insect pest species that correspond to genes previously isolated from other species.

When an insect is the target pest for the present invention, such pests include but are not limited to: from the order Lepidoptera, for example,

Acleris spp., *Adoxophyes spp.*, *Aegeria spp.*, *Agrotis spp.*, *Alabama argillaceae*, *Amylois spp.*, *Anticarsia gemmatalis*, *Archips spp*, *Argyrotaenia spp.*, *Autographa spp.*, *Busseola fusca*, *Cadra cautella*, *Carposina nipponensis*, *Chilo spp.*, *Choristoneura spp.*, *Clysia ambiguella*, *Cnaphalocrocis spp.*, *Cnephasia spp.*, *Cochylis spp.*, *Coleophora spp.*, *Crocidolomia binotalis*, *Cryptophlebia leucotreta*, *Cydia spp.*, *Diatraea spp.*, *Diparopsis castanea*, *Earias spp.*, *Ephestia spp.*, *Eucosma spp.*, *Eupoecilia ambiguella*, *Euproctis spp.*, *Euxoa spp.*, *Grapholita spp.*, *Hedya nubiferana*, *Heliothis spp.*, *Hellula undalis*, *Hyphantria cunea*, *Keiferia lycopersicella*, *Leucoptera scitella*, *Lithocollethis spp.*, *Lobesia botrana*, *Lymantria spp.*, *Lyonetia spp.*, *Malacosoma spp.*, *Mamestra brassicae*, *Manduca sexta*, *Operophtera spp.*, *Ostrinia Nubilalis*, *Pammene spp.*, *Pandemis spp.*, *Panolis flammea*, *Pectinophora gossypiella*, *Phthorimaea operculella*, *Pieris rapae*, *Pieris spp.*, *Plutella xylostella*, *Prays spp.*, *Scirpophaga spp.*, *Sesamia spp.*, *Sparganothis spp.*, *Spodoptera spp.*, *Synanthedon spp.*, *Thaumetopoea spp.*, *Tortrix spp.*, *Trichoplusia ni* and *Yponomeuta spp.*;

from the order *Coleoptera*, for example,

Agriotes spp., *Anthonomus spp.*, *Atomaria linearis*, *Chaetocnema tibialis*, *Cosmopolites spp.*, *Curculio spp.*, *Dermestes spp.*, *Diabrotica spp.*, *Epilachna spp.*, *Eremnus spp.*, *Leptinotarsa decemlineata*, *Lissorhoptrus spp.*, *Melolontha spp.*, *Orycaephilus spp.*, *Otiorhynchus spp.*, *Phlyctinus spp.*, *Popillia spp.*, *Psylliodes spp.*, *Rhizopertha spp.*, *Scarabeidae*, *Sitophilus spp.*, *Sitotroga spp.*, *Tenebrio spp.*, *Tribolium spp.* and *Trogoderma spp.*;

from the order *Orthoptera*, for example,

Blatta spp., *Blattella spp.*, *Gryllotalpa spp.*, *Leucophaea maderae*, *Locusta spp.*, *Periplaneta ssp.*, and *Schistocerca spp.*;

from the order *Isoptera*, for example,

Reticulitemes ssp;

from the order *Psocoptera*, for example,

Liposcelis spp.;

from the order *Anoplura*, for example,

Haematopinus spp., *Linognathus spp.*, *Pediculus spp.*, *Pemphigus spp.* and *Phylloxera spp.*;

from the order *Mallophaga*, for example,

Damalinea spp. and *Trichodectes spp.*;

from the order *Thysanoptera*, for example,

Franklinella spp., *Hercinothrips spp.*, *Taeniothrips spp.*, *Thrips palmi*, *Thrips tabaci* and *Scirtothrips aurantii*;

from the order *Heteroptera*, for example,

Cimex spp., *Distantiella theobroma*, *Dysdercus spp.*, *Euchistus spp.*, *Eurygaster spp.*, *Leptocorisa spp.*, *Nezara spp.*, *Piesma spp.*, *Rhodnius spp.*, *Sahlbergella singularis*, *Scotinophara spp.*, *Triatoma spp.*, *Miridae family spp. such as Lygus hesperus* and *Lygus lineoloris*, *Lygaeidae* family *spp.* such as *Blissus leucopterus*, and *Pentatomidae* family *spp.*;

from the order *Homoptera*, for example,

Aleurothrixus floccosus, *Aleyrodes brassicae*, *Aonidiella spp.*, *Aphididae*, *Aphis spp.*, *Aspidiotus spp.*, *Bemisia tabaci*, *Ceroplaster spp.*, *Chrysomphalus aonidium*, *Chrysomphalus dictyospermi*, *Coccus hesperidum*, *Empoasca spp.*, *Eriosoma larigerum*, *Erythroneura spp.*, *Gascardia spp.*, *Laodelphax spp.*, *Lacanium corni*, *Lepidosaphes spp.*, *Macrosiphus spp.*, *Myzus spp.*, *Nehotettix spp.*, *Nilaparvata spp.*, *Paratoria spp.*, *Pemphigus spp.*, *Planococcus spp.*, *Pseudaulacaspis spp.*, *Pseudococcus spp.*, *Psylla ssp.*, *Pulvinaria aethiopica*,

Quadraspidiotus spp., *Rhopalosiphum spp.*, *Saissetia spp.*, *Scaphoideus spp.*, *Schizaphis spp.*, *Sitobion spp.*, *Trialeurodes vaporariorum*, *Trioza erytreae* and *Unaspis citri*;

from the order *Hymenoptera*, for example,

Acromyrmex, *Atta spp.*, *Cephus spp.*, *Diprion spp.*, *Diprionidae*, *Gilpinia polytoma*, *Hoplocampa spp.*, *Lasius sppp.*, *Monomorium pharaonis*, *Neodiprion spp*, *Solenopsis spp.* and *Vespa ssp.*;

from the order *Diptera*, for example,

Aedes spp., *Antherigona soccata*, *Bibio hortulanus*, *Calliphora erythrocephala*, *Ceratitis spp.*, *Chrysomyia spp.*, *Culex spp.*, *Cuterebra spp.*, *Dacus spp.*, *Drosophila melanogaster*, *Fannia spp.*, *Gastrophilus spp.*, *Glossina spp.*, *Hypoderma spp.*, *Hyppobosca spp.*, *Liriomysa spp.*, *Lucilia spp.*, *Melanagromyza spp.*, *Musca ssp.*, *Oestrus spp.*, *Orseolia spp.*, *Oscinella frit*, *Pegomyia hyoscyami*, *Phorbia spp.*, *Rhagoletis pomonella*, *Sciara spp.*, *Stomoxys spp.*, *Tabanus spp.*, *Tannia spp.* and *Tipula spp.*,

from the order *Siphonaptera*, for example,

Ceratophyllus spp. und Xenopsylla cheopis and

from the order *Thysanura*, for example,

Lepisma saccharina.

It has been found that the present invention is particularly effective when the insect pest is a *Diabrotica spp.*, and especially when the pest is *Diabrotica virgifera virgifera* (Western Corn Rootworm, WCR), *Diabrotica barberi* (Northern Corn Rootworm, NCR), *Diabrotica virgifera zea* (Mexican Corn Rootworm, MCR), *Diabrotica balteata* (Brazilian Corn Rootworm (BZR) or Brazilian Corn Rootworm complex (BCR) consisting of *Diabrotica viridula* and *Diabrotica speciosa*), or *Diabrotica undecimpunctata howardi* (Southern Corn Rootworm, SCR).

EXAMPLES

The inventors herein have identified means for controlling coleopteran pest infestation by providing a double stranded ribonucleic acid molecules in the diet of pests. Surprisingly, the inventors have discovered double stranded ribonucleic acid molecules that function upon ingestion by the pest to inhibit a biological function in the pest, resulting in one or more of the following attributes: reduction in feeding by the pest, reduction in viability of the pest, death of the pest, inhibition of differentiation and development of the pest, absence of or reduced capacity for sexual reproduction by the pest, muscle formation, juvenile hormone

formation, juvenile hormone regulation, ion regulation and transport, maintenance of cell membrane potential, amino acid biosynthesis, amino acid degradation, sperm formation, pheromone synthesis, pheromone sensing, antennae formation, wing formation, leg formation, development and differentiation, egg formation, larval maturation, digestive enzyme formation, haemolymph synthesis, haemolymph maintenance, neurotransmission, cell division, energy metabolism, respiration, apoptosis, and any component of a eukaryotic cells' cytoskeletal structure, such as, for example, actins and tubulins. Any one or any combination of these attributes can result in an effective inhibition of pest infestation, and in the case of a plant pest, inhibition of plant infestation. For example, when used as a diet composition containing a pest inhibitory sufficient amount of one or more double stranded ribonucleic acid molecules provided topically to a plant, as a seed treatment, as a soil application around a plant, or when produced by a plant from a recombinant DNA molecule present within the cells of a plant, plant pest infestation is unexpectedly dramatically reduced. The Examples set forth herein below are illustrative of the invention when applied to a single pest. However, the skilled artisan will recognize that the methods, formulae, and ideas presented in the Examples are not intended to be limiting, and are applicable to all coleopteran pest species that can consume food sources that can be formulated to contain a sufficient amount of a pest inhibitory agent consisting at least of one or more double stranded RNA molecules exemplified herein intended to suppress some essential feature about or function within the pest.

EXAMPLE 1

Identification of Target Nucleotide Sequences For Preparation of dsRNA Useful for Controlling Corn Rootworms.

Corn rootworm cDNA libraries (LIB149, LIB 150, LIB3027, LIB3373) were constructed from whole larvae, pupae and from dissected midgut sections, and nucleotide sequence information was obtained (see Andersen *et al.*, U.S. Patent Application Serial No. 10/205,189 filed July 24, 2002, incorporated herein specifically by reference in its entirety). In addition, cDNA libraries were constructed from whole larvae at different developmental stages and at different times within each developmental stage in order to maximize the number of different EST sequences from the *Diabrotica* species. Libraries LIB5444 and LIB5462 were constructed respectively from mRNA pools obtained from first (1 gram) and third (2.9 grams) instar Western Corn Rootworm larvae. Harvested insects were rapidly frozen by insertion into liquid nitrogen. The insects were ground in a mortar and pestle

maintained at or below –20°C by chilling on dry ice and/or with the addition of liquid nitrogen to the mortar until the tissue was ground into a fine powder. RNA was extracted using TRIzol® reagent (Invitrogen) according to the manufacturer's instructions. Poly A+ RNA was isolated from the total RNA prep using DYNABEADS Oligo dT (Invitrogen) following the manufacturer's instructions. A cDNA library was constructed from the Poly A+ RNA using the SuperScript™ Plasmid System (Invitrogen). cDNA was size fractionated using chromatography. The fourth and fifth fractions were collected and ligated into the pSPORT1 vector (Life Technologies Inc., Gaithersburg MD) between the *Sal*1 and *Not*1 restriction endonucleases recognition sites, and transformed into *E. coli* DH10B electro-competent cells by electroporation. The first instar larvae library yielded about 420,000 colony-forming units. The third instar larvae library yielded about 2.78×10^6 colony forming units. Colonies from LIB149, LIB150 were washed from the plates, mixed to uniformity by vortexing briefly, and pooled into Tris-EDTA buffer. Half of the wash was brought to 10% glycerol, aliquoted into cryovials, and stored at –70°C. The other half was used to produce plasmid DNA using a Quiagen midi-prep purification column, or its equivalent. Purified plasmid DNA was aliquoted to microcentrifuge tubes and stored at –20°C.

Colonies from the *Diabrotica virgifera* cDNA libraries LIB5444 and LIB5462 were amplified individually in a high viscosity medium. Approximately 200,000 colony-forming units from LIB5444 and 600,000 colony-forming units from LIB5462 were mixed on a stir plate separately in 500 ml LB medium containing 0.3% SeaPrep agarose® and 50 mg/l carbenecillin at 37°C and then rapidly cooled in a water/ice bath for 1 hour allowing uniform suspension of the bacterial colonies. The inoculated libraries were then grown at 30°C for 42 hours. After incubation, the cells were mixed for 5 minutes on a stir plate. The medium was then transferred to two 250 ml centrifuge bottles. The bacterial cells were pelleted at 10,000 × g for 10 minutes. The medium was removed from the bottles and the cells were resuspended in a total of 20 ml of LB medium with 50 mg/l carbenecillin. Dimethyl sulfoxide was added to 10% to preserve the cells in freezing. Both libraries were amplified to a final titer of 10^8 colony-forming units per milliliter. Samples of the *Diabrotica virgifera* cDNA libraries LIB5444 and LIB5462 were combined and adjusted to a DNA concentration of about 1.25 micrograms per microliter in sterile distilled and deionized water and aliquoted into twenty five cryovials, each cryovial containing about 8.75 micrograms of DNA. These samples were deposited by the applicant(s)/inventors with the American Type Culture Collection (ATCC) located at 10801 University Boulevard, Manassas, Virginia, USA ZIP

20110-2209 on June 10, 2004 and referred to as LIB5444/62. The ATCC provided the Applicant with a deposit receipt, assigning the ATCC Deposit Accession No.PTA-6072.

Corn rootworm high molecular weight cDNA libraries, *i.e.*, LIB5496 and LIB5498, were prepared essentially as described above for the production of corn rootworm cDNA libraries. Libraries LIB5496 and LIB5498 were constructed respectively from mRNA pools obtained from first (1 gram) and second and third (1 gram) instar Western Corn Rootworm larvae. Briefly, insects were quickly frozen in liquid nitrogen. The frozen insects were reduced to a fine powder by grinding in a mortar and pestle. RNA was extracted using TRIzol® reagent (Invitrogen) following the manufacturer's instructions. Poly A+ RNA was isolated from the total RNA prep using DYNABEADS Oligo dT (Invitrogen). A high molecular weight cDNA library was made from 20 micrograms of Poly A+ RNA using the SuperScript™ Plasmid System (Invitrogen). The cDNA was size fractionated on a 1% agarose gel in TAE, and cDNA between the range of 1 Kb to 10 Kb was collected and ligated into the pSPORT1 vector in between the *Sal*1 and *Not*1 restriction sites and transformed into *E. coli* DH10B electro-competent cells by electroporation. LIB5496 yielded a total titer of about 3.5×10^6 colony forming units. LIB5498 yielded a total titer of about 1.0×10^6 colony forming units. Colonies from the corn rootworm high molecular weight cDNA libraries LIB5496 and LIB5498 were amplified individually in a high viscosity medium. Approximately 600,000 colony-forming units from LIB5496 and LIB5498 were mixed on a stir plate separately in 500 ml LB medium containing 0.3% SeaPrep agarose® and 50 mg/l carbenecillin at 37°C and then rapidly cooled in a water/ice bath for 1 hour allowing uniform suspension of the bacterial colonies. The libraries were then grown at 30°C for 42 hours. After incubation, the cells were mixed for 5 minutes on a stir plate. The medium was then transferred to two 250 mL centrifuge bottles. The bacterial cells were pelleted at 10,000 xg for 10 minutes. The medium was removed from the bottles and the cells were resuspended in a total of 20 mL of LB medium with 50 mg/L carbenecillin. Dimethyl sulfoxide was added to 10% to preserve the cells in freezing. Both libraries were amplified to a final titer of 10^8 colony-forming units per milliliter. Inserted cDNA sequence information was obtained from the corn rootworm species-specific plasmid libraries.

The Andersen *et al.* rootworm libraries together with additional sequences from the libraries LIB5444 and LIB5462 initially produced about 18,415 individual EST sequences consisting of approximately 1.0×10^7 nucleotide residues. The average length of an EST sequence was about 586 nucleotide residues. These EST sequences were subjected to

bioinformatics algorithms that resulted in the assembly of contig sequences referred to herein as UNIGENE sequences, and individual EST sequences that could not be compiled by overlap identity with other EST sequences, referred to herein as singletons. The LIB5444 and LIB5462 libraries were then sequenced much deeper, resulting in additional individual EST sequences. EST sequences obtained from libraries, *i.e.*, LIB149, LIB150, LIB3027, LIB3373, LIB5444, LIB5462, LIB5496 and LIB5503 were selected for further investigation in feeding bioassays as set forth below and the corresponding sequences are given in the sequence listing..

The EST sequences isolated from CRW cDNA libraries were assembled, where possible, into UNIGENE sets and these assembled Unigene sequences are included in the sequence listing. A UNIGENE is a gene-oriented cluster formed from the overlap of individual EST sequences within regions of sequence identity to form a larger sequence. Pontius *et al.* (2003). Each nucleotide sequence as set forth in the sequence listing was analyzed to identify the presence of open reading frames. Amino acid sequence information deduced from open reading frames was compared to known amino acid sequence information available in public databases in order to deduce the extent of amino acid sequence identity or similarity to those known amino acid sequences. Biological function, if any, associated with known amino acid sequences in public databases was annotated to the amino acid sequences deduced from the cDNA library nucleotide sequence information. Annotations provided information that was suggestive of the function of a protein that may be expressed from a particular gene that gave rise to a particular cDNA sequence, but was not outcome determinative. Based on the suggestive annotation information, certain cDNA sequences were characterized as those that encoded a protein that was likely involved in some biological function within corn rootworm cells that was either essential to life, or that was necessary for ensuring health and vitality to a cell, or were likely to be involved in cellular integrity, cell maintenance, reproductive capacity, and the like.

Sequences selected for further investigation were used in the construction of double stranded RNA molecules for incorporation into CRW diet. Thermal amplification primer pairs were designed based on cDNA and EST starting sequences to obtain sequences used in feeding assays. Primer pairs were constructed either as a pair of nucleotide sequences, each member of a primer pair exhibiting perfect complementarity either to a sense or to an antisense sequence. Some primer pair sequences were constructed so that each member of the pair exhibited a sequence containing a T7 phage RNA polymerase promoter at it's 5' end. Preferably a higher fidelity first amplification reaction was carried out using a first primer

pair lacking a T7 promoter to generate a first amplicon using CRW genomic DNA as template. Preferably, a cDNA or a mRNA sequence is used as the template for the synthesis of a dsRNA molecule for use in the present invention because eukaryotic genome sequences are recognized in the art to contain sequences that are not present within the mature RNA molecule. A sample of the first amplicon generated from the higher fidelity first amplification reaction was then used as template in a second thermal amplification reaction with a second primer pair containing the T7 promoter sequence to produce a second amplicon that contained a T7 promoter at or embedded within the 5' end of each strand of the second amplicon. The complete nucleotide sequence of the second amplicon was obtained in both directions and compared to the nucleotide sequence as reported for the cDNA, and discrepancies between the two sequences, if any, were noted. Generally, sequences prepared using genome DNA as template were inconsistent with further use as dsRNA molecules for use in achieving significant levels of suppression because of variations within the genome sequences that were not present within the mRNA or cDNA sequence.

An *in vitro* transcription reaction typically contained from about 1 to about 2 micrograms of linearized DNA template, T7 polymerase reaction buffer from a 10X concentrate, ribonucleotides ATP, CTP, GTP, and UTP at a final concentration of from between 50 and 100 mM each, and 1 unit of T7 RNA polymerase enzyme. The RNA polymerase reaction was incubated at about 37°C, depending on the optimal temperature of the RNA polymerase used according to the manufacturers' instructions, for a period of time ranging from several minutes to several hours. Generally, reactions were carried out for from about 2 to about 6 hours for transcription of template sequences up to about 400 nucleotides in length, and for up to 20 hours for transcription of template sequences greater than about 400 nucleotides in length. Heating the reaction to 65°C for fifteen minutes terminates RNA transcription. RNA transcription products were precipitated in ethanol, washed, air dried and resuspended in RNAse free water to a concentration of about 1 microgram per microliter. Most transcripts which took advantage of the opposing T7 promoter strategy outlined above produced double stranded RNA in the *in vitro* transcription reaction, however, a higher yield of double stranded RNA was obtained by heating the purified RNA to 65°C and then slowly cooling to room temperature to ensure proper annealing of sense and antisense RNA segments. Double stranded RNA products were then incubated with DNAse I and RNAse at 37°C for one hour to remove any DNA or single stranded RNA present in the mixture. Double stranded RNA products were purified over a column according to the manufacturers'

instructions (AMBION MEGAscript® RNAi KIT) and resuspended in 10 mM Tris-HCl buffer (pH 7.5) or RNAse free water to a concentration of between 0.1 and 1.0 microgram per microliter.

The following nucleotide sequences were derived first as cDNA sequences identified in a corn rootworm mid-gut cDNA library (Andersen *et al.*, ibid), and were adapted for use in constructing double stranded RNA molecules for use in testing the efficacy of inhibiting a biological function in a pest by feeding double stranded RNA molecules in the diet of the pest.

A. Chd3 Homologous Sequences

CHD genes have been identified in numerous eukaryotes, and the corresponding proteins are proposed to function as chromatin-remodeling factors. The term CHD is derived from the three domains of sequence homology found in CHD proteins: a chromo (chromatin organization modifier) domain, a SNF2-related helicase/ATPase domain, and a DNA-binding domain, each of which is believed to confer a distinct chromatin-related activity. CHD proteins are separated into two categories based on the presence or absence of another domain of sequence homology, a PHD zinc finger domain, typically associated with chromatin related activity. CHD3 related proteins possess a PHD zinc finger domain, but CHD1 related proteins do not. Experimental observations have suggested a role for CHD3 proteins in repression of transcription, and in some species have been shown to be a component of a complex that contains histone deacetylase as a subunit. Deacetylation of histones is correlated with transcriptional inactivation, and so CHD3 proteins have been implicated to function as repressors of transcription by virtue of being a component of a histone deacetylase complex (Ogas *et al.*, 1999). Thus, suppression of CHD3 protein synthesis may be a useful target for double stranded RNA mediated inhibition of coleopteran pests.

B. Beta-tubulin homologous sequences

Tubulin proteins are important structural components of many cellular structures in all eukaryote cells and principally in the formation of microtubules. Inhibition of microtubule formation in cells results in catastrophic effects including interference with the formation of mitotic spindles, blockage of cell division, and the like. Therefore, suppression of tubulin protein formation may be a useful target for double stranded RNA mediated inhibition.

C. 40 kDa V-ATPase homologous sequences

Energy metabolism within subcellular organelles in eukaryotic systems is an essential function. Vacuolar ATP synthases are involved in maintaining sufficient levels of ATP within vacuoles. Therefore, vacuolar ATP synthases may be a useful target for double stranded RNA mediated inhibition.

D. EF1α homologous sequences

Transcription elongation and transcription termination factors are essential to metabolism and may be advantageous targets for double stranded RNA mediated inhibition.

E. 26S proteasome subunit p28 homologous sequences

The 26S proteasome is a large, ATP-dependent, multi-subunit protease that is highly conserved in all eukaryotes. It has a general function in the selective removal of various short-lived proteins that are first covalently linked to ubiquitin and then subsequently degraded by the 26S proteasome complex. The ubiquitin pathway plays an important role in the control of the cell cycle by the specific degradation of a number of regulatory proteins including mitotic cyclins and inhibitors of cyclin-dependent kinases such as p27 of mammalian cells. Thus, the suppression of 26S proteasome synthesis and suppression of synthesis of its component subunits may be preferred targets for double stranded RNA mediated inhibition. (Smith *et al.*, 1997).

F. Juvenile Hormone Epoxide Hydrolase Homologous Sequences

Insect juvenile hormone controls and regulates a variety of necessary biological processes within the insect life cycle including but not necessarily limited to metamorphosis, reproduction, and diapause. Juvenile hormone (JH) concentrations are required to peak at appropriate times within the haemolymph of the larval form of an insect pest, in particular lepidopteran and coleopteran larvae, and then must be degraded in order to terminate the effects of the hormone response. Enzymes involved in decreasing the concentration of juvenile hormone are effective through two primary pathways of metabolic degradation. One pathway involves juvenile hormone esterase (JHE), which hydrolyzes the methyl ester providing the corresponding acid. The second pathway utilizes juvenile hormone epoxide hydrolase (JHEH) to achieve hydrolysis of the epoxide, resulting in formation of the diol. The contribution of JHE in the degradation of JH is well understood and has been found to be invariate between the lepidoptera and coleoptera species. Inhibition of JH esterase has been associated with severe morphological changes including but not limited to larval wandering, deferred pupation, and development of malformed intermediates. In contrast, the

contribution of JHEH in JH metabolism is less well understood and had been shown to vary between the species, but recent studies point to evidence that suggests that JHEH may be the primary route of metabolism of JH (Brandon J. Fetterolf, Doctoral Dissertation, North Carolina State University (Feb. 10, 2002) Synthesis and Analysis of Mechanism Based Inhibitors of Juvenile Hormone Epoxide Hydrolase from Insect *Trichoplusia ni*). In any event, disruption of either JH degradation pathway using gene suppression technology could be an effective target for double stranded RNA mediated pest inhibition.

G. Swelling dependent chloride channel protein homologous sequences

Swelling dependent chloride channel proteins have been postulated to play a critical role in osmoregulation in eukaryotic animal cell systems. Therefore, a nucleotide sequence exhibiting the ability to express an amino acid sequence that exhibits homology to previously identified swelling dependent chloride channel proteins may be a useful target for RNA inhibition in a pest.

H. Glucose-6-phosphate 1-dehydrogenase protein homologous sequences

Glucose-6-phosphate 1-dehydrogenase protein (G6PD) catalyzes the oxidation of glucose-6-phosphate to 6-phosphogluconate while concomitantly reducing the oxidized form of nicotinamide adenine dinucleotide phosphate (NADP+) to NADPH. NADPH is known in the art as a required cofactor in many eukaryotic biosynthetic reactions, and is known to maintain glutathione in its reduced form. Reduced glutathione acts as a scavenger for dangerous oxidative metabolites in eukaryotic cells, and with the assistance of the enzyme glutathione peroxidase, convert harmful hydrogen peroxide to water (Beutler *et al.*, 1991). Therefore, G6PD may be a preferable target for double stranded RNA mediated inhibition in a coleopteran pest.

I. Act42A protein homologous sequences

Actin is a ubiquitous and highly conserved eukaryotic protein required for cell motility and locomotion (Lovato *et al.*, 2001). A number of CRW cDNA sequences were identified that were predicted to likely encode actin or proteins exhibiting amino acid sequence structure related to actin proteins. Therefore, genes encoding actin homologues in a pest cell may be useful targets for double stranded RNA mediated inhibition.

J. ADP-ribosylation factor 1 homologous sequences

ADP ribosylation factors have been demonstrated to be essential in cell function in that they play integral roles in the processes of DNA damage repair, carcinogenesis, cell death, and genomic stability. Thus, it would be useful to be able to selectively disrupt

transcription of ADP-ribosylation factors in coleopteran pest species using double stranded RNA mediated inhibition.

K. Transcription Factor IIB protein homologous sequences

Transcription elongation and transcription termination factors, as indicated above, are essential to metabolism and may be advantageous targets for double stranded RNA mediated inhibition to control or eliminate coleopteran pest infestation.

L. Chitinase homologous sequences

Chitin is a $\beta(1\rightarrow 4)$homopolymer of N-acetylglucosamine and is found in insect exoskeletons. Chitin is formed from UDP-N-acetlglucosamine in a reaction catalyzed by chitin synthase. Chitin is a structural homopolymer polysaccharide, and there are many enzymatic steps involved in the construction of this highly branched and cross-linked structure. Chitin gives shape, rigidity and support to insects and provides a scaffolding to which internal organs such as muscles are attached. Chitin must also be degraded to some extent to mediate the steps involved in the insect molting process. Therefore, it is believed that double stranded RNA mediated inhibition of proteins in these pathways would be useful as a means for controlling coleopteran pest infestation.

M. Ubiquitin conjugating enzyme homologous sequences

The ubiquitin pathway plays an important role in the control of the cell cycle by the specific degradation of a number of regulatory proteins including mitotic cyclins and inhibitors of cyclin-dependent kinases such as p27 of mammalian cells. Thus, genes encoding ubiquitin and associated components may be a preferred target for double stranded RNA mediated inhibition. (Smith *et al.*, 1997). The ubiquitin-dependent proteolytic pathway is one of the major routes by which intracellular proteins are selectively destroyed in eukaryotes. Conjugation of ubiquitin to substrate proteins is mediated by a remarkably diverse array of enzymes. Proteolytic targeting may also be regulated at steps between ubiquitination of the substrate and its degradation to peptides by the multi-subunit 26S protease. The complexity of the ubiquitin system suggests a central role for protein turnover in eukaryotic cell regulation, and implicates other proteins in the pathway including ubiquitin-activating enzyme, ubiquitin-conjugating enzyme, ubiquitin-protein ligase, and 26S proteasome subunit components. Therefore, it is believed that double stranded RNA mediated inhibition of proteins in this pathway would be useful as a means for controlling coleopteran pest infestation.

N. Glyceraldehyde-3-phosphate dehydrogenase homologous sequences

The glycolytic pathway is an essential pathway in most organisms and is involved in the production of metabolic energy from the degradation of glucose. One important enzyme in the second stage of the glycolytic pathway is glyceraldehyde-3-phosphate dehydrogenase (G3PDH), which, in the presence of NAD+ and inorganic phosphate, catalyzes the oxidation of 3-phospho-glyceraldehyde to 3-phosphoglyceroyl-phosphate along with the formation of NADH. The important component of this reaction is the storage of energy through the formation of NADH. Genes encoding enzymes associated with the glycolytic pathway, and particularly genes encoding enzymes involved in the steps useful in formation of energy reserves may be particularly useful targets for double stranded RNA mediated inhibition in coleopteran pest species.

O. Ubiquitin B homologous sequences

As described above, the ubiquitin protein degradation pathway plays an important role in the control of the cell cycle by the specific degradation of a number of regulatory proteins including mitotic cyclins and inhibitors of cyclin-dependent kinases such as p27 of mammalian cells. Thus, genes encoding ubiquitin and associated components may be a preferred target for double stranded RNA mediated inhibition. (Smith *et al.*, 1997).

P. Juvenile hormone esterase homologs

As indicated above, insect juvenile hormone controls and regulates a variety of necessary biological processes within the insect life cycle including but not necessarily limited to metamorphosis, reproduction, and diapause. Disruption of JH synthesis or degradation pathways using gene suppression technology could be an effective target for double stranded RNA mediated pest inhibition.

Q. Alpha tubulin homologous sequences

Eukaryotic cells generally utilize cytoskeletal structural elements that are important, no t only as a mechanical scaffold, but also in sustaining the shape of the cell. Semiflexible microfilaments make cells mobile, help them to divide in mitosis (cytokinesis) and, in vertebrate and invertebrate animals, are responsible for muscular contraction. The relatively stiff microtubules which are made up of alpha and beta tubulin proteins play an important role in acting as a sort of highway for transport of vesicles and organelles and in the separation of chromosomes during mitosis (karyokinesis). The flexible intermediate filaments provide at least additional strength to the overall cellular structure. The cytoskeleton is also known to be involved in signaling across the cell cytoplasm. Taking

these functions into account, it is believed that any disruption of the cytoskeleton or even subtle changes of its integrity may cause pathological consequences to a cell.

R. Transport Related Sequences

As indicated above, sorting and transport of various molecules within a cell, including to appropriate organelles, as well as their secretion is an important physiological function. Such sorting pathways could include those relying on the endosomal sorting complex required for transport (ESCRT), complexes I-III, among others. Thus, functions related to transport of polypeptides and other molecules may also be a preferred target for dsRNA-mediated inhibition.

EXAMPLE 2

Insect Feeding Bioassays

Samples of double stranded RNA (dsRNA) were subjected to bioassay with a selected number of target pests. The dsRNA was prepared from sequences identified according to Example 1 using either a full contig sequence in the case of SEQ ID Nos:1-6, or a sequence amplified from the assembled contig using the primer pairs as set forth in the sequence listing. Varying does of dsRNA were applied as an overlay to corn rootworm artificial diet according to the following procedure. *Diabrotica virgifera virgifera* (WCR) eggs were obtained from Crop Characteristics, Inc., Farmington, Minnesota. The non-diapausing WCR eggs were incubated in soil for about 13 days at 24C, 60% relative humidity, in complete darkness. On day 13 the soil containing WCR eggs was placed between #30 and #60 mesh sieves and the eggs were washed out of the soil using a high pressure garden hose. The eggs were surface disinfested by soaking in LYSOL for three minutes, rinsed three times with sterile water, washed one time with a 10% formalin solution and then rinsed three additional times in sterile water. Eggs treated in this way were dispensed onto sterile coffee filters and hatched overnight at 27°C, 60% relative humidity, in complete darkness.

To prepare dsRNA, amplicons of selected sequences were cloned into a plasmid vector capable of replication in *E. coli* and sufficient amounts of plasmid DNA was recovered to allow for *in vitro* T7 RNA polymerase transcription from the embedded convergent T7 promoters at either end of the cloned fragment. Double stranded RNA was produced and subjected to bioassay; one RNA segment comprising the sequence as set forth in the sequence listing, the other RNA segment being substantially the reverse complement of the nucleotide sequence, uridines appropriately positioned in place of thymidines. A sample of double stranded RNA (dsRNA) was treated with DICER or with RNAse III to produce sufficient

quantities of small interfering RNA's (siRNA). Samples containing siRNA or dsRNA were overlayed onto CRW diet bioassay as described above and larvae were allowed to feed as set forth below.

A sample of double stranded RNA was either added directly to each well containing insect diet as indicated above, or was modified prior to being added to insect diet. Modification of double stranded RNA followed the instructions for RNAse III (AMBION CORPORATION, Austin, Texas) or DICER (STRATAGENE, La Jolla, California) provided by the manufacturer. RNAse III digestion of double stranded RNA produced twenty-one and twenty-two nucleotide duplexes containing 5' phosphorylated ends and 3' hydroxyl ends with 2-3 base overhangs, similar to the ~21-26 base pair duplexed short interfering RNA (siRNA) fragments produced by the dicer enzyme in the eukaryotic pathway identified by Hamilton *et. al.* (1999) and Elbashir *et. al.* (2001a). This collection of short interfering RNA duplexes was further purified and a sample characterized by polyacrylamide gel electrophoresis to determine the integrity and efficiency of duplex formation. The purity and quantity of the sample was then determined by spectrophotometry at a wavelength of 250 nanometers, and unused sample retained for further use by storage at –20°C.

Insect diet was prepared essentially according to Pleau *et al.* (2002), with the following modifications. 9.4 grams of SERVA agar was dispensed into 540 milliliters of purified water and agitated until the agar was thoroughly distributed. The water/agar mixture was heated to boiling to completely dissolve the agar, and then poured into a WARING blender. The blender was maintained at low speed while 62.7 grams of BIO-SERV DIET mix (F9757), 3.75 grams lyophilized corn root, 1.25 milliliters of green food coloring, and 0.6 milliliters of formalin was added to the hot agar mixture. The mixture was then adjusted to pH 9.0 with the addition of a 10% potassium hydroxide stock solution. The approximately 600 milliliter volume of liquid diet was continually mixed at high speed and maintained at from about 48°C to about 60°C using a sterilized NALGENE coated magnetic stir bar on a magnetic stirring hot plate while being dispensed in aliquots of 200 microliters into each well of FALCON 96-well round bottom microtiter plates. The diet in the plates was allowed to solidify and air dry in a sterile biohood for about ten minutes.

Thirty (30) microliter volumes of test samples containing either control reagents or double stranded RNA in varying quantities was overlayed onto the surface of the insect diet in each well using a micro-pipettor repeater. Insect diet was allowed to stand in a sterile biohood for up to one half hour after application of test samples to allow the reagents to

diffuse into the diet and to allow the surface of the diet to dry. One WCR neonate larva was deposited to each well with a fine paintbrush. Plates were then sealed with MYLAR and ventilated using an insect pin. 12-72 insect larvae were tested per dose depending on the design of the assay. The bioassay plates were incubated at 27°C, 60% relative humidity in complete darkness for 12-14 days. The number of surviving larvae per dose was recorded at the 12-14 day time point. Larval mass was determined using a suitable microbalance for each surviving larva. Data was analyzed using JMP©4 statistical software (SAS Institute, 1995) and a full factorial ANOVA was conducted with a Dunnet's test to look for treatment effects compared to the untreated control ($P<0.05$). A Tukey-Kramer post hoc test was performed to compare all pairs of the treatments ($P<0.05$). The results of the CRW larvae feeding assays exhibited significant growth inhibition and mortality compared to controls as explained below.

EXAMPLE 3

Results of Insect Feeding Bioassays

Artificial diet sufficient for rearing corn rootworm larvae was prepared by applying samples of double stranded RNA sequences identified as described in Example 1 using bioassays carried out as described in Example 2. Corn rootworm larvae were typically allowed to feed on the diet for twelve days and mortality and stunting monitored in comparison to rootworms allowed to feed only on negative and positive control diets. The results of the studies confirmed significant levels ($p<0.05$) of larval stunting and/or mortality using dsRNAs containing portions sequences homologous to a variety of different gene classes. The sequences and vectors yielding significant stunting and/or mortality and the corresponding SEQ ID NO for the sequence expressed as a dsRNA are given in Tables 1-5 below.

Table 1: dsRNA Constructs Demonstrating Significant Stunting and/or Mortality in Effect in Insect Feeding Bioassays with Southern Corn Rootworm or Western Corn Rootworm

Vector	Sequence Expressed as dsRNA	SEQ ID NO
RNAi-pIC17553:001	Apple	697
RNAi-pIC17504:049	EST Full Length V-ATPase	695
RNAi-pIC17554:001	Rpl 9	698
RNAi-pIC17555:001	Rpl 19	699
RNAi-pIC17504:050	Section 6.0 V-ATPase	711
RNAi-pIC19514:001	WCR mRNA capping enzyme LIB5496-	696

	028-A1-M1-A7	
RNAi-pIC17552:003	LIB5462-042-A1-M1-H10 Dv.6_CG9355 DUSKY STRUCTURAL CONSTITUENT OF CUTICLE	700
RNAi-pIC17546:003	LIB5462-091-A1-M1-G3 Dv.1_CG6217 KNICKKOPF UNK	701
RNAi-pIC17546:001	Dv.1_CG6217	1
RNAi-pIC17549:001	Dv.4_CG1435	4
RNAi-pIC17550:001	LIB5444-065-A1-M1-D5 Dv.5_cg1915_1	5
RNAi-pIC17551:001	LIB5462-012-A1-M2-B2 Dv.5_cg1915_2	703
RNAi-pIC17552:001	Dv.6_CG9355	6
RNAi-pMON78412:002	Dv.7_CG3416; putative Mov34:CG3416 ortholog	10
RNAi-pMON96172:002	Dv.8_CG1088; putative vacuolar H+ATPase E subunit: CG1088 ortholog	14
RNAi-pMON96168:002	Dv.9_CG2331; putative ATPase activity: CG2331 ortholog	18
RNAi-pMON78424:002	Dv.10_CG6141; putative ribosomal protein L9: CG6141 ortholog	22
RNAi-pMON78425:001	Dv.11_CG2746	26
RNAi-pMON78444:002	Dv.12_CG1341; putative proteasome regulatory particle, rpt1: CG1341 ortholog	30
RNAi-pMON78416:002	Dv.13_CG11276; putative ribosomal protein S4: CG11276 ortholog	34
RNAi-pMON78434:001	Dv.14_CG17927_2; putative myosin heavy chain: CG17927 ortholog	38
RNAi-pMON78439:001	Dv.16_CG5394; putative glutamyl-prolyl-tRNA synthetase: CG5394 ortholog	46
RNAi-pMON78438:001	Dv.17_CG10149; putative proteasome p44.5 subunit, rpn6: CG10149 ortholog	50
RNAi-pMON78435:002	Dv.18_CG1404; putative RAN small monomeric GTPase: CG1404 ortholog	54
RNAi-pMON78449:002	Dv.19_CG18174; putative proteasome regulatory particle, lid subcomplex, rpn11: CG18174 ortholog	58
RNAi-pMON78419:001	Dv.20_CG3180_1; putative DNA-directed RNA polymerase II: CG3180 ortholog	62
RNAi-pMON78440:002	Dv20_CG3180_2; putative DNA-directed RNA polymerase II: CG3180 ortholog	706
RNAi-pMON78420:001	Dv.21_CG3320; putative Rab1: CG3320 ortholog	70
RNAi-pMON78410:002	Dv.22_CG3395; putative Ribosomal protein S9: CG3395 ortholog	74
RNAi-pMON78422:001	Dv.23_CG7269; putative helicase: CG7269 ortholog	78

RNAi-pMON78423:001	Dv.25_CG9012; putative Clathrin heavy chain: CG9012 ortholog	86
RNAi-pMON78414:006	DV.26 sec1 ~ 5' half of EST	710
RNAi-pMON78414:001	Dv.26_CG9261; putative sodium/potassium-exchanging ATPase: CG9261 ortholog	90
RNAi-pMON78413:001	Dv.27_CG12052; putative RNA polymerase II transcription factor: CG12052 ortholog.	94
RNAi-pMON78427:001	Dv.35_CG3762; putative Vha68-2: CG3762 ortholog.	126
RNAi-pMON97122:001	C1_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer	713
RNAi-pMON97127:001	C2_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer	714
RNAi-pMON97125:001	C3_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer	715
RNAi-pMON78441:001	Dv.39_CG9078; putative sphingolipid delta-4 desaturase; stearoyl-CoA 9-desaturase: CG9078 ortholog	142
RNAi-pMON97114:001	Dv.41_CG2637; Female sterile Ketel; involved in protein-nucleus import: CG2637 ortholog	150
RNAi-pMON97140:001	Dv.44_CG1244; Putative nucleic acid binding activity: CG1244 ortholog	162
RNAi-pMON78429:001	Dv.46_CG10689; putative RNA helicase: CG10689 ortholog.	170
RNAi-pMON78432:001	Dv.48_CG33196; putative transmembrane receptor protein tyrosine kinase: CG33196 ortholog	178
RNAi-pMON78428:001	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog	182
RNAi-pMON78428:003	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog Free region selected from DV.49	704
RNAi-pMON78426:001	Dv.50_CG10110_1; putative Cleavage and polyadenylation specificity factor: CG10110_1 ortholog	186
RNAi-pMON96185:001	Dv.55_CG5931; putative splicing factor activity, RNA helicase activity: CG5931 ortholog	202
RNAi-pMON78442:001	Dv.57_CG2968; putative hydrogen-exporting ATPase: CG2968 ortholog	206
RNAi-pMON78431:001	Dv.58_CG1751; putative signal peptidase: CG1751 ortholog	210
RNAi-pMON96177:001	Dv.61_CG3725_1; putative Calcium ATPase: CG3725 ortholog	222
RNAi-pMON96183:001	Dv.62_CG3612; putative bellwether: CG3612 ortholog	230

RNAi-pMON96180:002	Dv.65_CG7033; putative chaperone activity: CG7033 ortholog	242
RNAi-pMON96176:001	Dv.66_CG32019; putative bent: CG32019 ortholog	246
RNAi-pMON96170:002	Dv.67_CG16916; putative endopeptidase activity: CG16916 ortholog	250
RNAi-pMON96166:001	Dv.70_CG5771; putative Rab-protein 11: CG5771 ortholog	258
RNAi-pMON96179:001	Dv.72_CG6831; putative rhea: CG6831 ortholog	266
RNAi-pMON96186:001	Dv.73_CG10119; putative Lamin C: CG10119 ortholog	270
RNAi-pMON96160:002	Dv.74_CG6375; putative pitchoune: CG6375 ortholog	274
RNAi-pMON97137:001	Dv.77_CG4214; putative Syntaxin 5; involved in intracellular protein transport: CG4214 ortholog	286
RNAi-pMON96167:001	Dv.82_CG8264; putative Bx42: CG8264 ortholog	302
RNAi-pMON96171:001	Dv.83_CG11397; putative gluon: CG11397 ortholog	306
RNAi-pMON96187:003	Dv.85_CG4494; putative protein binding activity: CG4494 ortholog	314
RNAi-pMON96174:001	Dv.86_CG5055; putative bazooka: CG5055 ortholog	318
RNAi-pMON97126:001	Dv.88_CG8756; function unknown; contains chitin binding domain: CG8756 ortholog	326
RNAi-pMON97130:001	Dv.93_CG8515; putative structural constituent of cuticle; contains chitin binding domain: CG8515 ortholog	342
RNAi-pMON97109:001	Dv.99_CG2446; Unknown; lethal in Drosophila & low homology with human: CG2446 ortholog	366
RNAi-pMON97111:001	Dv.105_CG1250_1; GTPase activator, involved in intracellular protein transport: CG1250 ortholog	390
RNAi-pMON97112:001	Dv.105_CG1250_2; GTPase activator, involved in intracellular protein transport: CG1250 ortholog	394
RNAi-pMON97107:001	Dv.107_CG14813; COPI vesicle coat; involved in Golgi to ER intracellular protein transport: CG14813 ortholog	398
RNAi-pMON97115:001	Dv.108_CG17248; n-synaptobrevin; involved in intracellular protein transport: CG17248 ortholog	402
RNAi-pMON97133:001	Dv.113; function unknown; WCR unique sequence	422

RNAi-pMON97121:001	Dv.122_CG3164; putative ATP-binding cassette transporter activity: CG3164 ortholog	454
RNAi-pMON97134:001	Dv.127; function unknown; no homology with human	470
RNAi-pMON97171:001	Dv.146; function unknown, WCR unique sequence	514
RNAi-pMON97166:001	Dv.147; function unknown, WCR unique sequence	518
RNAi-pMON97167:001	Dv.149; function unknown, WCR unique sequence	526
RNAi-pMON97169:001	Dv.155; function unknown, WCR unique sequence	550
RNAi-pMON97173:001	Dv.162; function unknown, WCR unique sequence	578
RNAi-pMON97170:001	Dv.170; function unknown, WCR unique sequence	610

Table 2: dsRNA Constructs Causing Significant Stunting Levels in Feeding Bioassays with Western Corn Rootworm (WCR) Larvae

Vector	Sequence Expressed as dsRNA
RNAi-pIC17553:001	Apple
RNAi-pIC17504:049	EST Full Length V-ATPase
RNAi-pIC17554:001	Rpl 9
RNAi-pIC17555:001	Rpl 19
RNAi-pIC17504:050	Section 6.0 V-ATPase
RNAi-pIC16005:001	V-ATPase D subunit 1
RNAi-pIC19514:001	WCR mRNA capping enzyme LIB5496-028-A1-M1-A7
RNAi-pIC17546:001	Dv.1_CG6217
RNAi-pIC17549:001	Dv.4_CG1435
RNAi-pIC17551:001	LIB5462-012-A1-M2-B2 Dv.5_cg1915_2
RNAi-pIC17552:001	Dv.6_CG9355
RNAi-pMON78412:001	Dv.7_CG3416
RNAi-pMON78412:002	Dv.7_CG3416; putative Mov34:CG3416 ortholog
RNAi-pMON96172:002	Dv.8_CG1088; putative vacuolar H+ATPase E subunit: CG1088 ortholog
RNAi-pMON96168:002	Dv.9_CG2331; putative ATPase activity: CG2331 ortholog
RNAi-pMON78424:002	Dv.10_CG6141; putative ribosomal protein L9: CG6141 ortholog
RNAi-pMON78425:001	Dv.11_CG2746
RNAi-pMON78444:002	Dv.12_CG1341; putative proteasome regulatory particle, rpt1: CG1341 ortholog
RNAi-pMON78416:002	Dv.13_CG11276; putative ribosomal protein S4: CG11276 ortholog
RNAi-pMON78434:001	Dv.14_CG17927_2; putative myosin heavy chain: CG17927 ortholog
RNAi-pMON78439:001	Dv.16_CG5394; putative glutamyl-prolyl-tRNA synthetase: CG5394 ortholog

RNAi-pMON78435:002	Dv.18_CG1404; putative RAN small monomeric GTPase: CG1404 ortholog
RNAi-pMON78449:002	Dv.19_CG18174; putative proteasome regulatory particle, lid subcomplex, rpn11: CG18174 ortholog
RNAi-pMON78440:002	Dv.20_CG3180_2; putative DNA-directed RNA polymerase II: CG3180 ortholog
RNAi-pMON78420:002	Dv.21_CG3320; putative Rab1: CG3320 ortholog
RNAi-pMON78410:001	Dv.22_CG3395; putative Ribosomal protein S9: CG3395 ortholog
RNAi-pMON78422:001	Dv.23_CG7269; putative helicase: CG7269 ortholog
RNAi-pMON78423:001	Dv.25_CG9012; putative Clathrin heavy chain: CG9012 ortholog
RNAi-pMON78414:001	Dv.26_CG9261; putative sodium/potassium-exchanging ATPase: CG9261 ortholog
RNAi-pMON78413:001	Dv.27_CG12052; putative RNA polymerase II transcription factor: CG12052 ortholog.
RNAi-pMON97122:001	C1_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON97127:001	C2_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON97125:001	C3_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON78427:007	Dv.35_CG3762; putative Vha68-2: CG3762 ortholog.
RNAi-pMON78441:001	Dv.39_CG9078; putative sphingolipid delta-4 desaturase; stearoyl-CoA 9-desaturase: CG9078 ortholog
RNAi-pMON97114:001	Dv.41_CG2637; Female sterile Ketel; involved in protein-nucleus import: CG2637 ortholog
RNAi-pMON78429:001	Dv.46_CG10689; putative RNA helicase: CG10689 ortholog.
RNAi-pMON78432:001	Dv.48_CG33196; putative transmembrane receptor protein tyrosine kinase: CG33196 ortholog
RNAi-pMON78428:001	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog
RNAi-pMON78428:003	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog Free region selected from DV.49
RNAi-pMON78426:001	Dv.50_CG10110_1; putative Cleavage and polyadenylation specificity factor: CG10110_1 ortholog
RNAi-pMON96185:001	Dv.55_CG5931; putative splicing factor activity, RNA helicase activity: CG5931 ortholog
RNAi-pMON78442:001	Dv.57_CG2968; putative hydrogen-exporting ATPase: CG2968 ortholog
RNAi-pMON78431:001	Dv.58_CG1751; putative signal peptidase: CG1751 ortholog
RNAi-pMON96177:001	Dv.61_CG3725_1; putative Calcium ATPase: CG3725 ortholog
RNAi-pMON96182:001	Dv.61_CG3725_2; putative Calcium ATPase: CG3725 ortholog
RNAi-pMON96183:001	Dv.62_CG3612; putative bellwether: CG3612 ortholog
RNAi-pMON96180:002	Dv.65_CG7033; putative chaperone activity: CG7033 ortholog
RNAi-pMON96180:001	Dv.65_CG7033; putative chaperone activity: CG7033 ortholog
RNAi-pMON96176:001	Dv.66_CG32019; putative bent: CG32019 ortholog
RNAi-pMON96170:002	Dv.67_CG16916; putative endopeptidase activity: CG16916 ortholog
RNAi-pMON96166:001	Dv.70_CG5771; putative Rab-protein 11: CG5771 ortholog
RNAi-pMON96179:001	Dv.72_CG6831; putative rhea: CG6831 ortholog
RNAi-pMON96186:001	Dv.73_CG10119; putative Lamin C: CG10119 ortholog
RNAi-pMON96160:002	Dv.74_CG6375; putative pitchoune: CG6375 ortholog
RNAi-pMON96160:001	Dv.74_CG6375; putative pitchoune: CG6375 ortholog

RNAi-pMON97137:002	Dv.77_CG4214; putative Syntaxin 5; involved in intracellular protein transport: CG4214 ortholog
RNAi-pMON96167:001	Dv.82_CG8264; putative Bx42: CG8264 ortholog
RNAi-pMON96171:001	Dv.83_CG11397; putative gluon: CG11397 ortholog
RNAi-pMON96187:003	Dv.85_CG4494; putative protein binding activity: CG4494 ortholog
RNAi-pMON97126:001	Dv.88_CG8756; function unknown; contains chitin binding domain: CG8756 ortholog
RNAi-pMON97109:001	Dv.99_CG2446; Unknown; lethal in Drosophila & low homology with human: CG2446 ortholog
RNAi-pMON97111:001	Dv.105_CG1250_1; GTPase activator, involved in intracellular protein transport: CG1250 ortholog
RNAi-pMON97107:001	Dv.107_CG14813; COPI vesicle coat; involved in Golgi to ER intracellular protein transport: CG14813 ortholog
RNAi-pMON97115:001	Dv.108_CG17248; n-synaptobrevin; involved in intracellular protein transport: CG17248 ortholog
RNAi-pMON97121:001	Dv.122_CG3164; putative ATP-binding cassette transporter activity: CG3164 ortholog
RNAi-pMON97171:001	Dv.146; function unknown, WCR unique sequence
RNAi-pMON97166:001	Dv.147; function unknown, WCR unique sequence
RNAi-pMON97167:001	Dv.149; function unknown, WCR unique sequence
RNAi-pMON97169:001	Dv.155; function unknown, WCR unique sequence
RNAi-pMON97173:001	Dv.162; function unknown, WCR unique sequence
RNAi-pMON97170:001	Dv.170; function unknown, WCR unique sequence

Table 3: dsRNA Constructs Causing Significant Mortality Levels in Feeding Bioassays with Western Corn Rootworm (WCR) Larvae

Vector	Sequence Expressed as dsRNA
RNAi-pIC17553:001	Apple
RNAi-pIC17504:049	EST Full Length V-ATPase
RNAi-pIC17555:001	Rpl 19
RNAi-pIC17554:001	Rpl 9
RNAi-pIC17504:050	Section 6.0 V-ATPase
RNAi-pIC17504:054	V-ATPase subunit 2 sequence from Diabrotica virgifera virgifera Full EST sequence serving as positive control
RNAi-pIC19514:001	WCR mRNA capping enzyme LIB5496-028-A1-M1-A7
RNAi-pIC17546:001	Dv.1_CG6217
RNAi-pIC17549:001	Dv.4_CG1435
RNAi-pIC17550:001	LIB5444-065-A1-M1-D5 Dv.5_cg1915_1
RNAi-pMON78412:002	Dv.7_CG3416; putative Mov34:CG3416 ortholog
RNAi-pMON96172:001	Dv.8_CG1088; putative vacuolar H+ATPase E subunit: CG1088 ortholog
RNAi-pMON96168:001	Dv.9_CG2331; putative ATPase activity: CG2331 ortholog
RNAi-pMON78424:002	Dv.10_CG6141; putative ribosomal protein L9: CG6141 ortholog
RNAi-pMON78425:001	Dv.11_CG2746
RNAi-pMON78444:001	Dv.12_CG1341; putative proteasome regulatory particle, rpt1:

	CG1341 ortholog
RNAi-pMON78416:002	Dv.13_CG11276; putative ribosomal protein S4: CG11276 ortholog
RNAi-pMON78434:001	Dv.14_CG17927_2; putative myosin heavy chain: CG17927 ortholog
RNAi-pMON78435:001	Dv.18_CG1404; putative RAN small monomeric GTPase: CG1404 ortholog
RNAi-pMON78449:001	Dv.19_CG18174; putative proteasome regulatory particle, lid subcomplex, rpn11: CG18174 ortholog
RNAi-pMON78440:001	Dv.20_CG3180; putative DNA-directed RNA polymerase II: CG3180 ortholog
RNAi-pMON78420:001	Dv.21_CG3320; putative Rab1: CG3320 ortholog
RNAi-pMON78410:001	Dv.22_CG3395; putative Ribosomal protein S9: CG3395 ortholog
RNAi-pMON78422:001	Dv.23_CG7269; putative helicase: CG7269 ortholog
RNAi-pMON78414:006	DV.26 sec1 ~ 5' half of EST
RNAi-pMON78414:001	Dv.26_CG9261; putative sodium/potassium-exchanging ATPase: CG9261 ortholog
RNAi-pMON97122:001	C1_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON97127:001	C2_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON97125:001	C3_Dv.35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON78427:001	Dv.35_CG3762; putative Vha68-2: CG3762 ortholog.
RNAi-pMON97114:001	Dv.41_CG2637; Female sterile Ketel; involved in protein-nucleus import: CG2637 ortholog
RNAi-pMON97140:001	Dv.44_CG1244; Putative nucleic acid binding activity: CG1244 ortholog
RNAi-pMON78429:001	Dv.46_CG10689; putative RNA helicase: CG10689 ortholog.
RNAi-pMON78428:001	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog
RNAi-pMON78428:003	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog Free region selected from DV.49
RNAi-pMON78426:001	Dv.50_CG10110_1; putative Cleavage and polyadenylation specificity factor: CG10110_1 ortholog
RNAi-pMON96185:001	Dv.55_CG5931; putative splicing factor activity, RNA helicase activity: CG5931 ortholog
RNAi-pMON78431:001	Dv.58_CG1751; putative signal peptidase: CG1751 ortholog
RNAi-pMON96177:001	Dv.61_CG3725_1; putative Calcium ATPase: CG3725 ortholog
RNAi-pMON96182:001	Dv.61_CG3725_2; putative Calcium ATPase: CG3725 ortholog
RNAi-pMON96180:001	Dv.65_CG7033; putative chaperone activity: CG7033 ortholog
RNAi-pMON96176:001	Dv.66_CG32019; putative bent: CG32019 ortholog
RNAi-pMON96170:001	Dv.67_CG16916; putative endopeptidase activity: CG16916 ortholog
RNAi-pMON96166:001	Dv.70_CG5771; putative Rab-protein 11: CG5771 ortholog
RNAi-pMON96160:001	Dv.74_CG6375; putative pitchoune: CG6375 ortholog
RNAi-pMON97137:001	Dv.77_CG4214; putative Syntaxin 5; involved in intracellular protein transport: CG4214 ortholog
RNAi-pMON96167:001	Dv.82_CG8264; putative Bx42: CG8264 ortholog
RNAi-pMON96187:002	Dv.85_CG4494; putative protein binding activity: CG4494 ortholog
RNAi-pMON97126:001	Dv.88_CG8756; function unknown; contains chitin binding domain: CG8756 ortholog
RNAi-pMON97130:001	Dv.93_CG8515; putative structural constituent of cuticle; contains

	chitin binding domain: CG8515 ortholog
RNAi-pMON97111:001	Dv.105_CG1250_1; GTPase activator, involved in intracellular protein transport: CG1250 ortholog
RNAi-pMON97107:001	Dv.107_CG14813; COPI vesicle coat; involved in Golgi to ER intracellular protein transport: CG14813 ortholog
RNAi-pMON97115:001	Dv.108_CG17248; n-synaptobrevin; involved in intracellular protein transport: CG17248 ortholog
RNAi-pMON97133:001	Dv.113; function unknown; WCR unique sequence
RNAi-pMON97121:001	Dv.122_CG3164; putative ATP-binding cassette transporter activity: CG3164 ortholog
RNAi-pMON97134:001	Dv.127; function unknown; no homology with human

Table 4: dsRNA Constructs Causing Significant Stunting Levels in Feeding Bioassays with Southern Corn Rootworm (SCR) Larvae

Vector	Sequence Expressed as dsRNA
RNAi-pMON96172:001	Dv8_CG1088; putative vacuolar H+ATPase E subunit: CG1088 ortholog
RNAi-pMON96168:001	Dv9_CG2331; putative ATPase activity: CG2331 ortholog
RNAi-pMON78424:001	Dv.10_CG6141
RNAi-pMON96155:002	Dv.10_CG6141; putative ribosomal protein L9: CG6141 ortholog.
RNAi-pMON78425:001	Dv.11_CG2746
RNAi-pMON96158:002	Dv.11_CG2746; putative Ribosomal protein L19: CG2746 ortholog.
RNAi-pMON78416:001	Dv.13_CG11276
RNAi-pMON78434:001	Dv.14_CG17927_2; putative myosin heavy chain: CG17927 ortholog
RNAi-pMON78435:001	Dv.18_CG1404; putative RAN small monomeric GTPase: CG1404 ortholog
RNAi-pMON78449:001	Dv.19_CG18174; putative proteasome regulatory particle, lid subcomplex, rpn11: CG18174 ortholog
RNAi-pMON78419:001	Dv.20_CG3180
RNAi-pMON78420:001	Dv.21_CG3320; putative Rab1: CG3320 ortholog
RNAi-pMON78414:001	Dv.26_CG9261; putative sodium/potassium-exchanging ATPase: CG9261 ortholog
RNAi-pMON97122:001	C1_Dv35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON97125:001	C3_Dv35; putative Vha68-2: CG3762 ortholog; concatamer
RNAi-pMON78427:008	Dv.35_CG3762; putative Vha68-2: CG3762 ortholog.
RNAi-pMON78428:001	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog
RNAi-pMON78442:001	Dv.57_CG2968; putative hydrogen-exporting ATPase: CG2968 ortholog
RNAi-pMON96177:001	Dv61_CG3725_1; putative Calcium ATPase: CG3725 ortholog
RNAi-pMON96166:001	Dv70_CG5771; putative Rab-protein 11: CG5771 ortholog
RNAi-pMON97126:001	Dv88_CG8756; function unknown; contains chitin binding domain: CG8756 ortholog
RNAi-pMON97111:001	Dv105_CG1250_1; GTPase activator, involved in intracellular protein transport: CG1250 ortholog
RNAi-pMON97112:001	Dv105_CG1250_2; GTPase activator, involved in intracellular

	protein transport: CG1250 ortholog
RNAi-pMON97107:001	Dv107_CG14813; COPI vesicle coat; involved in Golgi to ER intracellular protein transport: CG14813 ortholog
RNAi-pMON97121:001	Dv122_CG3164; putative ATP-binding cassette transporter activity: CG3164 ortholog

Table 5: dsRNA Constructs Causing Significant Mortality Levels in Feeding Bioassays with Southern Corn Rootworm (SCR) Larvae

Vector	Sequence Expressed as dsRNA
RNAi-pIC17546:003	LIB5462-091-A1-M1-G3 Dv1_CG6217 KNICKKOPF UNK
RNAi-pIC17504:055	V-ATPase subunit 2 sequence from *Diabrotica virgifera virgifera* Full EST sequence serving as positive control
RNAi-pMON96155:001	Dv.10_CG6141; putative ribosomal protein L9: CG6141 ortholog
RNAi-pMON96158:001	Dv.11_CG2746; putative Ribosomal protein L19: CG2746 ortholog
RNAi-pMON78416:001	Dv.13_CG11276
RNAi-pMON96154:003	Dv.14_CG17927; putative myosin heavy chain: CG17927 ortholog; cells grown in S Complete medium.
RNAi-pMON78438:001	Dv.17_CG10149; putative proteasome p44.5 subunit, rpn6: CG10149 ortholog
RNAi-pMON78449:001	Dv.19_CG18174; putative proteasome regulatory particle, lid subcomplex, rpn11: CG18174 ortholog
RNAi-pMON78440:001	Dv.20_CG3180; putative DNA-directed RNA polymerase II: CG3180 ortholog
RNAi-pMON96156:001	Dv.20_CG3180; putative RNA polymerase II 140kD subunit: CG3180 ortholog
RNAi-pMON78420:001	Dv.21_CG3320; putative Rab1: CG3320 ortholog
RNAi-pMON78427:006	Dv.35_CG3762; putative Vha68-2: CG3762 ortholog.
RNAi-pMON78428:001	Dv.49_CG8055_1; putative binding, carrier activity: CG8055_1 ortholog
RNAi-pMON96177:001	Dv61_CG3725_1; putative Calcium ATPase: CG3725 ortholog
RNAi-pMON96166:001	Dv70_CG5771; putative Rab-protein 11: CG5771 ortholog
RNAi-pMON96174:001	Dv86_CG5055; putative bazooka: CG5055 ortholog
RNAi-pMON97111:001	Dv105_CG1250_1; GTPase activator, involved in intracellular protein transport: CG1250 ortholog
RNAi-pMON97107:001	Dv107_CG14813; COPI vesicle coat; involved in Golgi to ER intracellular protein transport: CG14813 ortholog

EXAMPLE 4

Transgenic Plant Transformation and Bioassays

Briefly, the sequence encoding a dsRNA construct as described above is linked at the 5' end to a sequence consisting of a 35S promoter operably linked to a maize hsp70 intron and at the 3' end to a Nos3' transcription termination and polyadenylation sequence. This expression cassette is placed downstream of a glyphosate selection cassette. These linked cassettes are then placed into an *Agrobacterium tumefaciens* plant transformation functional

vector, used to transform maize tissue to glyphosate tolerance, and events selected and transferred to soil. R_0 plant roots are fed to western corn rootworm larvae (WCR, *Diabrotica virgifera).* Transgenic corn roots are handed-off in Petri dishes with MS0D medium containing antibiotics and glyphosate for *in vitro* selection. Two WCR larvae are infested per root in each dish with a fine tip paintbrush. The dishes are sealed with Parafilm to prevent the larvae from escaping. The assays are placed into a 27° C, 60% RH Percival incubator in complete darkness. Contamination and larval quality are monitored. After six days of feeding on root tissue, the larvae are transferred to WCR diet in a 96 well plate. The larvae are allowed to feed on the diet for eight days making the full assay fourteen days long. Larval mass and survivorship are recorded for analysis. A one-way ANOVA analysis and a Dunnett's test is performed on the larval mass data to look for statistical significance compared to an untransformed negative control. WCR larvae stunting is measured after feeding on two events and compared to growth of larvae fed on negative control plants.

Transgenic corn plants (R_0) generated are planted into 10-inch pots containing Metromix soil after reaching an appropriate size. When plants reach the V4 growth stage, approximately 1000 Western corn rootworm (WCR, *Diabrotica virgifera*) eggs are infested into the root zone. Non-transgenic corn of the same genotype is infested at a similar growth stage to serve as a negative control. Eggs are pre-incubated so hatch occurs within 24 hours of infestation. Larvae are allowed to feed on the root systems for 3 weeks. Plants are removed from the soil and washed so that the roots can be evaluated for larval feeding. Root damage is rated using a Node Injury Scale (NIS) to score the level of damage where a 0 indicates no damage, a 1 indicates that one node of roots is pruned to within 1.5 inches, a 2 indicates that 2 nodes are pruned, while a 3 indicates that 3 nodes are pruned. Because the plants being used for evaluation are directly out of tissue culture after transformation and because transformation events are unique, only a single plant is evaluated per event at this time. The plants in the assay that present signs or symptoms of larval feeding indicate that a successful infestation is obtained. Negative control plant roots are moderately to severely damaged averaging whereas roots of the transgenic plants provide substantial control of larval feeding, with about 0.2 or less on the Node Injury Scale.

EXAMPLE 5

Implementing Insect Pest Gene Suppression Using A ta-siRNA Mediated Silencing Method

An alternative method to silence genes in a plant pest uses the recently discovered class of trans-acting small interfering RNA (ta-siRNA) (Dalmay *et al.*, 2000; Mourrain *et al.*, 2000; Peragine *et al*, 2004; Vazquez *et al*, 2004). ta-siRNA are derived from single strand RNA transcripts that are targeted by naturally occurring miRNA within the cell. Methods for using microRNA to trigger ta-siRNA for gene silencing in plants are described in US Provisional Patent Application Serial No. 60/643,136 (Carrington *et al.* 2004), incorporated herein by reference in its entirety. At least one pest specific miRNA expressed in gut epithelial cells of corn rootworm larvae is identified. This pest specific miRNA is then used to identify at least one target RNA transcript sequence complementary to the miRNA that is expressed in the cell. The corresponding target sequence is a short sequence of no more than 21 contiguous nucleotides that, when part of a RNA transcript and contacted by its corresponding miRNA in a cell type with a functional RNAi pathway, leads to slicer-mediated cleavage of said transcript. Once miRNA target sequences are identified, at least one miRNA target sequence is fused to a second sequence that corresponds to part of a pest gene that is to be silenced using this method. For example, the miRNA target sequence(s) is fused to any of SEQ ID NO:1 through SEQ ID NO:906, or a fragment thereof, such as a sequence of the corn rootworm vacuolar ATPase (V-ATPase) gene. The miRNA target sequence can be placed at the 5' end, the 3' end, or embedded in the middle of the target sequence. It may be preferable to use multiple miRNA target sequences corresponding to multiple miRNA genes, or use the same miRNA target sequence multiple times in the chimera of the miRNA target sequence and the target gene sequence. The target gene sequence can be of any length, with a minimum of 21 bp.

The chimera of the miRNA target sequence(s) and the target gene sequence is expressed in plant cells using any of a number of appropriate promoter and other transcription regulatory elements, as long as the transcription occurs in cell types subject to being provided in the diet of the pest, *e.g.* corn roots for control of corn rootworm.

This method may have the additional advantage of delivering longer RNA molecules to the target pest. Typically, dsRNAs produced in plants are rapidly processed by Dicer into short RNA's that may not be effective when fed exogenously to some pests. In this method, a single strand transcript is produced in the plant cell, taken up by the pest, and converted into a

dsRNA in the pest cell where it is then processed into ta-siRNA capable of post-transcriptionally silencing one or more genes in one or more target pests.

EXAMPLE 6

Method For Providing A DNA Sequence For dsRNA-Mediated Gene Silencing

This example illustrates a method for providing a DNA sequence for dsRNA-mediated gene silencing. More specifically, this example describes selection of an improved DNA useful in dsRNA-mediated gene silencing by (a) selecting from a target gene an initial DNA sequence including more than 21 contiguous nucleotides; (b) identifying at least one shorter DNA sequence derived from regions of the initial DNA sequence consisting of regions predicted to not generate undesirable polypeptides and not exhibiting identity with known sequences such as homologs/orthologs, and (c) selecting a DNA sequence for dsRNA-mediated gene silencing that includes the at least one shorter DNA sequence. Undesirable polypeptides include, but are not limited to, polypeptides homologous to allergenic polypeptides and polypeptides homologous to known polypeptide toxins.

WCR V-ATPase has been demonstrated to function in corn rootworm feeding assays to test dsRNA mediated silencing as a means of controlling larval growth. A cDNA sequence from a target gene, such as vacuolar ATPase gene (V-ATPase) from Western corn rootworm (WCR) (*Diabrotica virgifera virgifera* LeConte), is selected for use as an initial DNA sequence. This initial DNA sequence can be screened to identify regions within which every contiguous fragment including at least 21 nucleotides matches fewer than 21 out of 21 contiguous nucleotides of known vertebrate sequences. Sequence segments that are greater than about 100 contiguous nucleotides free of such 21/21 hits are identified. Thus criteria including segment length, GC content, sequence, predicted function based on sequence or function of a corresponding gene in a model organism, and predicted secondary structure (*e.g.* Elbashir, *et al.*, 2001b) may be used to select and design sequence(s) for use. Different combinations of these sequence segments are combined to construct chimeric DNA sequences for expression as dsRNA and use in insect feeding bioassays as described above.

EXAMPLE 7

Additional Results of Insect Feeding Bioassays with Sequences selected from EST Database

This example illustrates additional sequences found to be effective in causing larval stunting and/or mortality when ingested by rootworm larvae as double stranded RNA sequences. Methods for rearing corn rootworm larvae, application of dsRNA, and insect bioassays are as described in Examples 1-3. The results of the studies confirmed significant levels ($p<0.05$) of larval stunting and/or mortality using dsRNAs containing portions of sequences homologous to a variety of different gene classes. The sequences and vectors yielding significant stunting and/or mortality and the corresponding SEQ ID NO for the sequence expressed as a dsRNA are given in Table 6 below. pMON98503, an exemplary binary vector used in corn transformation, contains the following elements between the right and left T-DNA borders for transfer into a plant cell: e35S – HSP70 – DV49 (antisense orientation) - universal spacer – DV49 (sense orientation) – hsp17; ACT (promoter and intron) – CTP2 transit signal – CP4 – NOS.: pMON98504, another exemplary binary vector used in corn transformation, contains the following elements between the right and left borders: e35S – HSP70 – C1 (antisense orientation) - universal spacer – C1 (sense orientation) – hsp17; ACT (promoter and intron) – CTP2 transit signal – CP4 – NOS.

Table 6: Additional dsRNA Constructs Demonstrating Significant Stunting and/or Mortality Effect in Insect Feeding Bioassays with Southern Corn Rootworm or Western Corn Rootworm

Vector	Sequence Expressed as dsRNA	SEQ ID NO
pMON98356	Dv164; function unknown, WCR unique sequence	726
pMON98354	Dv172; function unknown, WCR unique sequence	727
pMON97191	Dv189; function unknown, WCR unique sequence	728
pMON98359	Dv200; function unknown, WCR unique sequence	729
pMON38880	Dv207_F39H11.5;putative pbs-7, endopeptidase: F39H11.5 ortholog	730
pMON101054	Dv208_F58F12_1; putative Mitochondrial F1F0-ATP synthase, subunit delta/ATP16: F58F12_1 ortholog	731
pMON98437	Dv210_K11H12_2; putative rpl-15, structural constituent of ribosome: K11H12_2 ortholog	732
pMON98435	Dv211_R12E2_3; putative rpn-8, translation initiation factor, 26S proteasome regulatory complex, subunit RPN8: R12E2_3 ortholog	733

Vector	Sequence Expressed as dsRNA	SEQ ID NO
pMON98447	Dv212_C17H12_14; putative vha-8, hydrogen-exporting ATPase: C17H12_14 ortholog	734
pMON98448	Dv213_B0464_1; putative drs-1, tRNA ligase: B0464_1 ortholog	735
pMON101059	Dv214_F53G12_10; putative rpl-7, structural constituent of ribosome: F53G12_10 ortholog	736
pMON98442	Dv216_C52E4_4; putative rpt-1, ATPase subunit of the 19S regulatory complex of the proteasome: C52E4_4 ortholog	737
pMON98441	Dv218_K01G5_4; putative ran-1, small monomeric GTPase: K01G5_4 ortholog	738
pMON98440	Dv219_C15H11_7; putative pas-1, endopeptidase: C15H11_7 ortholog	739
pMON101081	Dv223_R10E11.1; putative cbp-1, homolog of transcriptional cofactors CBP and p300: R10E11.1 ortholog	740
pMON101050	Dv224_F11C3_3; putative unc-54, ATP binding; motor activity: F11C3_3 ortholog	741
pMON101051	Dv225_C37H5_8; putative hsp-6, heat shock protein 6: C37H5_8 ortholog	742
pMON38888	Dv226_C47E12.5;putative uba-1, ubiquitin activating enzyme: C47E12.5 ortholog	743
pMON38887	Dv227_F54A3.3;putative Chaperonin complex component, TCP-1 gamma subunit: F54A3.3 ortholog	744
pMON101110	Dv229_D1081.8;putative Myb-like DNA binding: D1081.8 ortholog	745
pMON101052	Dv230_F55A11_2 ; putative syn-3, protein transporter; syntaxin: F55A11_2 ortholog	746
pMON101107	Dv231_C30C11.1;putative mitochondrial ribosomal protein L32: C30C11.1 ortholog	747
pMON101055	Dv232_B0250_1; putative rpl-2, structural constituent of ribosome: B0250_1 ortholog	748
pMON98446	Dv233_F54C9_5; putative rpl-5, 5S rRNA binding, structural constituent of ribosome: F54C9_5 ortholog	749
pMON101138	Dv235_C04F12.4 ;putative rpl-14, large ribosomal subunit L14 protein: C04F12.4 ortholog	750
pMON98449	Dv236_C01G8_5; putative erm-1, Ezrin/Radixin/Moesin (ERM) family of cytoskeletal linkers: C01G8_5 ortholog	751
pMON98439	Dv237_F57B9_10; putative rpn-6, proteasome Regulatory Particle, Non-ATPase-like: F57B9_10 ortholog	752
pMON98436	Dv240_F53A3_3; putative rps-22, structural constituent of ribosome: F53A3_3 ortholog	753
pMON101078	Dv241_F32H2.5; putative alcohol dehydrogenase, zinc-dependent: F32H2.5 ortholog	754
pMON101058	Dv242_B0336_2; putative arf-1, small monomeric GTPase: B0336_2 ortholog	755
pMON101057	Dv244_C14B9_7; putative rpl-21, structural constituent of ribosome: C14B9_7 ortholog	756
pMON98444	Dv245_C26F1_4; putative rps-30, Ribosomal Protein, Small subunit: C26F1_4 ortholog	757
pMON98434	Dv247_C13B9_3; putative delta subunit of the coatomer (COPI) complex: C13B9_3 ortholog	758

Vector	Sequence Expressed as dsRNA	SEQ ID NO
pMON101053	Dv248_F38E11_5; putative vesicle coat complex COPI, beta' subunit: F38E11_5 ortholog	759
pMON98445	Dv249_F37C12_9; putative rps-14, structural constituent of ribosome: F37C12_9 ortholog	760
pMON101056	Dv250_CD4_6; putative pas-6, endopeptidase: CD4_6 ortholog	761
pMON101104	Dv251_D1007.12 ;putative rpl-24.1, structural constituent of ribosome: D1007.12 ortholog	762
pMON101088	Dv252_C49H3.11; putative rps-2, structural constituent of ribosome: C49H3.11 ortholog	763
pMON101079	Dv253_C26D10.2; putative hel-1, ATP-dependent RNA helicase: C26D10.2 ortholog	764
pMON101085	Dv254_B0336.10; putative rpl-23, structural constituent of ribosome: B0336.10 ortholog	765
pMON38879	Dv255_C36A4.2;putative member of Cytochrome P450 family: C36A4.2 ortholog	766
pMON101087	Dv256_K05C4.1; putative pbs-5, proteasome beta subunit: K05C4.1 ortholog	767
pMON101082	Dv257_F29G9.5; putative rpt-2, 26S proteasome regulatory complex: F29G9.5 ortholog	768
pMON101084	Dv258_F40F8.10; putative rps-9, structural constituent of ribosome: F40F8.10 ortholog	769
pMON101083	Dv259_K07D4.3; putative rpn-11, 26S proteasome regulatory complex, subunit RPN11: K07D4.3 ortholog	770
pMON101080	Dv260_F49C12.8; putative rpn-7, proteasome Regulatory Particle, Non-ATPase-like: F49C12.8 ortholog	771
pMON101115	Dv261_D1054.2;putative pas-2, endopeptidase: D1054.2 ortholog	772
pMON101141	Dv263_F55A3.3;putative metalloexopeptidase: F55A3.3 ortholog	773
pMON101126	Dv264_F56F3.5;putative rps-1, structural constituent of ribosome: F56F3.5 ortholog	774
pMON101133	Dv266_C09D4.5;putative rpl-19, structural constituent of ribosome: C09D4.5 ortholog	775
pMON38881	Dv268_R06A4.9;putative Polyadenylation factor I complex, subunit PFS2: R06A4.9 ortholog	776
pMON101135	Dv271_F37C12.4;putative rpl-36, structural constituent of ribosome:F37C12.4 ortholog	777
pMON101132	Dv273_F54E7.2;putative rps-12, structural constituent of ribosome: F54E7.2 ortholog	778
pMON101139	Dv274_C23G10.4 ;putative rpn-2, proteasome Regulatory Particle, Non-ATPase-like: C23G10.4 ortholog	779
pMON101130	Dv275_C03D6.8;putative rpl-24.2, structural constituent of ribosome: C03D6.8 ortholog	780
pMON101119	Dv276_C26E6.4;putative DNA-directed RNA polymerase: C26E6.4 ortholog	781
pMON101134	Dv277_R13A5.8 ;putative rpl-9, structural constituent of ribosome: R13A5.8 ortholog	782
pMON101127	Dv279_F42C5.8;putative rps-8, structural constituent of ribosome: F42C5.8 ortholog	783

Vector	Sequence Expressed as dsRNA	SEQ ID NO
pMON101122	Dv280_F13B10.2;putative rpl-3, large ribosomal subunit L3: F13B10.2 ortholog	784
pMON101116	Dv281_T05C12.7;putative cct-1, Chaperonin complex component, TCP-1 alpha subunit: T05C12.7 ortholog	785
pMON101125	Dv282_F07D10.1;putative rpl-11.2, structural constituent of ribosome: F07D10.1 ortholog	786
pMON38883	Dv283_T05H4.6;putative Peptide chain release factor 1 (eRF1): Dv283_T05H4.6 ortholog	787
pMON101124	Dv284_C47E8.5;putative daf-21, Heat shock 90 protein, chaperone activity: C47E8.5 ortholog	788
pMON101120	Dv285_M03F4.2;putative act-4, actin: M03F4.2 ortholog	789
pMON101137	Dv286_F25H5.4;putative eft-2, translation elongation factor: F25H5.4 ortholog	790
pMON101140	Dv287_F26D10.3;putative hsp-1, Heat shock protein: F26D10.3 ortholog	791
pMON101117	Dv288_F28D1.7;putative rps-23, structural constituent of ribosome: F28D1.7 ortholog	792
pMON38886	Dv290_CG11979;putative H-exporting ATPase: CG11979 ortholog	793
pMON38885	Dv291_CG13628;putative H-exporting ATPase: CG13628 ortholog	794
pMON101103	Dv293_CG31237;putative DNA-directed RNA polymerase II: CG31237 ortholog	795
pMON101096	Dv294_CG8669;putative cryptocephal; transcription factor, involved in molting cycle, pupariation and metamorphosis: CG8669 ortholog	796
pMON101095	Dv295_CG8048;putative Vacuolar H+ ATPase 44kD C subunit: CG8048 ortholog	797
pMON101100	Dv298_CG9032;putative H-exporting ATPase: CG9032 ortholog	798
pMON101111	Dv299_CG17369;putative H-exporting ATPase: CG17369 ortholog	799
pMON101129	Dv303_CG4152;putative ATP-dependent RNA helicase: CG4152 ortholog	800
pMON101136	Dv305_CG4916;putative ATP-dependent RNA helicase: CG4919 ortholog	801
pMON101131	Dv315_CG9160;putative NADH dehydrogenase: CG9160 ortholog	802
pMON101123	Dv316_CG8764;putative ubiquinol-cytochrome-c reductase: CG8764 ortholog	803
pMON98364	C4_Dv49_CG8055 concatemer; putative binding, carrier activity: CG8055 ortholog	804
pMON98365	C5_Dv49_CG8055 concatemer; putative binding, carrier activity: CG8055 ortholog.	805
pMON98368	C6 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26, Dv49, Dv23, Dv20, Dv13, Dv22, Dv18	806
pMON98369	C7 concatemer of insect-specific targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv6, Dv1, Dv88, Dv93, Dv4, Dv113, Dv127, Dv99	807
pMON98372	C8 concatemer; putative sodium/potassium-exchanging ATPase: CG9261 ortholog	808

Vector	Sequence Expressed as dsRNA	SEQ ID NO
pMON98373	C9 concatemer; putative sodium/potassium-exchanging ATPase: CG9261 ortholog	809
pMON98366	C10 concatemer of genes with putative same/different mode of action, ~50% GC criterion	810
pMON98367	C12 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv23-Dv13-Dv26-Dv18-Dv49-Dv22-Dv20.	811
pMON98371	C14 concatemer of gene targets active in several different organisms, ~50% GC criterion	812
pMON98503	Comprising DV49 putative ESCRT-III (endosomal sorting complex required for transport III) complex subunit from *Diabrotica virgifera*	820
pMON98504	Comprising putative Vha68-2: CG3762 ortholog; 250bp concatamer C1;	821
pMON102862	Dv319_ CG14750;putative ESCRTII, Vps25: CG14750 ortholog	835
pMON102863	Dv320_CG9712;putative ESCRTI, Vps23: CG9712 ortholog	836
pMON102861	Dv321_CG12770;putative ESCRTI, Vps28: CG12770 ortholog	837
pMON102865	Dv322_ CG14542;putative ESCRT III, Vps2: CG14542 ortholog	838
pMON102866	Dv323_CG4071;putative ESCRT III, Vsp20: CG4071 ortholog	839
pMON102871	Dv326_CG3564;putative protein carrier, component of the COPI vesicle coat: CG3564 ortholog	840
pMON102873	Dv327_CG6223;putative coatomer, component of the COPI vesicle coat: CG6223 ortholog	841
pMON102877	Dv328_CG6948;putative Clathrin light chain, coat of coated pit: CG6948 ortholog	842
pMON102872	Dv330_CG9543;putative COPI vesicle coat: CG9543 ortholog	843
pMON102879	Dv331_CG5183;putative KDEL sequence binding:CG5183 ortholog	844
pMON102867	Dv335_F11C1.6;putative nhr-25, DNA binding: F11C1.6 ortholog	845
pMON102870	Dv337_CG18734;putative furin 2, serine-type endopeptidase: CG18734 ortholog	846
pMON102875	Dv329_CG7961;putative coatomer, component of the COPI vesicle coat: CG7961 ortholog	874

Efficacy tests were conducted as follows, utilizing progeny of corn plants transformed with selected insect control constructs:

1. Seven days post planting: incubate 10,000 WCR eggs per event (10 plants per event) at 25° C, 60%RH in complete darkness for seven days.

2. Fourteen days post infestation: plants are transplanted from 4"peat pots to 8" pots; v4 root tip samples may be taken for gene expression studies.

3. Fourteen days post planting: wash the WCR eggs out of the soil. Place the eggs and soil into a 60-mesh screen and place a 30-mesh screen on top of the 60 –mesh screen to protect the eggs from the water stream. Rinse thoroughly with warm water using a spray nozzle until the soil is removed.

4. Suspend the eggs in a 2% (w/v) Difco agar solution, 25 mL of solution per 1 mL of eggs. The eggs are infested into the soil in about 3 or 4 aliquots using, for example, an Eppendorf repeater pipette, about 1000 eggs per plant. Holes are made into the soil using a spatula prior to infestation and covered after infestation.

5. Twenty-eight days post planting v8 root tip samples may be taken for gene expression studies.

6. Thirty-five days post planting; the assay is evaluated. Plants are cut down using pruning sheers, leaving about 6" of stalk. Plant stakes containing the event information are hole-punched and zip tied to the stalk. As much soil as possible is removed from the root system. The remainder of the soil is washed off using a spray hose.

7. The roots are examined and given a root damage rating by using the Olsen (0-3) NIS scale for WCR larvae damage.

FIG. 1 and FIG. 2 illustrate insect control results obtained following challenge of F1 corn plants (derived from plants transformed with either pMON98503 or pMON98504) with WCR. In growth chamber efficacy tests performed essentially as described above, NIS scores at or below the economic injury threshold were seen in progeny of events derived by transformation with pMON98503 or pMON98504.

Full length EST DNA sequences were assembled for selected genes described in Examples 3 and 7 displaying significant activity versus Western Corn Rootworm. These EST sequences are listed in Table 7:

Table 7: Assembled EST Sequences for WCR Targets

Assembled Sequence	SEQ ID NO
Dv9 full length (aka Apple); putative ortholog of CG2331	813
Dv10 full length (Rp19); putative ortholog of CG6141	814
Dv11 full length (Rpl19); putative ortholog of CG2746	815
Dv13 full length (Rps4); putative ortholog of CG11276	816
Dv35 full length v-ATPase A; ortholog of CG3762	817
Dv49 full length ortholog of CG8055	818
Dv248 full length putative ortholog of CG6699	819

EXAMPLE 8

Creation and Efficacy Results for Dv49 and Dv248 sequences

Portions of the assembled EST and adjacent sequences of Dv49 (SEQ ID NO:818) and Dv248 (SEQ ID NO:819) were selected for further bioactivity assays based on criteria including predicted function, phenotype of knockout mutants of corresponding coding regions in other organisms, segment length, GC content, similarity to known sequences, and predicted secondary structure (*e.g.* Elbashir, *et al.*, 2001b). The respective Dv49 and Dv248 sequences were synthesized *in vitro* based on their predicted activity against WCR individually, as well as grouped as shown in FIGs. 3-4, and Table 8, and applied to WCR larvae.

Table 8: Dv49 and Dv248 Fragments Assessed for Efficacy Against WCR

Fragment	SEQ ID NO
F1	822
F2	823
F3	824
F4	825
F5	826
F6	827
F7	828
F8	829
F9	830
F10	831
F11	832
F12	833
F13	834

Fragments F1- F3 correspond to portions of the full length Dv49 transcript. Fragments F4- F6 correspond to portions of the Dv248 transcript or flanking region. Fragments F7- F13 are concatemers of two or more of fragments F1- F6, as shown in FIG. 4. Fragment F13 (SEQ ID NO:834) represents the C38 (Dv49-Dv248) concatemer.

Dose Response data for F1- F13 is shown in FIGs. 5-7. As shown in FIG. 5, activity (larval % mortality) of fragments F4-F6, comprising Dv248-derived sequences (FIG. 4), was significantly better than the control when fed to WCR larvae at 0.1 ppm. Fragment F6 displayed significant activity when fed at 0.02 ppm as well. Activity of fragment F5 at the lowest dose is likely an artifact, since surviving larvae displayed no stunting.

As shown in FIG. 6, each of fragments F7- F10 displays statistically significant activity when fed to WCR larvae at 0.1 ppm. Fragments F9 and F10 also displayed statistically significant activity when fed to WCR larvae at 0.02 ppm, and fragment F10 displayed statistically significant activity when fed to WCR larvae at 0.01 ppm as well. Activity of F8 at 0.01 ppm may be an artifact.

As shown in FIG. 7, fragments F11- F13 display statistically significant activity when fed to WCR larvae at 0.02 ppm or higher. Additionally, the largest fragments (F12 and F13) show activity at 0.005 ppm and higher.

EXAMPLE 9

Additional Active Concatemer Sequences Derived from Concatemer C6

As shown in Table 9, portions of active concatemer C6 (SEQ ID NO:806), derived from pMON98368, were identified in diet overlay bioassays (performed as described *e.g.* in Example 2) as inhibiting the growth and/or survival of corn rootworm (WCR). The C6 full length concatemer contains 7 target subfragments of 70bp each, as noted in Table 6 and Table 9.

Table 9 Efficacy of full length C6 concatemer and selected sub-portions in rootworm diet bioassay (SEQ ID NOs:806, 847-873).

atemer	Segments	% Mortality at 1 ppm	SEQ ID NO
ull length	Dv26-Dv49-Dv23-Dv20-Dv13-Dv22-Dv18	100	806
	Dv26-Dv49	35.3	847
	Dv26-Dv49-Dv23	57.1	848
	Dv26-Dv49-Dv23-Dv20	84.7	849
	Dv26-Dv49-Dv23-Dv20-Dv13	51	850
	Dv26-Dv49-Dv23-Dv20-Dv13-Dv22	41.3	851
	Dv49-Dv23	94.6	852
	Dv49-Dv23-Dv20	75.6	853
	Dv49-Dv23-Dv20-Dv13	50	854
	Dv49-Dv23-Dv20-Dv13-Dv22	56.4	855
0	Dv49-Dv23-Dv20-Dv13-Dv22-Dv18	52.5	856

catemer	Segments	% Mortality at 1 ppm	SEQ ID NO
1	Dv23-Dv20	74.6	857
2	Dv23-Dv20-Dv13	63.4	858
3	Dv23-Dv20-Dv13-Dv22	58.5	859
4	Dv23-Dv20-Dv13-Dv22-Dv18	60.8	860
5	Dv20-Dv13	57.5	861
6	Dv20-Dv13-Dv22	20	862
7	Dv20-Dv13-Dv22-Dv18	44.8	863
8	Dv13-Dv22	71.1	864
9	Dv13-Dv22-Dv18	52.5	865
0	Dv22-Dv18	44.6	866
8	Dv26	58.9	867
9	Dv49	72.3	868
0	Dv23	71.9	869
1	Dv20	62.6	870
2	Dv13	54.2	871
3	Dv22	56.7	872
4	Dv18	44.6	873

Full length concatemer C7 contains 8 target sub-fragments of 70 bp each, as noted in Table 6. Similarly, full length concatemer C12 contains 7 target sub-fragments from Dv23-Dv13-Dv26-Dv18-Dv49-Dv22-Dv20, ranging in length between 53-80 bp, as noted in Table 6 and Table 10.

Table 10 Composition of full length C12 concatemer and selected sub-portions (SEQ ID NOs:811, 887-892).

Concatemer	Segments	Included sequence (SEQ ID NO) in 5'-3' direction
C12_full length	Dv23-Dv13-Dv26-Dv18-Dv49-Dv22-Dv20	811

Concatemer	Segments	Included sequence (SEQ ID NO) in 5'-3' direction
C12.1	Dv23-Dv13	887
C12.2	Dv23-Dv13-Dv26	888
C12.3	Dv23-Dv13-Dv26-Dv18	889
C12.4	Dv23-Dv13-Dv26-Dv18-Dv49	890
C12.5	Dv23-Dv13-Dv26-Dv18-Dv49-Dv22	891
C12.6	Dv13-Dv26	892
C12.7	Dv13-Dv26-Dv18	893
C12.8	Dv13-Dv26-Dv18-Dv49	894
C12.9	Dv13-Dv26-Dv18-Dv49-Dv22	895
C12.10	Dv13-Dv26-Dv18-Dv49-Dv22-Dv20	896
C12.11	Dv26-Dv18	897
C12.12	Dv26-Dv18-Dv49	898
C12.13	Dv26-Dv18-Dv49-Dv22	899
C12.14	Dv26-Dv18-Dv49-Dv22-Dv20	900
C12.15	Dv18-Dv49	901
C12.16	Dv18-Dv49-Dv22	902
C12.17	Dv18-Dv49-Dv22-Dv20	903
C12.18	Dv49-Dv22	904
C12.19	Dv49-Dv22-Dv20	905
C12.20	Dv22-Dv20	906

Table 11 lists additional sequences for use in targeting other coleopteran pests, including *Diabrotica* sp. and other *Coccinellidae* and *Chrysomelidae*.

Table 11: Additional Coleopteran Target Sequences

Sequence and source	SEQ ID NO
Dbar248_CG6699 (*D. barberi*)	875
Dbal248_CG6699 (*D. balteata*)	876
Du248_CG6699 (*D. undecimpunctata howardi*)	877
Dz248_CG6699 (*D. virgifera zea*)	878
Dv248_CG6699 (*D. virgifera virgifera*)	879
Ev248_CG6699 (*Epilachna varivestis*)	880
Ld248_CG6699 (*Leptinotarsa decemlineata*)	881
Dbal49_CG8055_2 (*D. balteata*)	882
Db49_CG8055_2 (*D. barberi*)	883
Du49_CG8055_2 (*D. undecimpunctata howardi*)	884
Dz49_CG8055_2 (*D. virgifera zea*)	885
Dv49_CG8055_2 (*D. virgifera virgifera*)	886

* * *

All of the compositions and methods disclosed and claimed herein can be made and executed without undue experimentation in light of the present disclosure. While the compositions and methods of this invention have been described in terms of the foregoing illustrative embodiments, it will be apparent to those of skill in the art that variations, changes, modifications, and alterations may be applied to the composition, methods, and in the steps or in the sequence of steps of the methods described herein, without departing from the true concept, spirit, and scope of the invention. More specifically, it will be apparent that certain agents that are both chemically and physiologically related may be substituted for the agents described herein while the same or similar results would be achieved. All such similar substitutes and modifications apparent to those skilled in the art are deemed to be within the spirit, scope, and concept of the invention as defined by the appended claims.

References

The following references, to the extent they provide exemplary procedural or other details supplemental to those set forth herein, are specifically incorporated herein by reference:

U.S. Patent: 4,245,432; U.S. Patent 4,272,417; U.S. Patent 4,339,456; U.S. Patent 4,372,080; U.S. Patent 4,383,391; U.S. Patent 4,465,017 ; U.S. Patent 4,536,475; U.S. Patent 4,634,587; U.S. Patent 4,693,977; U.S. Patent 4,735,015; U.S. Patent 4,759,945; U.S. Patent 4,876,197; U.S. Patent 4,880,734; U.S. Patent 4,886,937; U.S. Patent 4,959,317; U.S. Patent 5,080,925; U.S. Patent 5,107,065; U.S. Patent 5,107,787; U.S. Patent 5,231,020; U.S. Patent 5,283,184; U.S. Patent 5,300,127; U.S. Patent 5,302,523; U.S. Patent 5,328,942; U.S. Patent 5,384,253; U.S. Patent 5,389,399; U.S. Patent 5,464,765; U.S. Patent 5,501,967; U.S. Patent 5,527,695; U.S. Patent 5,538,877; U.S. Patent 5,538,880; U.S. Patent 5,550,318; ; U.S. Patent 5,554,445; U.S. Patent 5,563,055; U.S. Patent 5,580,544; U.S. Patent 5,591,616; U.S. Patent 5,593, 874; U.S. Patent 5,622,003; U.S. Patent 5,633,435; U.S. Patent 5,661,103; U.S. Patent 5,698,425; U.S. Patent 5,712,135; U.S. Patent 5,759,829; U.S. Patent 5,780,708; U.S. Patent 5,789,214; U.S. Patent 5,791,084; U.S. Patent 5,804,693; U.S. Patent 5,834,447; U.S. Patent 5,837,848; U.S. Patent 5,849,320; U.S. Patent 5,876,739; U.S. Patent 5,882,713; U.S. Patent 5,891,246; U.S. Patent 5,918,413; U.S. Patent 5,939,356; U.S. Patent 6,118,047; U.S. Patent 6,326,193; U.S. Patent 6,489,542; U.S. Patent 6,506,559;

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WHAT IS CLAIMED IS:

1. An isolated polynucleotide selected from the group consisting of:

(a) a polynucleotide comprising a nucleic acid sequence of SEQ ID NO:1 through SEQ ID NO:906;

(b) a polynucleotide that hybridizes to a nucleic acid sequence of SEQ ID NO:1 through SEQ ID NO:906 under wash conditions of 5X SSC, 50% formamide and 42°C for 10 minutes;

(c) a polynucleotide comprising at least 70% sequence identity to a nucleic acid sequence of SEQ ID NO:1 through SEQ ID NO:906;

(d) a fragment of at least 21 contiguous nucleotides of a nucleic acid sequence of SEQ ID NO:1 through SEQ ID NO:906, wherein ingestion by a coleopteran plant pest of a double stranded ribonucleotide sequence comprising at least one strand that is complementary to said fragment inhibits the growth of said pest; and

(e) a complement of the sequence of (a), (b), (c) or (d).

2. The isolated polynucleotide of claim 1 selected from the group consisting of SEQ ID NO:697, SEQ ID NOs:813-819, SEQ ID NO:841, and SEQ ID NO:874.

3. The isolated polynucleotide of claim 1, defined as operably linked to a heterologous promoter.

4. The isolated polynucleotide of claim 1, defined as comprised on a plant transformation vector.

5. A double stranded ribonucleotide sequence produced from the expression of a polynucleotide according to claim 1, wherein ingestion of said ribonucleotide sequence by a coleopteran plant pest inhibits the growth of said pest.

6. The double stranded ribonucleotide sequence of claim 5, defined as produced by preparing a recombinant polynucleotide sequence comprising a first, a second and a third polynucleotide sequence, wherein the first polynucleotide sequence comprises the isolated polynucleotide of claim 1, wherein the third polynucleotide sequence is linked to the first polynucleotide sequence by the second polynucleotide sequence, and wherein the third polynucleotide sequence is substantially the reverse complement of the first polynucleotide sequence such that the first and the third polynucleotide sequences hybridize when transcribed into a ribonucleic acid to form the double stranded ribonucleotide molecule stabilized by the linked second ribonucleotide sequence.

7. The double stranded ribonucleotide sequence of claim 5, wherein ingestion of the polynucleotide sequence by the pest inhibits the expression of a nucleotide sequence substantially complementary to said polynucleotide sequence.

8. A cell transformed with the polynucleotide of claim 1.

9. The cell of claim 8, defined as a prokaryotic cell.

10. The cell of claim 8, defined as a eukaryotic cell.

11. The cell of claim 8, defined as a plant or bacterial cell.

12. A plant transformed with the polynucleotide of claim 1.

13. A seed of the plant of claim 12, wherein the seed comprises the polynucleotide.

14. A plant transformed with the polynucleotide of claim 2.

15. The plant of claim 12, wherein said polynucleotide is expressed in a cell of the plant as a double stranded ribonucleotide sequence and ingestion of an insect pest inhibitory amount of said double stranded ribonucleotide sequence in a diet inhibits the pest from further feeding on said diet.

16. The plant of claim 15, wherein the insect pest is selected from the group consisting of *Diabrotica virgifera, Diabrotica virgifera virgifera, Diabrotica virgifera zea, Diabrotica balteata, Diabrotica barberi, Diabrotica viridula, Diabrotica speciosa,* and *Diabrotica undecimpunctata.*

17. The plant of claim 15, wherein ingestion of the insect pest inhibitory amount of the double stranded ribonucleotide sequence stunts the growth of the pest.

18. A commodity product produced from a plant according to claim 12, wherein said commodity product comprises a detectable amount of the polynucleotide of claim 1 or a ribonucleotide expressed therefrom.

19. A method for controlling coleopteran pest infestation comprising providing in the diet of a coleopteran pest an agent comprising a first polynucleotide sequence that functions upon ingestion by the pest to inhibit a biological function within said pest, wherein said polynucleotide sequence exhibits from about 95 to about 100% nucleotide sequence identity along at least from about 19 to about 25 contiguous nucleotides to a coding sequence derived from said pest and is hybridized to a second polynucleotide sequence that is complementary to said first polynucleotide sequence, and wherein said coding sequence derived from said pest is selected from the group consisting of SEQ ID NO:1 through SEQ ID NO:906, and the complements thereof.

20. The method of claim 19, wherein said coleopteran pest is a *Diabrotica spp.* is selected from the group consisting of *Diabrotica virgifera*, *Diabrotica virgifera virgifera*, *Diabrotica virgifera zea*, *Diabrotica balteata*, *Diabrotica barberi*, *Diabrotica viridula*, *Diabrotica speciosa*, and *Diabrotica undecimpunctata*.

21. A method for controlling a coleopteran pest infestation comprising providing in the diet of a coleopteran pest a plant cell expressing a polynucleotide sequence according to claim 1, wherein the polynucleotide is expressed to produce a double stranded ribonucleic acid that functions upon ingestion by the pest to inhibit the expression of a target sequence within said pest and results in decreased feeding on said diet relative to a diet lacking the plant cell.

22. The method of claim 21, wherein the pest exhibits reduced growth following ingestion of the cell.

23. The method of claim 21, wherein the plant cell further comprises a polynucleotide sequence encoding a pesticidal agent selected from the group consisting of a patatin, a *Bacillus thuringiensis* insecticidal protein, a *Xenorhabdus* insecticidal protein, a *Photorhabdus* insecticidal protein, a *Bacillus laterosporus* insecticidal protein, and a *Bacillus sphaericus* insecticidal protein.

24. The method of claim 23 wherein said *Bacillus thuringiensis* insecticidal protein is selected from the group consisting of a Cry1, a Cry3, a TIC851, a CryET70, a Cry22, a TIC901, a TIC201, a TIC407, a TIC417, a binary insecticidal protein CryET33 and CryET34, a binary insecticidal protein CryET80 and CryET76, a binary insecticidal protein TIC100 and TIC101, a combination of the insecticidal proteins ET29 or ET37 with insecticidal proteins TIC810 or TIC812, and a binary insecticidal protein PS149B1.

25. The method of claim 21, wherein the target sequence encodes a protein, the predicted function of which is selected from the group consisting of muscle formation, juvenile hormone formation, juvenile hormone regulation, ion regulation and transport, digestive enzyme synthesis, maintenance of cell membrane potential, amino acid biosynthesis, amino acid degradation, sperm formation, pheromone synthesis, pheromone sensing, antennae formation, wing formation, leg formation, development and differentiation, egg formation, larval maturation, digestive enzyme formation, haemolymph synthesis, haemolymph maintenance, neurotransmission, cell division, energy metabolism, respiration, and apoptosis.

26. The method of claim 21, wherein said coleopteran pest is a *Diabrotica spp.* is selected from the group consisting of *Diabrotica virgifera, Diabrotica virgifera virgifera, Diabrotica virgifera zea, Diabrotica balteata, Diabrotica barberi, Diabrotica viridula, Diabrotica speciosa,* and *Diabrotica undecimpunctata.*

27. The method of claim 21, wherein the polynucleotide functions upon ingestion by the pest to suppress a gene that performs a function essential for insect survival, said function being selected from the group consisting of feeding by the pest, pest cell apoptosis, cell differentiation and development, capacity or desire for sexual reproduction, muscle formation, muscle twitching, muscle contraction, juvenile hormone formation, juvenile hormone regulation, ion regulation and transport, maintenance of cell membrane potential, amino acid biosynthesis, amino acid degradation, sperm formation, pheromone synthesis, pheromone sensing, antennae formation, wing formation, leg formation, egg formation, larval maturation, digestive enzyme formation, haemolymph synthesis, haemolymph maintenance, neurotransmission, larval stage transition, pupation, emergence from pupation, cell division, energy metabolism, respiration, and formation of cytoskeletal structure.

28. A method for improving the yield of a crop produced from a crop plant subjected to insect pest infestation, said method comprising the steps of,

a) introducing a polynucleotide according to claim 1 into said crop plant,

b) cultivating the crop plant to allow the expression of said polynucleotide, wherein expression of the polynucleotide inhibits feeding by insects pests and loss of yield due to pest infestation.

29. The method of claim 28, wherein expression of the polynucleotide produces an RNA molecule that suppresses at least a first target gene in an insect pest that has ingested a portion of said crop plant, wherein the target gene performs at least one essential function selected from the group consisting of feeding by the pest, viability of the pest, pest cell apoptosis, differentiation and development of the pest or any pest cell, sexual reproduction by the pest, muscle formation, muscle twitching, muscle contraction, juvenile hormone formation and/or reduction, juvenile hormone regulation, ion regulation and transport, maintenance of cell membrane potential, amino acid biosynthesis, amino acid degradation, sperm formation, pheromone synthesis, pheromone sensing, antennae formation, wing formation, leg formation, egg formation, larval maturation, digestive enzyme formation, haemolymph synthesis, haemolymph maintenance, neurotransmission, larval stage transition, pupation, emergence from pupation, cell division, energy metabolism, respiration, cytoskeletal structure synthesis and maintenance, nucleotide metabolism, nitrogen metabolism, water use, water retention, and sensory perception.

30. The method of claim 28, wherein the insect pest is a corn rootworm pest selected from the group consisting of *Diabrotica undecimpunctata howardi* (Southern Corn Rootworm (SCR)), *Diabrotica virgifera virgifera* (Western Corn Rootworm (WCR)), *Diabrotica barberi* (Northern Corn Rootworm (NCR)), *Diabrotica virgifera zea* (Mexican Corn Rootworm (MCR)), *Diabrotica balteata* (Brazilian Corn Rootworm (BZR)), *Diabrotica viridula* (Brazilian Corn Rootworm (BZR)), and *Diabrotica speciosa* (Brazilian Corn Rootworm (BZR)).

31. A method for improving the drought tolerance of a crop produced from a crop plant subjected to insect pest infestation, said method comprising the steps of,

a) introducing a polynucleotide according to claim 1 into said crop plant,

b) cultivating the crop plant to allow the expression of said polynucleotide, wherein expression of the polynucleotide inhibits feeding by insects pests and loss of drought tolerance due to pest infestation.

32. A method of producing a commodity product comprising obtaining a plant according to claim 12 or a part thereof, and preparing a commodity product from the plant or part thereof.

33. A method of producing food or feed, comprising obtaining a plant according to claim 12 or a part thereof and preparing food or feed from said plant or part thereof.

34. The method of claim 33, wherein the food or feed is defined as oil, meal, protein, starch, flour or silage.

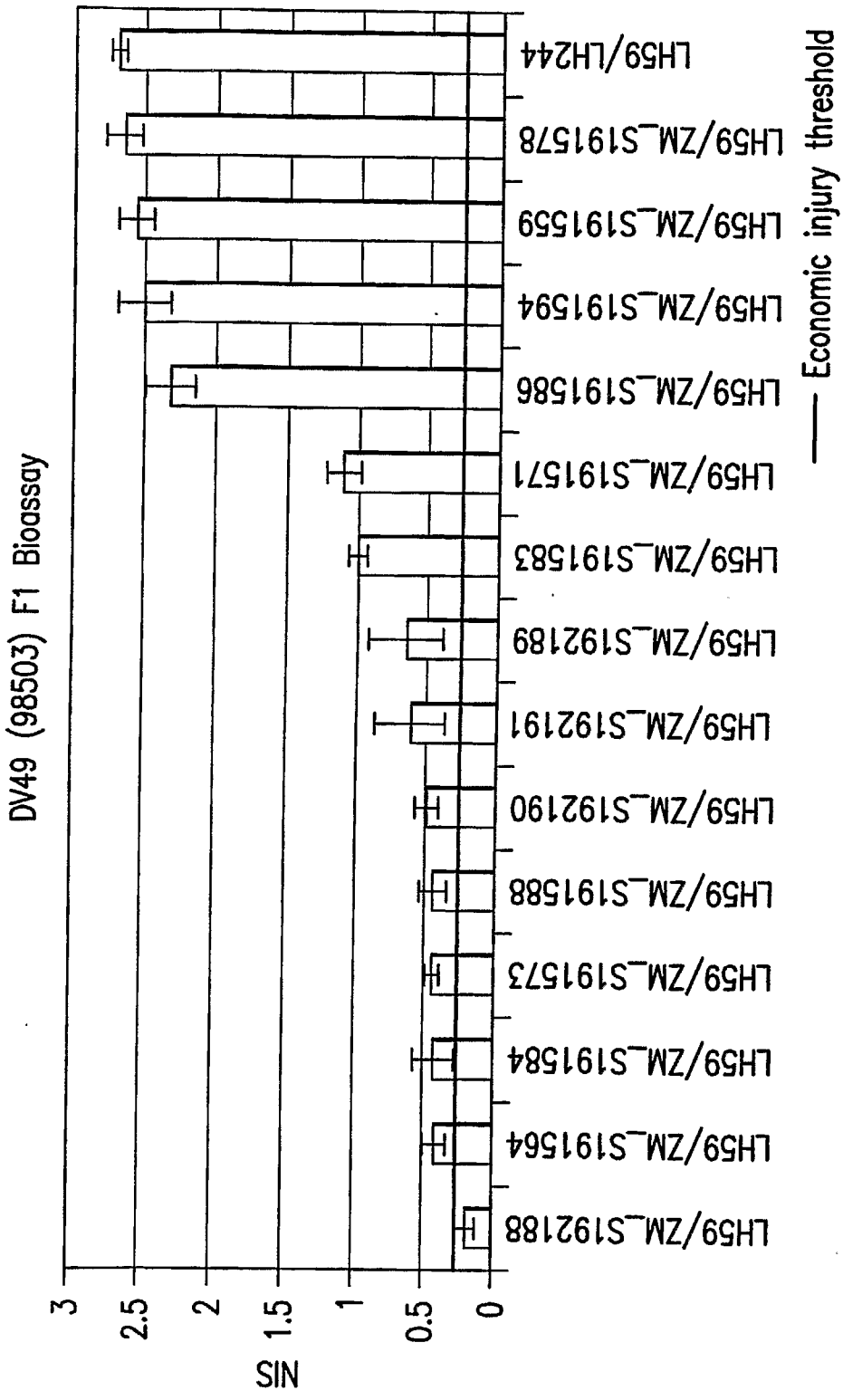
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FIG. 1

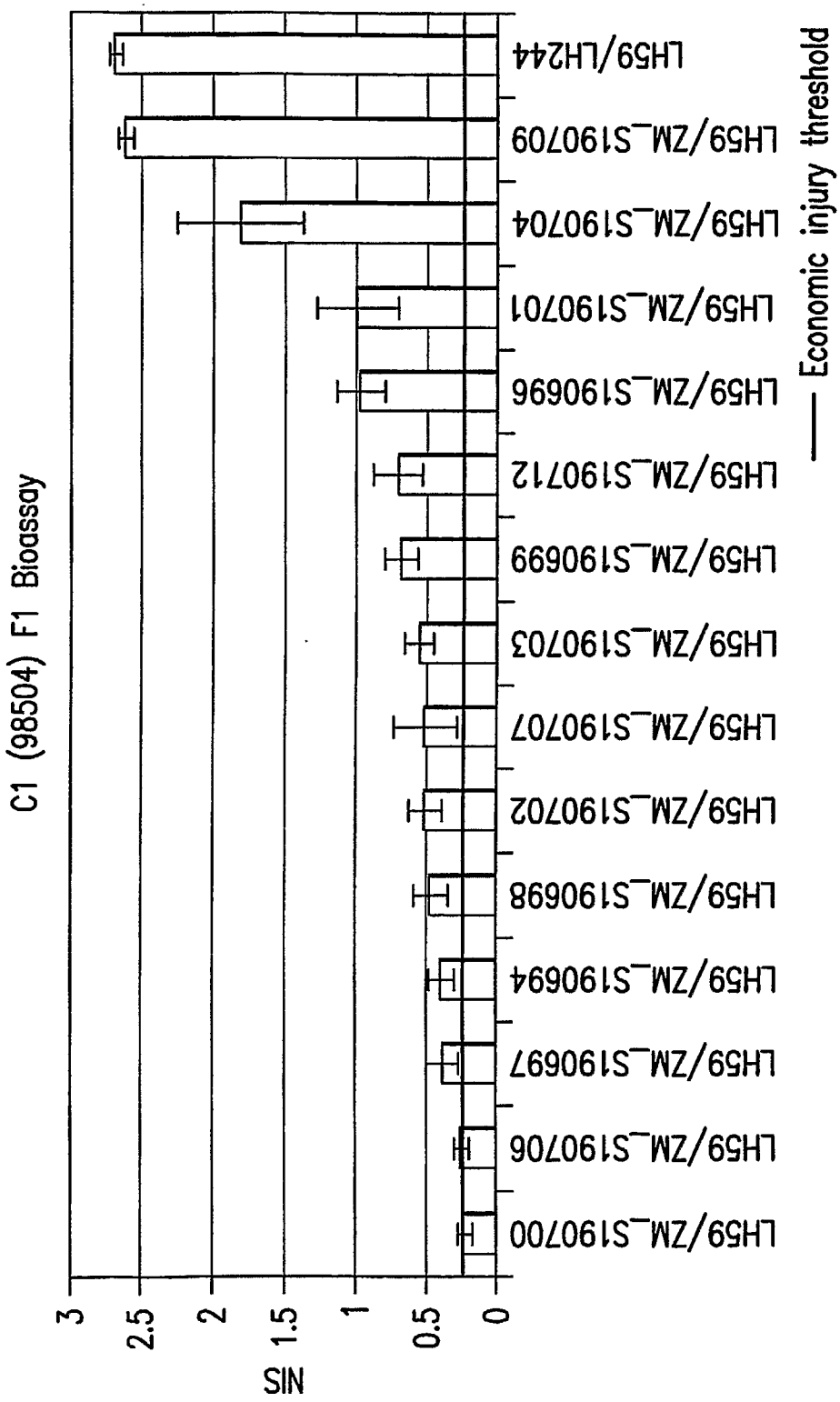
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FIG.2

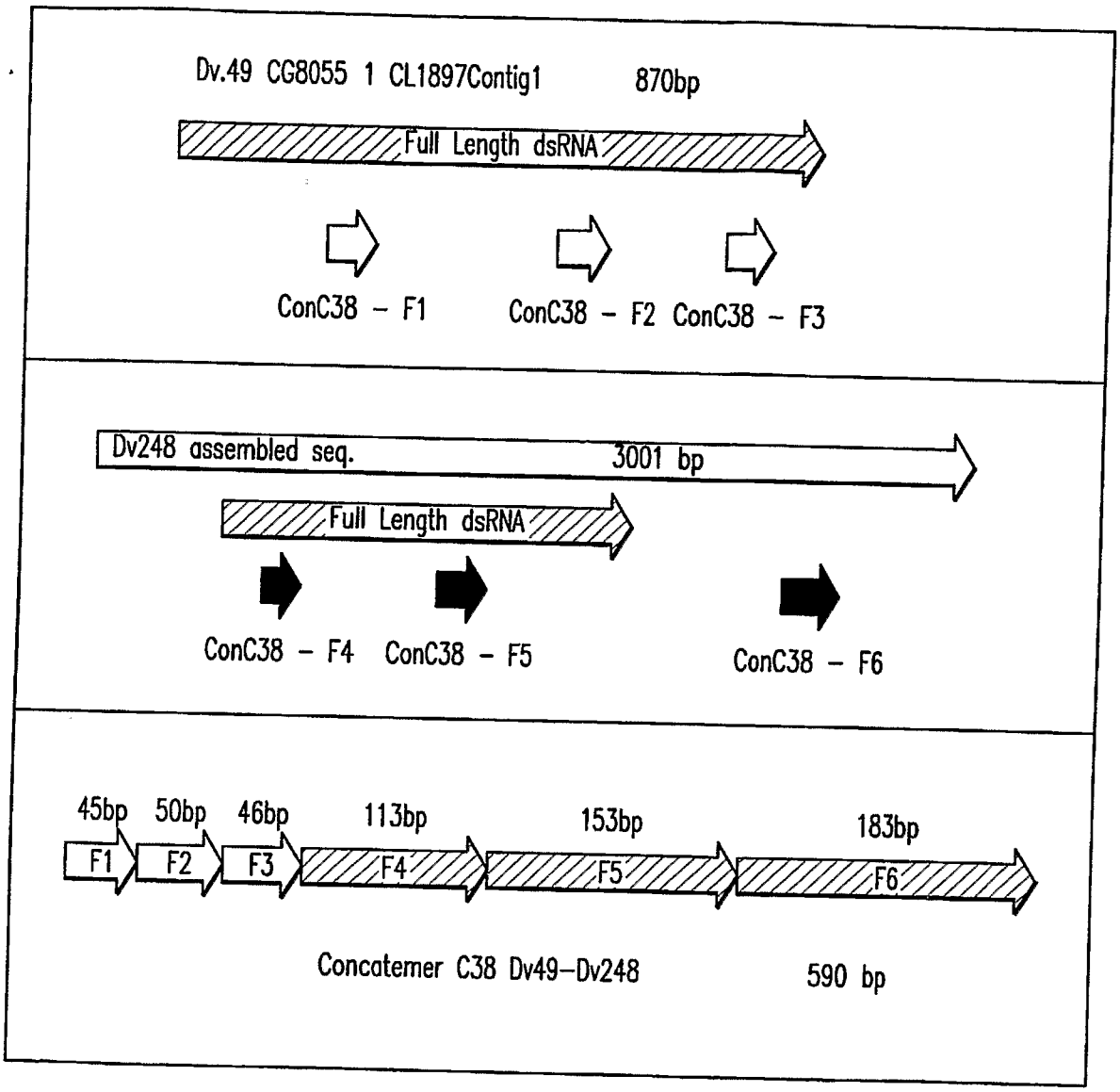
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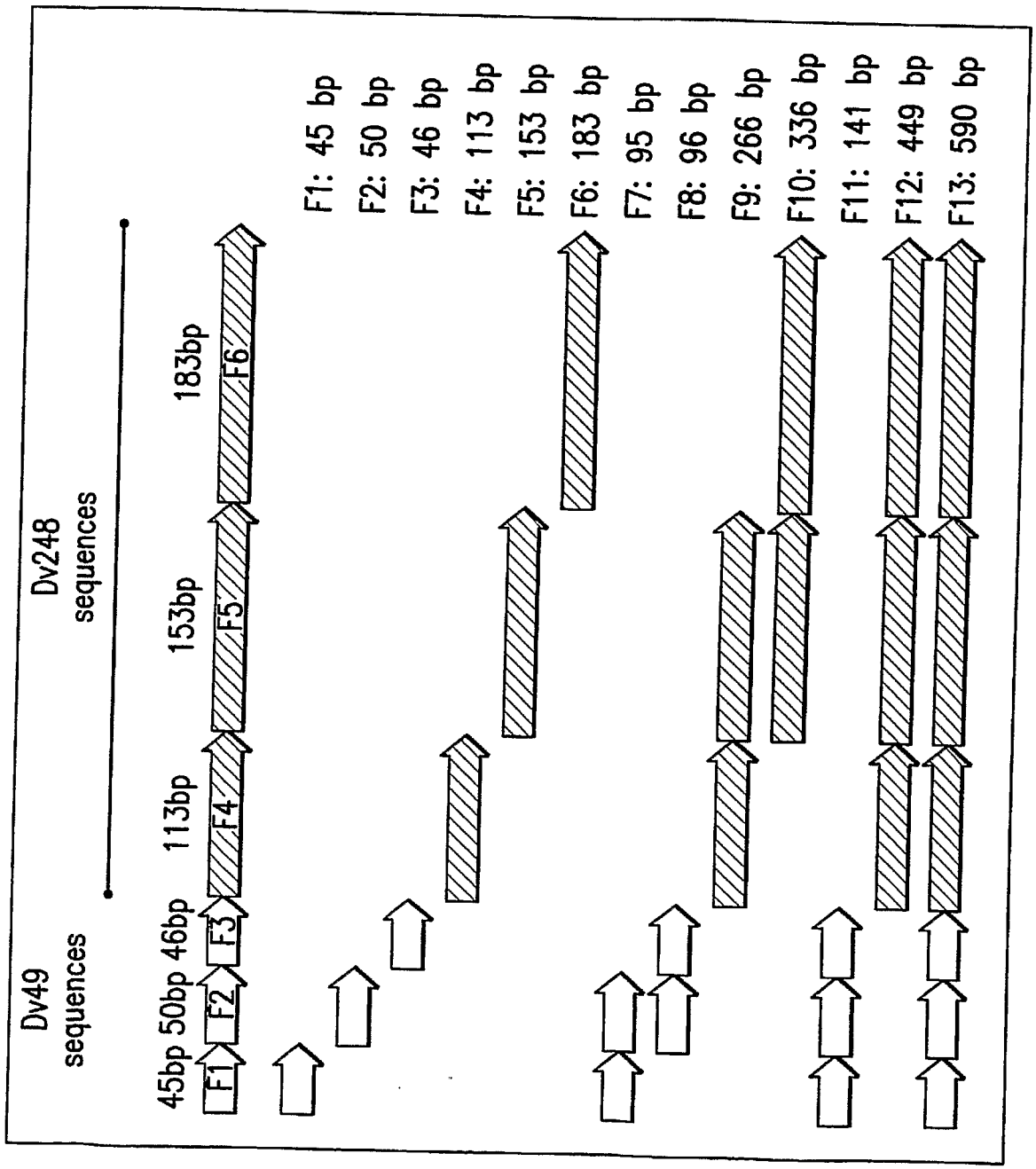
FIG.3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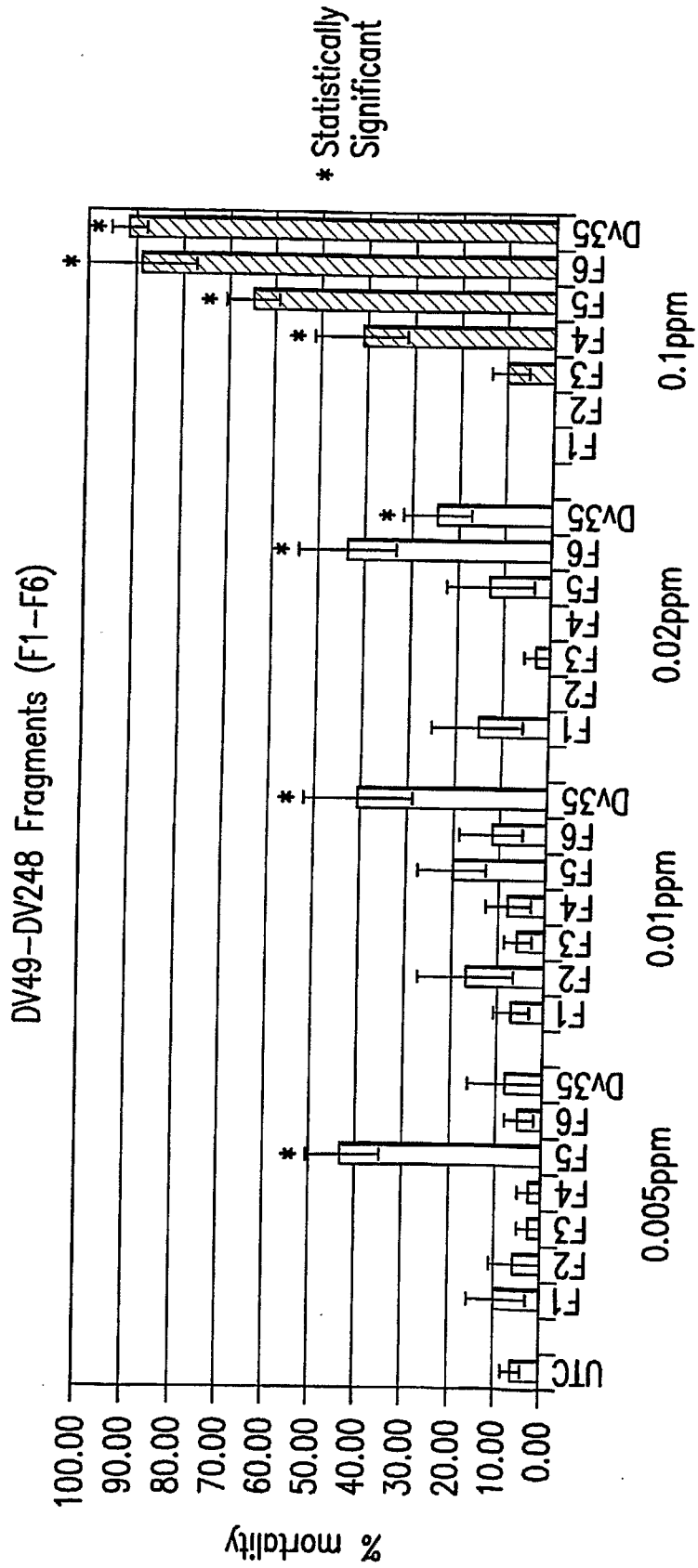
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30.00
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10.00
0.00
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FIG.5

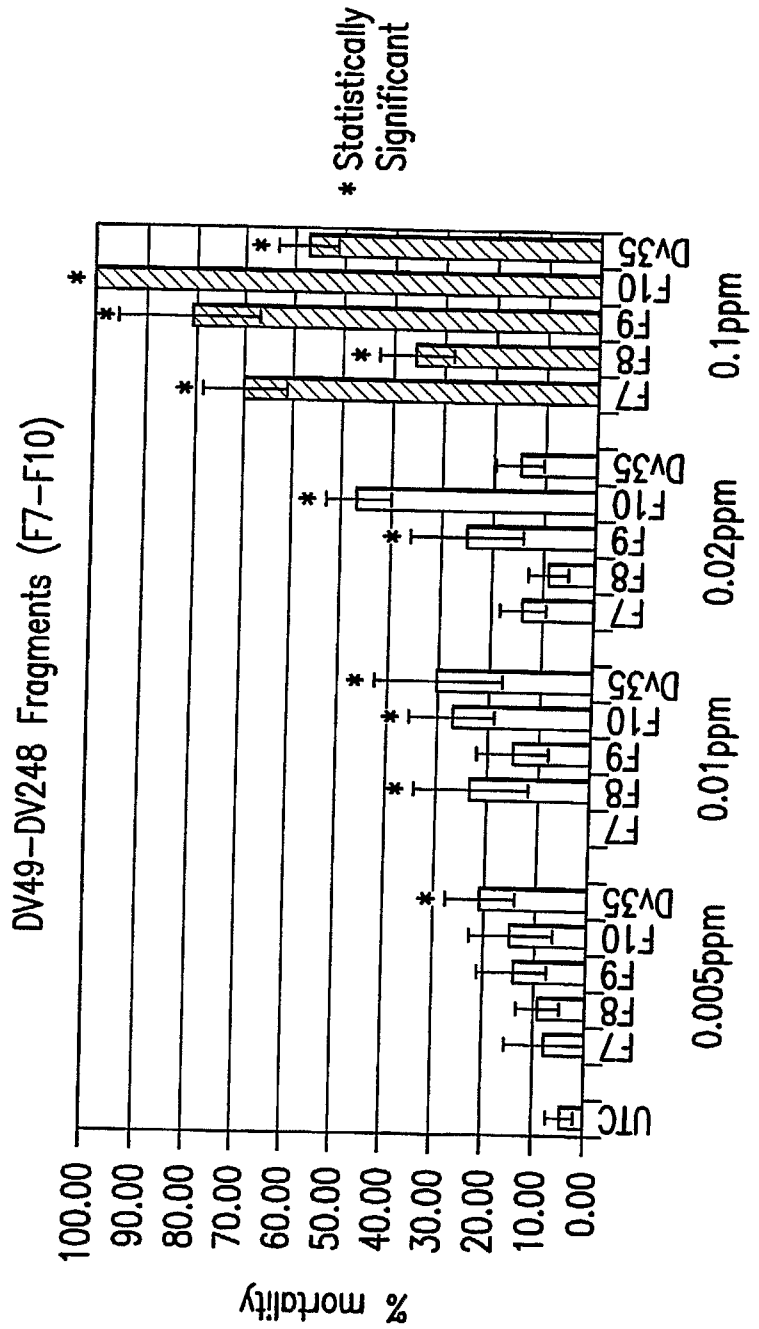
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FIG.6

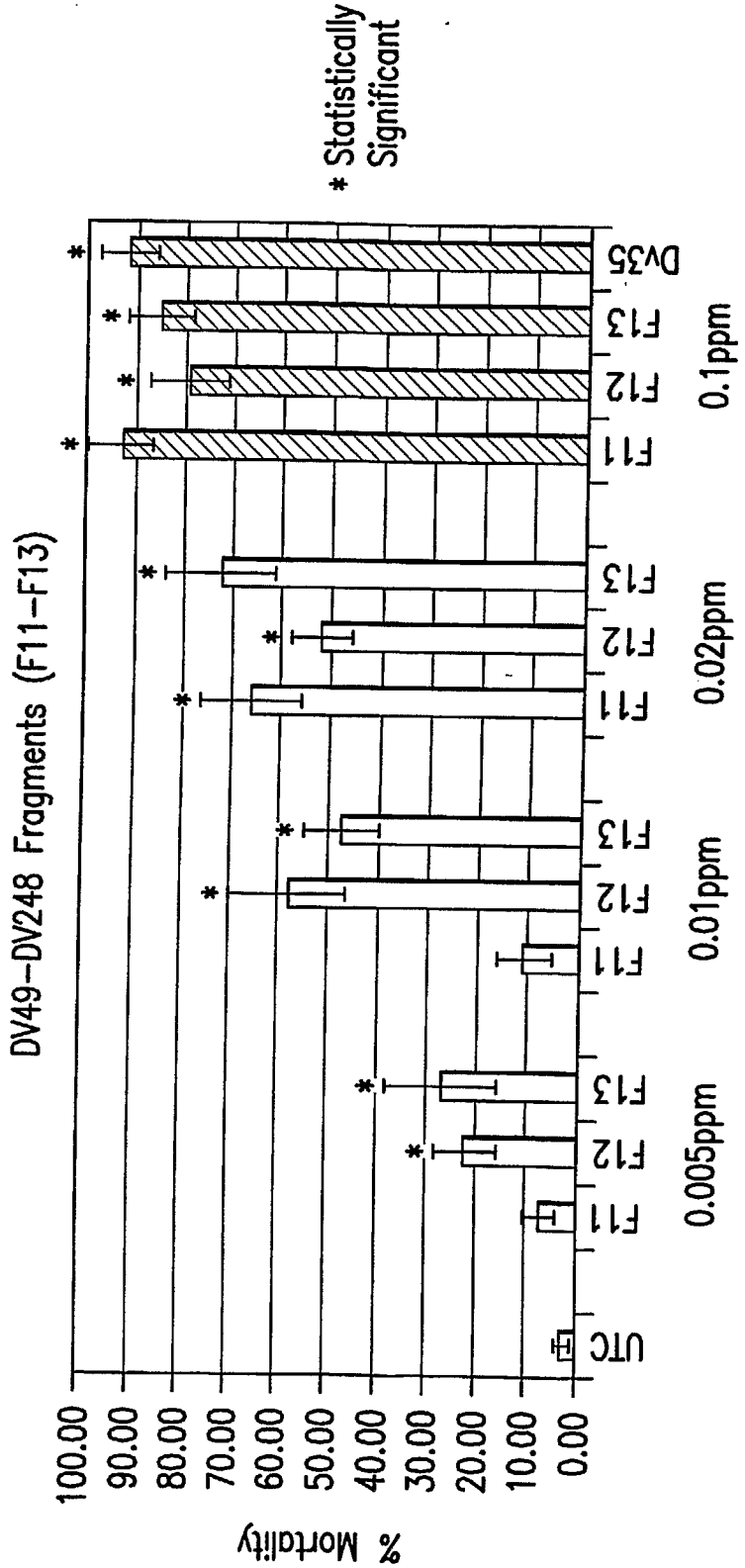
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FIG. 7

SEQUENCE LISTING

<110> BAUM, JAMES A.
CAJACOB, CLAIRE A.
FELDMANN, PESCALE
HECK, GREGORY R.
NOOREN, IRENE
PLAETINCK, GEERT
VAUGHN, TY T.
MADDELEIN, WENDY

<120> METHODS FOR GENETIC CONTROL OF INSECT INFESTATIONS IN PLANTS AND COMPOSITIONS THEREOF

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tgctgataca aatgctgata aaattatttc gtctactgaa gatacactaa aaatactgaa 780
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acaataatat atatgtaca 859

<210> 4
<211> 873
<212> DNA
<213> Diabrotica virgifera

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cttc 1384

<210> 6
<211> 735
<212> DNA
<213> Diabrotica virgifera

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ccatacagtt agtcgaccaa agaggttgtg tcacaagacc aaaattgatg tccagattta 180
ctaagattaa aaactttggc gcaagcgctt cagtgttatc atatgcccac ttccaggcat 240
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aatgtccaga tcagtgttca gattcttcag gacaacatct ccacggcttg cttgatttgg 360
tgcatggtcc acctgatact ggttatggtg ctcctccacc gctacctatc gaagcatatt 420
tacatcctgg gcgaccaagg gatgaaagga gatcaaagag agctctcgct gtcgacccgg 480
aaaaggaagt gggggtgaat aggattatta gggttgtatc tacaggagat ttgacattta 540
cacttgacga aaacagcaat agcacaactc cacccactat ggtctttccc gccaaggagg 600
aaattaacaa cggaggatta atatgtatga ctactccagg ttttgcagca accttagtag 660
ttttattagc tatattaata gtatcttgtc ttatgtcagc tttcctttgt gtcaaactaa 720
gaccatttgc tgaaa 735

<210> 7
<211> 888
<212> DNA
<213> Diabrotica virgifera

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tcggcaatca aaagcgtgtt gttggtgttc ttcttggctg ttggcgtgct aaaggagtct 240
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gggaacgagt agtaggttgg taccacaccg gccccaaact tcatcaaaat gatattgcca 420
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caaaagattt aggtttacca actgaagctt atcaagctgt agaagaagta cacgatgacg 540
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aagaagttgg tgttgaacac ttattgagag atattaaaga cacaactgtt ggtactttgt 660
cacagagaat aacgaatcag cttttagggt taaaaggtct ccattcacag ttacgtgata 720
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cgttttacgt gaaaaataac gatcaaatgt tagtcgttta tctagcag 888

<210> 8
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 8
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<210> 9
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 9
gcatcctgat ttatatcggg caaaag 26

<210> 10
<211> 746
<212> DNA
<213> Diabrotica virgifera

<400> 10
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ggtgttcttc ttggctgttg gcgtgctaaa ggagtcttag atgtttctaa cagttttgca 180
gttccttttg acgaagatga caaggataag tctgtgtggt tcttggacca tgattactta 240
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ttagggttaa aaggtctcca ttcacagtta cgtgatatta gggactattt ggtacaagtg 660
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cttttgcccg atataaatca ggatgc 746

<210> 11
<211> 1123
<212> DNA

<213> Diabrotica virgifera

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tttctaagga ttttaaaaaa tatctgcttg acaaggatac aattagggta acaacaaact 180
taactgttta aaatacttca aaaaaaggaa tggtttatta tatatatcgt atatacatag 240
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gggcttccag agtattgttg attttgatct tgtttctcaa ggccaacagt tcgattcctc 480
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gactttccag gatttgtgta tatttgcctg aatctctggt tacctcacca agacgtttgc 720
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<210> 12
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 12
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<210> 13
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 13
gttcagaaag ttgctgggcg tagtcg 26

<210> 14
<211> 743
<212> DNA
<213> Diabrotica virgifera

<400> 14
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cctccggtgg tttcttgaga aaggtggctc tcgtcgtcga tttttagatt tacgtcttta 180
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ctacgcccag caactttctg aac 743

<210> 15
<211> 2325
<212> DNA
<213> Diabrotica virgifera

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<213> Diabrotica virgifera

<400> 16
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<210> 17
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<212> DNA
<213> Diabrotica virgifera

<400> 17
ggaaactcat ggtcacgtag gtgctg 26

<210> 18
<211> 978
<212> DNA
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<210> 19
<211> 637
<212> DNA
<213> Diabrotica virgifera

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ccccgaggta atctgaagag atccttcaaa catcttaccc tggacattcg aatgatcaac 180
cccaggttac tgaaagtaga gaaatggttc ggtaccaaga aggaattagc tgctgtcaga 240
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taacttgtat ttttgaaata aatttaagtt tatattt 637

<210> 20
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 20
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<210> 21
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 21
cagatacata aagcccatct aagaatttac g 31

<210> 22
<211> 499
<212> DNA
<213> Diabrotica virgifera

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tccaccaaac aaaaggatga acttatcatt gaaggaaact cattggagga tgtttcaaag 420
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gatgggcttt atgtatctg 499

<210> 23
<211> 678
<212> DNA
<213> Diabrotica virgifera

<400> 23
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aatgaaatca acgaaattgc caacactaac tcaagacaga acatccgtaa gttgataaag 180
gatggtctta ttattaagaa gcccgtagct gtacattccc gtgcccgtgt tcgcaaaaac 240
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gcccgtaccc cacaaaagga attatggatt caacgcatga gagttttgcg tcgtctcctt 360
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gcagagaaag cccgtgccaa gatgttggca gaccaggcca atgccagaag gatgaaggta 540
aaacaggcta gagaaagacg tgaggaacgt atcgccacaa agaaacaaga agttttgcag 600
aactacatga gggaggatga agctgcggcc actaagaaat aagttaattg ttttataaga 660
tgactatatt aaaaattt 678

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<213> Diabrotica virgifera

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<210> 26
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<213> Diabrotica virgifera

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gcccgtgcca agatgttggc agaccaggcc aatgccagaa ggatgaaggt aaaacaggct 480
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<210> 29
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<212> DNA
<213> Diabrotica virgifera

<400> 29
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<210> 30
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<210> 33
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<400> 33
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<210> 34
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<212> DNA
<213> Diabrotica virgifera

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<211> 31
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<213> Diabrotica virgifera

<400> 36
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<210> 37
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<212> DNA
<213> Diabrotica virgifera

<400> 37
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<210> 38
<211> 672
<212> DNA
<213> Diabrotica virgifera

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<212> DNA
<213> Diabrotica virgifera

<400> 40
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<210> 41
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 41
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<210> 42
<211> 684
<212> DNA
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<211> 864
<212> DNA
<213> Diabrotica virgifera

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<212> DNA
<213> Diabrotica virgifera

<400> 44
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<210> 45
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<212> DNA
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<400> 45
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<210> 46
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<212> DNA
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<212> DNA
<213> Diabrotica virgifera

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ggaacgttgt atgacaatat gttggagcag aacctttgca gaattattga accatattct 1020
agggtacaag tagagtatgt agcaaaaacc ataaaactcc cagtactaca agtagagaag 1080
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<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 48
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<210> 49
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<212> DNA
<213> Diabrotica virgifera

<400> 49
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<210> 50
<211> 675
<212> DNA
<213> Diabrotica virgifera

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aatcgacctt actgaaagag ttaaaaaagt tggatgacaa aaatttgttg gtggaagtac 180
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<211> 942
<212> DNA
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gatatcaatt gttacacacg cgctttggaa cgatgacaga gttttagtaa ttggttaatg 180
agtttataaa tcttcgtcat catcgggcag tgcagtttct gaggcttctt taagatcctt 240
ttcgatttgt tgctgccatt ggggatccat ctggacttct ggaggaagca aggcaggtgc 300
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gaagacaatg ctctttgcct taactttcct atctttgatg tcaactttgt taccacacaa 480
tacaattggg atattttcac aaactctaac aagatctctg tgccagtttg gaacattttt 540
gtaagtgact ctagatgtaa catcaaacat aattatggca cattgtcctt ggatgtagta 600
tccatcacgc agaccaccaa acttttcttg gcctgctgtg tcccatacgt taaaacgaat 660
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<210> 52
<211> 22
<212> DNA
<213> Diabrotica virgifera

<400> 52
cttcgtcatc atcgggcagt gc 22

<210> 53
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 53
cgtcttggtc ggagatggag gtactg 26

<210> 54
<211> 605
<212> DNA
<213> Diabrotica virgifera

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ctaagttggg atctccaatg agtttcctag ccaaccacaa gaagggtttt tcaaagttgt 180
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gaccaccaaa cttttcttgg cctgctgtgt cccatacgtt aaaacgaatt tgtcctctat 480
ttgtgtggaa aactaaaggg tgaacttcta ctcctaaggt tgctacatat ttcttttcga 540
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<210> 55
<211> 763
<212> DNA
<213> Diabrotica virgifera

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gataaacaat aaaatggata gacttcttcg actaggaggt ggaatgccag gtttaactca 180
ggcaccgccg ccttctgatg ctcctgttgt ggatactgcc gaacaagtat acatatcctc 240
cttagcacta ttaaaaatgt tgaagcacgg ccgagctgga gtacccatgg aagtaatggg 300
tcttatgtta ggagaattcg tagatgacta taccgttcgt gtaatcgatg tatttgctat 360
gcctcagact ggtaccggtg tcagtgtaga agctgttgat ccagtttttc aagcaaaaat 420
gcttgacatg ttaagacaga ctggtaggcc agaaatggtt gtggggtggt atcattccca 480
tccaggtttc ggatgttggt tgtctggagt ggatatcaac acccagcaaa gttttgaggc 540
tctctcggaa agagctgtag cagtagtagt tgatccaatc cagtcagtga aaggcaaagt 600
cgttattgat gcctttaggt taataaatcc gaatatgatg gtattgggcc aagaaccgcg 660
ccaaactaca tccaacttag gacatctaca gaaaccatca gtccaggctt tgattcatgg 720
tctcaatcgg cattactact ccatcagtat taattacaga aag 763

<210> 56
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 56
cgactaggag gtggaatgcc agg 23

<210> 57
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 57
caaagcctgg actgatggtt tctgtag 27

<210> 58
<211> 564
<212> DNA
<213> Diabrotica virgifera

<400> 58
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ggccgagctg gagtacccat ggaagtaatg ggtcttatgt taggagaatt cgtagatgac 180
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gaagctgttg atccagtgtt tcaagcaaaa atgcttgaca tgttaagaca gactggtagg 300
ccagaaatgg ttgtggggtg gtatcattcc catccaggtt tcggatgttg gttgtctgga 360
gtggatatca acacccagca aagttttgag gctctctcgg aaagagctgt agcagtagta 420
gttgatccaa tccagtcagt gaaaggcaaa gtcgttattg atgcctttag gttaataaat 480
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cagaaaccat cagtccaggc tttg 564

<210> 59
<211> 1156
<212> DNA
<213> Diabrotica virgifera

<400> 59
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ctcacgctat ccctcccgt atgacgattg gtcacttgat cgagtgcatc caaggtaagg 180
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agaaaatctc cactttgtta caagaatatg gttatcaact cagaggcaac gaagtaatgt 300
acaacggcca tactggacgt aagataaatg ctcagatttt cttaggacct acctattatc 360
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aagtttccga tccttataga atccatattt gcaacttctg tggtttgata gctatcgcca 600
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<210> 60
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 60
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<210> 61
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 61
gacaatctcg ttccatctca ccgaaac 27

<210> 62
<211> 677
<212> DNA

<213> Diabrotica virgifera

<400> 62
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gacgattggt cacttgatcg agtgcatcca aggtaaggta tcatccaata aaggagaaat 180
cggtgatgct acacctttca acgatgccgt caacgtacag aaaatctcca ctttgttaca 240
agaatatggt tatcaactca gaggcaacga agtaatgtac aacggccaca ctggacgtaa 300
gataaatgct cagattttct taggacctac ttactatcaa agattgaagc acatggtgga 360
cgataagatc cattcaagag ctagaggacc gttgcagatt ctcgtcagac agcctatgga 420
gggccgtgca agagacggtg gtctacgttt cggtgagatg gaacgagatt gtcaaatttc 480
acacggtgct gcacaattct taagagagag gctgtttgaa gtttccgatc cttatagaat 540
ccatatttgc aacttctgtg gtttgatagc tatcgccaat ttgcgtaaca acacctttga 600
atgtaagggt tgcaaaaata agacacagat atcgcaagtt agactgcctt atgctgcgaa 660
attactgttt caagagc 677

<210> 63
<211> 1156
<212> DNA
<213> Diabrotica virgifera

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ctcacgctat cccctcccgt atgacgattg gtcacttgat cgagtgcatc caaggtaagg 180
tatcatccaa taaaggagaa atcggtgatg ctacaccttt caacgatgcc gtcaacgtac 240
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aaagattgaa gcacatggtg gacgataaga ttcattcaag agctagagga ccgttgcaga 420
ttctcgtcag acagcctatg gagggtcgtg caagagacgg cggtctacgt ttcggtgaga 480
tggaacgaga ttgtcaaatt tcacacggtg cggcacaatt cttaagagag aggctgtttg 540
aagtttccga tccttataga atccatattt gcaacttctg tggtttgata gctatcgcca 600
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cgagacttat ggtactgtag tgtttttaag taaataaata aatgtcctta tctaagagga 780
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<212> DNA
<213> Diabrotica virgifera

<400> 64
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<210> 65
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<213> Diabrotica virgifera

<400> 65
gctcttgaaa cagtaatttc gcagcat 27

<210> 66
<211> 677
<212> DNA
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gacgattggt cacttgatcg agtgcatcca aggtaaggta tcatccaata aaggagaaat 180
cggtgatgct acacctttca acgatgccgt caacgtacag aaaatctcca ctttgttaca 240
agaatatggt tatcaactca gaggcaacga agtaatgtac aacggccaca ctggacgtaa 300
gataaatgct cagattttct taggacctac ttactatcaa agattgaagc acatggtgga 360
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gggccgtgca agagacggtg gtctacgttt cggtgagatg gaacgagatt gtcaaatttc 480
acacggtgct gcacaattct taagagagag gctgtttgaa gtttccgatc cttatagaat 540
ccatatttgc aacttctgtg gtttgatagc tatcgccaat ttgcgtaaca acacctttga 600
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attactgttt caagagc 677

<210> 67
<211> 919
<212> DNA
<213> Diabrotica virgifera

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tacgtattca ccataataat ataaacgtag aaaatgaatc ccgagtatga ttatttattc 180
aaacttctgc tgattggaga ttcaggagta ggaaaatctt gtcttctact gagatttgca 240
gatgatacct acacagaaag ctatattagt accattggcg tagattttaa aatcaggaca 300
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gcgtgtgaca atgtaaacaa attactggta gggaataaaa gcgatttgac aactaagaaa 540
gttgtcgact tcactacagc caaggagtat gccgaccaat tgggtatacc atttttggaa 600
acctcagcta agaatgcaac caatgtagaa caggccttta tgactatggc cgctgaaata 660
aaaaatagag taggacctcc atcttctgcg gtagaccaag gaaataaggt taggttcgat 720
caaagtcgcc cagtcgaaac aaccaaatcc ggttgctgct gaaaatattt agttctcttt 780
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attctagtaa tatccgtctg tatgtatagt tattttaaag tttttgtttg attttcactt 900
ttaaattttt tttttcaaa 919

<210> 68
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 68
caaacttctg ctgattggag attcagg 27

<210> 69
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 69
cttggtctac cgcagaagat ggagg 25

<210> 70
<211> 521
<212> DNA
<213> Diabrotica virgifera

<400> 70
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agatgatacc tacacagaaa gctatattag taccattggc gtagatttta aaatcaggac 120
aatcgattta gatggaaaga caattaaatt gcaaatttgg gatacagcag gtcaggaaag 180
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agttgtcgac ttcactacag ccaaggagta tgccgaccaa ttgggtatac catttttgga 420
aacctcagct aagaatgcaa ccaatgtaga acaggccttt atgactatgg ccgctgaaat 480
aaaaaataga gtaggacctc catcttctgc ggtagaccaa g 521

<210> 71
<211> 755
<212> DNA
<213> Diabrotica virgifera

<400> 71
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gaaggcccgt ttagatcaag aattgaaaat catcggagcc tttggtctcc gaaacaaacg 180
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gagcggtggt ggaggtgcag ctgaagaaga ggaagactaa gctgtatgtc gtgctagttg 660
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aaaaaagaaa aaagaaaaaa aaaaaaaaaa aaaaa 755

<210> 72
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 72
gtttagatca agaattgaaa atcatcggag c 31

<210> 73
<211> 21
<212> DNA
<213> Diabrotica virgifera

<400> 73
gcacctccac caccgctctt c 21

<210> 74
<211> 490
<212> DNA
<213> Diabrotica virgifera

<400> 74
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aagagaaaga acccaaaagg ttgtttgaag gtaatgcact cctacgtcgt ttggttcgta 180
ttggagtact agacgagaac agaatgaagc tcgattacgt attgggtctc aagattgaag 240
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ttccctcctt catcgtccgt ttggattcac aaaaacacat cgacttctct ctgaaatcac 420
ctttgggagg cggtcgtcca ggacgtgtta agaggaagaa cctcaccaag aagagcggtg 480
gtggaggtgc 490

<210> 75
<211> 857
<212> DNA
<213> Diabrotica virgifera

<400> 75
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gaaacggcaa ctacagaggt acagaaaaag ggtgtcaagg gcacatatgt atcaatacac 180
agttctgggt ttagagattt tctgttaaaa ccagcaattc tcagagctat agtggactgc 240
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gatattctgt gccaagctaa atccggtatg ggaaaaacgg ctgtttttgt attagctaca 360
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gtcatgatgt tcagtgccac cttaagtaaa gaaattagac cagtttgcaa gaaatttatg 780
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caacattatg taaaact 857

<210> 76
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 76
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<210> 77
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 77
cttgaacatc acgtctcatg tctaataact cc 32

<210> 78
<211> 627
<212> DNA
<213> Diabrotica virgifera

<400> 78
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gaaacggcaa ctacagaggt acagaaaaag ggtgtcaagg gcacatatgt atcaatacac 120
agttctgggt ttagagattt tctgttaaaa ccagcaattc tcagagctat agtggactgc 180
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gagttagcct tccagataag caaagagtac gaacgtttca gtaaatatat gcccaatatt 420
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aattgcccgc atatcgttgt gggtactcca ggaagaattt tagcattggt cagatcgaaa 540
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<211> 847
<212> DNA
<213> Diabrotica virgifera

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acggagatgt tgtcccggag aaaggaccta ttcctgctca tttgttagga aatatgtggg 240
cacaaacatg gaacaatatt gcaagcttca cattaccata tccagatgtt gttgattatg 300
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<212> DNA
<213> Diabrotica virgifera

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<210> 81
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<212> DNA
<213> Diabrotica virgifera

<400> 81
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<210> 82
<211> 666
<212> DNA
<213> Diabrotica virgifera

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cacgaaatgg gacacataga gtacttttta cagtaccgca atcagcctac tccataccgg 600
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<212> DNA
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ttttacttgg attacaaacc gctgttgtta aatgaccttt tgttggtgtt ggcacccagg 480
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<210> 84
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 84
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<210> 85
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 85
cgtgcttctc caatttctga gccaag 26

<210> 86
<211> 686
<212> DNA
<213> Diabrotica virgifera

<400> 86
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cttgtctcag aaattggaga agcacg 686

<210> 87
<211> 999
<212> DNA
<213> Diabrotica virgifera

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<210> 88
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 88
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<210> 89
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 89
gtatgttcct tgcccaggct ctgc 24

<210> 90
<211> 595
<212> DNA
<213> Diabrotica virgifera

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ggccaaatta aaacatgctc tcatcacgac tatcctacta gtggagaagt atgcgaagtc 180
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<210> 91
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<212> DNA
<213> Diabrotica virgifera

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<210> 92
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 92
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<210> 93
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<212> DNA
<213> Diabrotica virgifera

<400> 93
ggaacttggg gcatgtcatc tgtc 24

<210> 94
<211> 802
<212> DNA
<213> Diabrotica virgifera

<400> 94
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<211> 1412
<212> DNA
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<210> 96
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<212> DNA
<213> Diabrotica virgifera

<400> 96
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<210> 97
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<212> DNA
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<400> 97
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<210> 98
<211> 750
<212> DNA
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<212> DNA
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gaaacaatgg gtaaaggttt t 441

<210> 100
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 100
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<210> 101
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 101
ctttacccat tgtttcctgt tgtatttcaa cc 32

<210> 102
<211> 396
<212> DNA
<213> Diabrotica virgifera

<400> 102

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<212> DNA
<213> Diabrotica virgifera

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<213> Diabrotica virgifera

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<212> DNA
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<210> 106
<211> 736
<212> DNA
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<210> 109
<211> 33

<212> DNA
<213> Diabrotica virgifera

<400> 109
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<210> 110
<211> 740
<212> DNA
<213> Diabrotica virgifera

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caacaatctt acagacatat tcagtaaagc attgtcccac atgcaggatc tttcagtaat 660
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<213> Diabrotica virgifera

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gcaattagca agtcggatat gatagaacta tcagaatgca aagaaagaat aaagagaaag 180
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gccgatgcta accatgagtg ggtttcacag atattttcag aatttggaaa tgtggtttat 300
gtttccatac canaatacag acataatana acaaacaaag gttttgcttt tgttgagttc 360
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ccatcagaaa caaacccgga gaaattaaag agtatcagac attc 464

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<212> DNA
<213> Diabrotica virgifera

<400> 112
ctctggatga tttacgaaaa gcaattagca 30

<210> 113
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 113
ggtttgtttc tgatggcatt ttacacc 27

<210> 114
<211> 336
<212> DNA
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<400> 114
ctctggatga tttacgaaaa gcaattagca agtcggatat gatagaacta tcagaatgca 60
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tatatgttga aaatattaaa gccgatgcta accatgagtg ggtttcacag atattttcag 180
aatttggaaa tgtggtttat gtttccatac caaaatacag acataataaa acaaacaaag 240
gttttgcttt tgttgagttc gaagatgaag ctggtgctaa aaatgctctt acatactttg 300
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<210> 115
<211> 968
<212> DNA
<213> Diabrotica virgifera

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aggattgtgg acattgtgta tagcacaaac ggaatattgt atgaccccaa ggcaggaagg 180
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tattagatct gaggacgcgg attatttaag aaaatcacaa tgtggtttcg aggggacgtt 300
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gctaatac 968

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<213> Diabrotica virgifera

<400> 116
caaggcagga aggaggagat tgc 23

<210> 117
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 117
gatcatcagc agtttttgga agacagatg 29

<210> 118
<211> 690
<212> DNA
<213> Diabrotica virgifera

<400> 118
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tcgaggggac gttaccaaaa gtgtgctgtg ctctgcaaga aactgttcaa actaccacgc 180
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aaacagacac agactgtgta caaacagtaa gtggtcaaaa atgtgcacct cctccagtta 540
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accatgacat tgccttactt agacttgcaa gaaatgtaaa aattaccgga tttgttagac 660
ccatctgtct tccaaaaact gctgatgatc 690

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aaacacatcg ccataaacat tgaacatgca ccaaagatct caatttccaa gtacctagta 180
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<210> 120
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 120
cacaaaggaa acgaaagact ggaacttc 28

<210> 121
<211> 28
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<213> Diabrotica virgifera

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<212> DNA
<213> Diabrotica virgifera

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gtccatgctg tctcaggtcc agtcgttact gctgagaaaa tgtctggttc tgctatgtac 180
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<213> Diabrotica virgifera

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<210> 125
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 125
caagtacacg ctgtcctgta agcagagg 28

<210> 126
<211> 742
<212> DNA
<213> Diabrotica virgifera

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<210> 127
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<212> DNA
<213> Diabrotica virgifera

<400> 127
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<211> 24
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<213> Diabrotica virgifera

<400> 128
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<210> 129
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<212> DNA
<213> Diabrotica virgifera

<400> 129
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<210> 130

<211> 838
<212> DNA
<213> Diabrotica virgifera

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<213> Diabrotica virgifera

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gtggaaacaa ggtatcattg tactgtgtgt gaagactttg acttgtgcat ccaatgttat 360
gagaaagaag gtcatcctca caaaatggag aaacttggat tggatattga tgatggaagt 420
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cagaagatga aacgagtcac aaatcacacc aaattgtgca agaggaaaac aaatggtggt 600
tgccctattt gcaaacaact catcgctcta tgttgctatc atgccaaaca ctgcccagaa 660
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<210> 132
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<212> DNA
<213> Diabrotica virgifera

<400> 132
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<210> 133
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 133

ggacacttgt tttctgggca gtgtttg 27

<210> 134
<211> 515
<212> DNA
<213> Diabrotica virgifera

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acttgtaata gttgtaaagc ccatgtggaa acaaggtatc attgtactgt gtgtgaagac 180
tttgacttgt gcatccaatg ttatgagaaa gaaggtcatc ctcacaaaat ggagaaactt 240
ggattggata ttgatgatgg aagttcacct agtgatagca aagccaatcc aggagaagct 300
agaaaattat ctatacagcg ttgtatccat tctttggtac atgcttgtca atgcagagat 360
gccaattgtc ggttaccaag ctgtcagaag atgaaacgag tcacaaatca caccaaattg 420
tgcaagagga aaacaaatgg tggttgccct atttgcaaac aactcatcgc tctatgttgc 480
tatcatgcca aacactgccc agaaaacaag tgtcc 515

<210> 135
<211> 1120
<212> DNA
<213> Diabrotica virgifera

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aagaaaaaga atgaaaacca agaagaaaac agtgaccaaa gcaacgaggt tgtccaagcc 180
gaaaacaact tattatctaa cttatcgaac cctattaata caatatcaat taaggagcta 240
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ctaaagaaga cattccagtt ttggaatacc cagcctgttc ccaaaatgga cgaaaaaata 360
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agtttgcctg atggttttat gtgggacact cttaatctag atgaaccgtt ggtgctcaaa 480
gagttatata cgttactcaa tgaaaactat gttgaagatg acgattgtat gtttagattt 540
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<210> 136
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 136
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<210> 137

<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 137
gtaggtacaa gtactcactg gtttcggtag g 31

<210> 138
<211> 707
<212> DNA
<213> Diabrotica virgifera

<400> 138
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aaaaacctgc caagagttca gaggaagctc taaagaagac attccagttt tggaataccc 180
agcctgttcc caaaatggac gaaaaaataa ctgttaacga agccattgaa ccagacaaag 240
aacctgctga cattagacaa gaaccgtaca gtttgcctga tggttttatg tgggacactc 300
ttaatctaga tgaaccgttg gtgctcaaag agttatatac gttactcaat gaaaactatg 360
ttgaagatga cgattgtatg tttagatttg attatcaacc tgaatttttg aaatgggctt 420
tgcaaccccc agggtggaag cgagaatggc attgtggagt ccgagttgta aaaagtggta 480
gattagtggg atttatctct gcaattccag caactctaaa catttataaa aagacacaaa 540
gaatggtgga gataaatttt ctatgtgtac ataaaaagct acgttccaaa cgagtcgcac 600
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<212> DNA
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tgtgtcaaac agggaagttt ttaaattgtt aatttagaag ttaatttttt gattaagtta 180
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gcgtattgct taggaggtgt catcaatcac tcgttaatgt tggctataca tgaaatttcc 480
cacaatttgg cgtttggaca cgcacggccg ttgcacaata aattatttgg atttttgcc 540
aatttgccaa taggattacc gattactata agctttaaaa aataccactt ggaacaccac 600
agatatcaag gtgacgaaca gaaagatacg gacatcccaa cgtacataga ggccaaacta 660
ttttgcacga cctttggaaa attcatttgg gtgatactgc aaccgttttt ctactctttc 720
cgcccactcg tagtttatcc gaagccgcct acgcttttgg aattcgtaaa cctggtaatt 780
caactcgcct tcgatgctct cgttgtttat tttttcggag gaagaatgtt gggatatctc 840
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cattacatgt tcaaaaaggg ctacgaaacg tacagctact 940

<210> 140
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 140
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<210> 141
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 141
ggataaacta cgagtgggcg gaaagag 27

<210> 142
<211> 746
<212> DNA
<213> Diabrotica virgifera

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taagaatgtg tcaaacaggg aagtttttaa attgttaatt tagaagttaa ttttttgatt 180
aagttatacc taagtgcgaa attttcaaaa atgggccaac acgtatctag aacagatttc 240
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atttcccaca atttggcgtt tggacacgca cggccgttgc acaataaatt atttggattt 540
tttgccaatt tgccaatagg attaccgatt actataagct ttaaaaaata ccacttggaa 600
caccacagat atcaaggtga cgaacagaaa gatacggaca tcccaacgta catagaggcc 660
aaactatttt gcacgacctt tggaaaattc atttgggtga tactgcaacc gtttttctac 720
tctttccgcc cactcgtagt ttatcc 746

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<212> DNA
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gttagataca aaaggtaata aaagactagt cttagtatta aacaaggcag acttagttcc 600
tagagaaatt ttggatcaat ggctaaagta cttgaagaaa accactccca ctatagcatt 660
caaagcatca actcaaaatc aaagtaaaaa gttaggacag agaaagcttg gaaagggaaa 720
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aacacctggt gttactaggg caatgcagga agtacaatta gactcaaaga taaaactttt 960
ggattctcct ggtatagttt ttgcatctgg aaatgacagt agtgcttctt tgagaaatgc 1020

agttcgaatt tctgccttga gtgatcctg 1049

<210> 144
<211> 35
<212> DNA
<213> Diabrotica virgifera

<400> 144
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<210> 145
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 145
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<210> 146
<211> 598
<212> DNA
<213> Diabrotica virgifera

<400> 146
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ataagaacaa ccctaaaaag aaaaaggaaa taatacaaat cccaaacata tgtcctttta 120
aagaggacat tcttaaagaa gtagaagcac taaagaaaca aaaggaagaa gaaaaactta 180
agctaagaga agctgcaaaa ttggaaaggc aaaaggagaa agaggaaagt aaaaaagaga 240
aacttactgc agaacttcag ggattagtgc aaaatgctga actaaggagt aaacttcatg 300
aacatctaac accagataat aatgtaaaac agcacgagac aaataatgag cagtccctga 360
aacaatatta caaagagttt aagaaggtta tcgaagctgc agatgttatt ctagaagtag 420
ttgacgctag agatccttta gggactagat gtaagcaagt agagcaggct gtgttagata 480
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ttttggatca atggctaaag tacttgaaga aaaccactcc cactatagca ttcaaagc 598

<210> 147
<211> 889
<212> DNA
<213> Diabrotica virgifera

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gactaaccta ctagaattca tcaaaactct atcagatata ttaagacatg gcggaaatag 180
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tcgtttagca gctacacagg ccctattaaa ctctctagaa ttcacaaagg ccaactttga 660
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ttcacagatc agagtggccg ctttgcagtg tctagttaag attatgtctt tgtattatca 780
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<210> 148
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 148
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<210> 149
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 149
gtgataggga atagagcagg agccatataa g 31

<210> 150
<211> 792
<212> DNA
<213> Diabrotica virgifera

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atcagatata ttaagacatg gcggaaatag ccctgtggcc cgaatggccg caggtttgca 180
gttaaaaaat caactcacct ctaaagactc caacataaag accacctacc aacaacggtg 240
gttggctttc ccagaggacg ttcgggggta tattaaaaat aacgttgtgt gcgcacttgg 300
aaccgaaaca agcagaccat catccgcagc tcagtgcgta gcatacgtcg cagtaacaga 360
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aatgcgagcc tcggaaccga gcaaccacgt tcgtttagca gctacacagg ccctattaaa 600
ctctctagaa ttcacaaagg ccaactttga ccaaccgacg gaacggaact atatcatgga 660
agtcgtctgt gaagccacgc agtctccaga ttcacagatc agagtggccg ctttgcagtg 720
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<210> 151
<211> 685
<212> DNA
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ccaactttag actattcctc accatggaaa ttaatccgaa actaccagtt aatcttctta 240
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cattcaacac agttccagtc agtaggatga tgaaagcacc aaacgaaaca gcaagacttt 360

acttcttatt ggcgtggttc cacgcgattg tccaggagag gttgatatat tgccctctag 420
gttgagcaaa acattatgaa tttagtgaat catatttaag agtcgcctgc gatactttgg 480
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gtgacaccct agccactctg ctctcgcaat ccatctatgg tggtaaaatc gataacgatt 600
ccgatcaacg actgttacat tccttcctga atctgctttt tactcccata agctttgaaa 660
gcgactttcg cttcaagtcc aacat 685

<210> 152
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 152
ggatcatgcc gaagcgattc aac 23

<210> 153
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 153
gaatgtaaca gtcgttgatc ggaatcg 27

<210> 154
<211> 588
<212> DNA
<213> Diabrotica virgifera

<400> 154
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gaagcttcat tcacttcaac ctcacgccaa ctttagacta ttcctcacca tggaaattaa 180
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gaacttgccg ccagagaaag tcccatggga cgccctagtc actctgctct cgcaatccat 540
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<210> 155
<211> 946
<212> DNA
<213> Diabrotica virgifera

<400> 155
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taaatatgtt gctaatatgc atggggatga agccatagga agacagttga tgatttacct 180
ggctctctat ttaattcaca attatggcac taatgatagg gtgaccagat tggttaattc 240
aactgatatt tatttaatgc cttcaatgaa ccctgatggt tatgaaaatt cagaagaggg 300
cagatgtgaa tctaaaaaac aatatgttgg aagagaaaat gaaaatagtg ttgatttaaa 360
tagagatttt ccagatcagt ttgatgctac aaaagcagga acaattctgt ctggtaggca 420

gcctgaaacg atagctatga tgacttggat tatttccaga ccatttgttt tatctggaaa 480
tttgcacgga ggtgcagtag tagctagcta tccgtatgat gattctaact ctggtcgaag 540
atgctgtgta gagagtagat caccagataa taatattttc aaaacgttag cattaaacta 600
cgctcaatcg aatcctgtga tgaaaaaggg taatgcttgt aaagacgata catttgatca 660
gggcatcaca aatggtgctt tttggtatga agtgagaggt ggcatgcaag acttcaacta 720
cgttcactcc aactgtttcg aagtaacttt tgaactgagt tgctgtaaat ttccgttagc 780
caaaactcta cctcaggaat gngcaacaac aaggaagccc tactaacttt catggagtca 840
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gacgtagtgg ttgtgggtat tacacataac gtcactacat ccaacc 946

<210> 156
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 156
ctgtaagaaa tagggatttg tgggctttag 30

<210> 157
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 157
gttggagtga acgtagttga agtcttgc 28

<210> 158
<211> 689
<212> DNA
<213> Diabrotica virgifera

<400> 158
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tgttaacacc aatgtttaaa tatgttgcta atatgcatgg ggatgaagcc ataggaagac 120
agttgatgat ttacctggct ctctatttaa ttcacaatta tggcactaat gatagggtga 180
ccagattggt taattcaact gatatttatt taatgccttc aatgaaccct gatggttatg 240
aaaattcaga agagggcaga tgtgaatcta aaaaacaata tgttggaaga gaaaatgaaa 300
atagtgttga tttaaataga gattttccag atcagtttga tgctacaaaa gcaggaacaa 360
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ttgttttatc tggaaatttg cacggaggtg cagtagtagc tagctatccg tatgatgatt 480
ctaactctgg tcgaagatgc tgtgtagaga gtagatcacc agataataat attttcaaaa 540
cgttagcatt aaactacgct caatcgaatc ctgtgatgaa aaagggtaat gcttgtaaag 600
acgatacatt tgatcagggc atcacaaatg gtgctttttg gtatgaagtg agaggtggca 660
tgcaagactt caactacgtt cactccaac 689

<210> 159
<211> 658
<212> DNA
<213> Diabrotica virgifera

<400> 159
gccgtggact tagcgggctg cgggatgatc gtgatctcgt cattgatctt cagaggtttc 60
aactgatctg cagccgacgg cttgggagag ctgttggaag ttgtcgaaga ggtcgtggag 120

ccgcccttct tgtccatgac tcgcttggcg acgacgctgt gggcggaata gacgtggttc 180
tcgaattgtt tgtacattcc gaaggtggcc gtgcacactg tgcatttgta ggacaggtgc 240
gcgggtttca acgtcatgtt atgatcccgg gccacgtggt ttagtaattt ccattggtag 300
actcttccac aaacaggaca ccttcctgaa tctttgctct tgttggcagc atcctgcatg 360
ctggaggtga ctaatccatg agagcctaat aaatgccttt ccaacccttg atctgtgaag 420
aacctaaatt gacacttttg acaatttaat ggcggcctgt tatatatcat cttgggatga 480
atcttaatct tgtgtatcca ttgcatgtga tttctaagct gttcaaggtc cttgatgtac 540
ccatcgcaga tctcgcagat gacgaacgag ttcttggagg atgtatcccc tggtttggcg 600
ccgcccgaag atccaggtgc ggctgcggca gcagatgggg actagttcta gatcgcga 658

<210> 160
<211> 21
<212> DNA
<213> Diabrotica virgifera

<400> 160
gacttagcgg gctgcgggat g 21

<210> 161
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 161
gatacatcct ccaagaactc gttcgtca 28

<210> 162
<211> 580
<212> DNA
<213> Diabrotica virgifera

<400> 162
gacttagcgg gctgcgggat gatcgtgatc tcgtcattga tcttcagagg tttcaactga 60
tctgcagccg acggcttggg agagctgttg gaagttgtcg aagaggtcgt ggagccgcct 120
ttcttgccat gactcgcttg gcgacgacgc tgtgggcgga atagacgtgg ttctcgaatt 180
gtttgtacat gccgaatgtg gccgtgcaca ctgtgcattt gtaggacagg tgtgcgggtt 240
tcaacgtcat gttatgatcc cgggccacgt ggtttagtaa tttccattgg tagactcttc 300
cacaaacagg acaccttcct gaatctttgc tcttgttggc agcatcctgc atgctggagg 360
tgactaatcc atgagagcct aataaatgcc tttccaaccc ttgatctgtg aagaacctaa 420
attgacactt ttgacaattt aatggcggcc tgttatatat catcttggga tgaatcttaa 480
tcttgtgtat ccattgcatg tgatttctaa gctgttcgag gtccttgatg tacccatcgc 540
agatctcgca gatgacgaac gagttcttgg aggatgtatc 580

<210> 163
<211> 888
<212> DNA
<213> Diabrotica virgifera

<400> 163
cttattttat ggtgtcgtgc cagcagaaaa ttttaaaaat tcttgtaatt gtttagacat 60
ttcgcaacaa ttgtgaacaa ttttggaaaa tattgcttga aagctataat tctagatgta 120
agagcaaagt tttgtagtca aaatggctgg agtattcgat ttagaactgc atgatgttga 180
aactgtagaa gtagatgatt cagacgatgc aatcgaaatt gaagaggatg aatatgatca 240

aaatcctaat attaatgcaa ttgtagaatc cgatgataca gaaacggttc atctgactga 300
acaaattgtg aatccgggcc aggaaaaaac cggaccccat gactttgaat tacgcaaagt 360
cctgggcaaa ggaggttatg gcaaagtatt tcaagttaga aaaattacgg ggaaagatgc 420
caatactgtc tttgccatga aggttctccg caaggcttcc atagttagaa atcaaaaaga 480
tactgcccat acgaaagcag aacgaaatat tttagaagaa gttaagcatc cttttatagt 540
ggatttgata tatgccttcc aaacgggtgg aaaattgtac ttaattttag aatacctcag 600
cgggggcgaa ctttttatgc atttagaaag agaaggaata tttttagagg ataccgcttg 660
cttttattta tccgaaatca ttctcgccct agaacattta catggacaag gaattattta 720
tagagatcta aagcctgaaa atattttact tgacgcccac ggtcacgtta nattgacaga 780
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tattgaatat atggcacctg aaatttaact agacatggcc atggaaaa 888

<210> 164
<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 164
gcatgatgtt gaaactgtag aagtagatga ttc 33

<210> 165
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 165
gtgtgggtca atatgccttc gttaatg 27

<210> 166
<211> 658
<212> DNA
<213> Diabrotica virgifera

<400> 166
cttatgttga aactgtagaa gtagatgatt cagacgatgc aatcgaaatt gaagaggatg 60
aatatgatca aaatcctaat attaatgcaa ttgtagaatc cgatgataca gaaacggttc 120
atctgactga acaaattgtg aacccgggcc aggaaaaaac cggaccccat gactttgaat 180
tacgcaaagt cctgggcaaa ggaggttatg gcaaagtatt tcaagttaga aaaattacgg 240
ggaaagatgc caatactgtc tttgccatga aggttctccg caaggcttcc atagttagaa 300
atcaaaaaga tactgcccat acgaaagcag aacgaaatat tttagaagaa gttaagcatc 360
cttttatagt ggatttgata tatgccttcc aaacgggtgg aaaattgtac ttaattttag 420
aatacctcag cgggggcgaa ctttttatgc atttagaaag agaaggaata tttttagagg 480
ataccgcttg cttttattta tccgaaatca ttctcgccct agaacattta catggacaag 540
gaattattta tagagatcta aagcctgaaa atattttact tgacgcccac ggtcacgtta 600
aattgacaga tttcggtctg tgtaaagaac acattaacga aggcatattg acccacac 658

<210> 167
<211> 886
<212> DNA
<213> Diabrotica virgifera

<400> 167
cgtttactaa acgtaaacga ataaaacaat aaaagtacaa tgaaaattat ttaaataaga 60

acataagtat ttcagtatgg atcgaccaag tacaagtaag cgaaatgtct ttgactccga 120
ttcagatagt gtcgacagca ctgaagaagc tcgccgaaga gatctgaagg aaagagatga 180
attcgcaaat aggctcaaaa aacgcgatga agaacgtact agaaacgttg ccagtacttc 240
tgataagcgc gcttatgaag aggctgctaa aagacttaaa ttggacaatg cagaaaaaga 300
gaaacttatt cctgcactca gagttgcttc caggaggaag tatttggaga agagaaagga 360
ggacaaacta caagaattgg aagctgatat tgccgatgat gagtaccttt ttgaggaaga 420
tgttttgact gaaagagaga aaaaagatcg tgtacacaag aaagagctgt taaaattggc 480
gcaggaacat gaaaaggcca gggaacttga gcgggttcaa aggtatcaca tgcccagaga 540
tttgggcaag gactccactg ctgattacat tgaagttgat gacttggaga aggtaccaca 600
atctgaacag aagaaatggg aaaaagatca gatggcctcg gcagtgttta agtttggagc 660
aaaagatggg attaaaaaag aagagtatga gttagtgtta gaagatcaaa ttcagtttat 720
acaagcacta caaatgccag gagtgtctga taagaaagaa cccgaactaa cggaaacaga 780
aaagaaaaaa cttactatag aaganacaaa gaaaagcctt ccgatatacc cttttaaaga 840
cgacttaata caggccatta gggaacacca agttttgatt atcgaa 886

<210> 168
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 168
cgaccaagta caagtaagcg aaatgtcttt g 31

<210> 169
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 169
gttctttctt atcagacact cctggcattt g 31

<210> 170
<211> 679
<212> DNA
<213> Diabrotica virgifera

<400> 170
cgaccaagta caagtaagcg aaatgtcttt gactccgatt cagatagtgt cgacagcact 60
gaagaagctc gccgaagaga tctgaaggaa agagatgaat tcgcaaatag gctcaaaaaa 120
cgcgatgaag aacgtactag aaacgttgcc agtacttctg ataagcgcgc ttatgaagag 180
gctgctaaaa gacttaaatt ggacaatgca gaaaaagaga aacttattcc tgcactcaga 240
gttgcttcca ggaggaagta tttggagaag agaaaggagg acaaactaca agaattggaa 300
gctgatattg ccgatgatga gtacctttt gaggaagatg ttttgactga aagagagaaa 360
aaagatcgtg tacacaagaa agagctgtta aaattggcgc aggaacatga aaaggccagg 420
gaacttgagc gggttcaaag gtatcacatg cccagagatt tgggcaagga ctccactgct 480
gattacattg aagttgatga cttggagaag gtaccacaat ctgaacagaa gaaatgggaa 540
aaagatcaga tggcctcggc agtgtttaag tttggagcaa aagatgggat taaaaaagaa 600
gagtatgagt tagtgttaga agatcaaatt cagtttatac aagcactaca aatgccagga 660
gtgtctgata agaaagaac 679

<210> 171
<211> 910
<212> DNA

<213> Diabrotica virgifera

<400> 171
accaaaatta taacccagga aggatattga aaatattcag aacttttagg aacccagaag 60
gacgcgaatt cacccgcgta gaatacgtcc ggaagcaagt cgtgatagac gcctacgtca 120
aaattcgtat gaccaaagac gaagaattca taagacagtt cgctacgtta gacgaagcgc 180
agaaggaaga gatgaagaga gagaagcgac ggatacagga gcaactgagg cggatcaaga 240
gaaaccaaga gaaggaaaag atgggaggtg ggcatacgca tatgcattcg acgcctatcg 300
taccgcctgc agggactgcg attgaaaagt tgccaaatcc aagtgactct ctttcgacac 360
ctgttacacc aacttctagt aagagtatgt cctcgtctcc tcctaaatca aggaggaaaa 420
ccaaactcaa gccagatctc aaactcaagt gtggagcctg tggaaatgtc ggccatatga 480
gaacaaacaa agcctgccct ctttatcaag ccacaactgg tcagaacccg cctattaacg 540
ttgccatgac tgaagaacaa gaagaagata tcgagaagca aattaataca gacgatgaag 600
atctcgtaaa cgtagatgga accaaagtta aattgtctgg aaagttgttg aagaattact 660
ttcagcatgc cgaggagatt aagcgtagga gcttaatgtt aaaagtccct aaggacgctt 720
taggtaaccg aaaaagaaga agaggggtgc aagatttaca ttgtgattat ttgaagaaac 780
acaacaggcc agcgaataga agacgaacgg atccggttgt cgttttgtct actattttag 840
agaatatact caatgaaatg cgagatatgc cagacgtcca gccttttctt attccctgtc 900
aatcaaaaac 910

<210> 172
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 172
cagaactttt aggaacccag aaggacg 27

<210> 173
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 173
gatccgttcg tcttctattc gctgg 25

<210> 174
<211> 776
<212> DNA
<213> Diabrotica virgifera

<400> 174
cagaactttt aggaacccag aaggacgcga attcacccgc gtagaatacg tccggaagca 60
agtcgtggta gacgcctacg tcaaaattcg tatgaccaaa gacgaagaat tcataagaca 120
gttcgctacg ttagacgaag cgcagaagga agagatgaag agagagaagc gacggataca 180
ggagcaactg aggcggatca agagaaacca agagaaggaa aagatgggag gtgggcatac 240
gcatatgcat tcgacgccta tcgtaccgcc tgcagggact gcgattgaaa agttgccaaa 300
tccaagtgac tctctttcga cacctgttac accaacttct agtaagagta tgtcctcgtc 360
tcctcctaaa tcaaggagga aaaccaaact caagccagac ctcaaactca agtgtggagc 420
ctgtggaaat gtcggccata tgagaacaaa caaagcctgc cctctttatc aagccacaac 480
tggtcagaac ccgcctatta acgttgccat gactgaagaa caagaagaag atatcgagaa 540
gcaaattaat acagacgatg aagatctcgt aaacgtagat ggaaccaaag ttaaattgtc 600
tggaaagttg ttgaagaatt actttcagca tgccgaggag attaagcgca ggagtttaat 660
gttaaaagtc cctaaggacg ctttaggtaa ccgaaaaaga agaagagggg tgcaagattt 720

acattgtgat tatttgaaga agcacaatag gccagcgaat agaagacgaa cggatc 776

<210> 175
<211> 365
<212> DNA
<213> Diabrotica virgifera

<400> 175
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atcatgagaa gtttaatagt tgccacgatt gtacttttcg ccgtttatca ggcagtagat 120
ggtctcattg cctgtcacga aacctttgc gacaatcaaa aatgtacaga aaacctcgtt 180
tgcaaagatt ctgaagttct ggttcccaag ggaaccattt gcggatgttg cgacgactgc 240
tacagaaaac taaatgaagg cgatgcttgc aggtcacgtt ttattggagg aggtccattc 300
agaggaaaat gtgtagatgg attagtatgt aacgctgaag gaaaatgcgc caaagcctaa 360
attat 365

<210> 176
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 176
cgtttatcag gcagtagatg gtctcattg 29

<210> 177
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 177
gcattttcct tcagcgttac atactaatcc 30

<210> 178
<211> 247
<212> DNA
<213> Diabrotica virgifera

<400> 178
cgtttatcag gcagtagatg gtctcattgc ctgtcacgaa acctttgcg acaatcaaaa 60
atgtacagaa aacctcgttt gcaaagattc tgaagttctg gttcccaagg gaaccatttg 120
cggatgttgc gacgactgct acagaaaact aaatgaaggc gatgcttgca ggtcacgttt 180
tattggagga ggtccattca gaggaaaatg tgtagatgga ttagtatgta acgctgaagg 240
aaaatgc 247

<210> 179
<211> 870
<212> DNA
<213> Diabrotica virgifera

<400> 179
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ttcgggggga aaaaggaaga gatagcccct agtcctgggg aggctattca aaaactcaga 120

gagactgaag aaatgttaat aaaaaaacag gatttttag aaaagaagat agaagaattt 180
accatggtag caaagaaaaa tgcgtcgaaa aataaaagag ttgcactcca agccctcaaa 240
aagaagaaac gattggaaaa gacccaacta caaatagatg gaacccttac aactattgaa 300
atgcagaggg aagccctcga aggagctagc acaaatactg ctgtattaga ttctatgaaa 360
aatgctgcag atgcccttaa gaaagctcat aagaatttga atgtagatga tgttcacgat 420
atcatggatg acatagccga acaacacgac atagccaacg aaatcacaaa cgctattagc 480
aatcctgtcg gattcaccga cgatctggat gacgatgaat tagaaaaaga attagaagag 540
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gctgtgcctg ctgatgcagt tgctactaaa ccaatcaaac cagcagctaa aaaagttgaa 660
gatgatgacg atatgaaaga attggaagcc tgggcctcgt aaaattcctg aaatctggat 720
atttgtaaac gaaatcaccc atctaagatg aaaacattat aaatatatag gtaataacag 780
ctaaaaacgt ttcaatgtag aacaagcttt tgctgaaaag gcgtcttgca aaaaatgttg 840
ataatttaga attctctata tattatatat 870

<210> 180
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 180
gtcctgggga ggctattcaa aaactc 26

<210> 181
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 181
caggcttcca attctttcat atcgtcatc 29

<210> 182
<211> 601
<212> DNA
<213> Diabrotica virgifera

<400> 182
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atttttaga aaagaagata gaagaattta ccatggtagc aaagaaaaat gcgtcgaaaa 120
ataaaagagt tgcactccaa gccctcaaaa agaagaaacg attggaaaag acccaactac 180
aaatagatgg aacccttaca actattgaaa tgcagaggga agccctcgaa ggagctagca 240
caaatactgc tgtattagat tctatgaaaa atgctgcaga tgcccttaag aaagctcata 300
agaatttgaa tgtagatgat gttcacgata tcatggatga catagccgaa caacacgaca 360
tagccaacga aatcacaaac gctattagca atcctgtcgg attcaccgac gatctggatg 420
acgatgaatt agaaaaagaa ttagaagagc tcgaacaaga aggattggaa gaagacctgc 480
tccaagtgcc aggtccaact caactgccgg ctgtgtctgc tgatgcagtt gctactaaac 540
caatcaaacc agcagctaaa aaagttgaag atgatgacga tatgaaagaa ttggaagcct 600
g 601

<210> 183
<211> 860
<212> DNA
<213> Diabrotica virgifera

<400> 183
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ttatcctaaa aatgatttgt aagcttatgt atatccgtaa ggtcttcaat aagttcttcc 120
attttagtac caatttttg aaacctctga cttttctgtt agcgaaaggt ttaggaaatt 180
ccacactaac tccccatcga ttatagatct agcagggttg ttttgtagtt ttctccaact 240
tttaaatgtc ctgaaagcct tgggatttag gccggcaata tgagctcctt gggaaactaa 300
tacattttgc aacataagta aacggcgata tgttttctct ggaactggca taatgtatcc 360
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ctttttatca tcgcctagtt cacctagttt acatttaatt ttaaagaatg tgttgacagt 480
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tgatgaatta tctatcatgt attctattga atatacttcg tttggtttga aatccctaga 660
taccattgac agtgttcggt actcttcttg aaaccttaac aacgcgatag atttgtagac 720
atcaccaacc aacagcaaac ttttgatagt aagtatttga tgagtataga cttgtgtatc 780
tataaatgct actccaataa atcngtatct ttgagttgcc aaatatatat cttttgtccc 840
actgctgaca caggaaacct 860

<210> 184
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 184
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<210> 185
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 185
ctgttggttg gtgatgtcta caaatctatc g 31

<210> 186
<211> 399
<212> DNA
<213> Diabrotica virgifera

<400> 186
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ccttctatct gctccagaaa aatgcttttt atcatcgcct agttcaccta gtttacattt 120
aattttaaag aatgtgttga cagtttggcc taaatggaaa tccgctttcc ttaatagtct 180
ttgacctcct aaagattctc ttgattctgg ttgatacata tacatggcta gattttgttc 240
tccatctgat actaaaaatc ctagtgatga attatctatc atgtattcta ttgaatatac 300
ttcgtttggt ttgaaatccc tagataccat tgacagtgtt cggtactctt cttgaaacct 360
taacaacgcg atagatttgt agacatcacc aaccaacag 399

<210> 187
<211> 816
<212> DNA
<213> Diabrotica virgifera

<400> 187

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tcggagacac tcaaagacag caacatgtac gtatacggtt tcgacattac atagacgtgt 120
aatatgcgtg cgagtgcttg atcacggtga agttctggcg tgaacggtgg ctcggaggaa 180
tcatggcgtc ggtggcgggc tcgcaagaac agccgcccgc cgcgcacggc catagcttct 240
gcaagaagac cttccacaag cccacctact gccaccactg cagcgacatg ttatggggcc 300
tcatccagca gggcttcatc tgcgaagttt gcaacttcgt agtgcatgat cgctgcttaa 360
ggactgtggt atccccgtgt tccagcgtct ccgccagtca aataagaaat ccggttgcac 420
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tagatgacag cgaatccatt cattgcgaaa tttgtgagta tttcgtacat gtggagtgcc 540
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ccttcgtgcg tcatcaacat cactggcgcg aaggaaatct tccaagcaat tcccaagtgt 660
gctctctgta aaaagacgtg ctggactact gaatgtttat cccggataca gatgcgaatg 720
gtggtgaatg acgagccatg cctcctgtcc tacgagtatt aatagtgaat ggacttttg 780
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<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 188
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<210> 189
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 189
ctcgtaggac aggaggcatg gct 23

<210> 190
<211> 717
<212> DNA
<213> Diabrotica virgifera

<400> 190
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gcgtgaacgg tggctcggag gaatcatggc gtcggtggcg ggctcgcaag aacagccgcc 180
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ctgcagcgac atgttatggg gcctcatcca gcagggcttc atctgcgaag tttgcaactt 300
cgtagtgcat gatcgctgct taaggactgt ggtatccccg tgttccagcg tctccgccag 360
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ttgcaacgta tgtagaaaac ggttagatga cagcgaatcc attcattgcg aaatttgtga 480
gtatttcgta catgtggagt gccaggattt tgcagtagct gactgtaaag aaaatgcaac 540
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tcttccaagc aattccaagt gtgctctctg taaaaagacg tgctggacta ctgaatgttt 660
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<212> DNA

<213> Diabrotica virgifera

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acaggcgaga ataataatgg tgttaagaga attagtgata atagaaggag taacaagcct 180
attatggaga aaaggcggag ggcgaggata aataactgtc tcaatgagtt gaaaacgctc 240
atattggacg ccatgaaaaa agatcctgcc agacattcaa agctggaaaa agctgacatc 300
ctggagatga cagtcaagca tttacagaac cttcaaagac agcaagtcgc tatgtcagcg 360
gcagcagatc ccttagtagt taataaattc agagcagggt ttagcgagtg cgcttcagaa 420
gtcggcagat ttccaggtct agatccaatc gtccgacgaa ggttactcca gcatctagcc 480
aactgtctca gccaaggttc caaaccacaa gaagttcctc aagtacaagt tcacatactt 540
ccaaacactc aaaaaccttt agaacagcaa gtaccccaaa gcagtggcat tattcttagt 600
aacggtaacg gtactggagt tcaactagta ccaacaagac taccgaatgg agatttagct 660
ctggtacttc ctacgacctt acaaacacag ccccagtatt caccggcggc agtaccatta 720
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aattatttct ccagtcatag tccagagcct atggagtcta tgtaca 826

<210> 192
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 192
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<210> 193
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 193
gctgtgtttg taaggtcgta ggaagtacca 30

<210> 194
<211> 679
<212> DNA
<213> Diabrotica virgifera

<400> 194
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agcatgattc aaggaaatag tacgacgcct acatctaaca cccctggcac aggcgagaat 120
aataatggtg ttaagagaat tagtgataat agaaggagta acaagcctat tatggagaaa 180
aggcggaggg cgaggataaa taactgtctc aatgagttga aaacgctcat atcggacgcc 240
atgaaaaaag atcctgccag acattcaaag ctggaaaaag ctgacatcct ggagatgaca 300
gtcaagcatt tacagaacct tcaaagacag caagtcgcta tgtcagcggc agcagatccc 360
ttagtagtta ataacttcag agcagggttt agcgagtgcg cttcagaagt cggcagattt 420
ccaggtctag atccaatcgt ccgacgaagg ttactccagc atctagccaa ctgtctcagc 480
caaggttcca aaccacaaga agttcctcaa gtacaagttc acatacttcc aaacactcaa 540
aaaccttag aacagcaagt accccaaagc agtggcatta ttcttagtaa cggtaacggt 600
actggagttc aactagtacc gacaagacta ccgaatggag atttagctct ggtacttcct 660
acgaccttac aaacacagc 679

<210> 195
<211> 873
<212> DNA
<213> Diabrotica virgifera

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tacacttcaa gctgggttgc gtacgttaca tgaggctggt ccagaactga aacgcgccat 180
ctcaggcaat ctagatgaat taattgatga caatcccgaa ccaatgcatc gtagaaatca 240
ttcactcttc ggaagtgtat ggtcttcaat gagacgaggt catactttca atagagcgaa 300
atctctgaag ttaaattcaa cccaaatcaa aattacaccg gcttccagcg tcgactatct 360
tccatacaat tctattaaga atgccgtcac agaagggatg aatcacatta cttccatgac 420
gaaaaacgtt caaaaccgtg ttagcgctag ttccttgaac aatcaggata actataagga 480
tgaagaaatt cctctgaggt ctcttagtaa tctgcataat ggagatgaga agaataacta 540
cacggtcatc gataaatctg gcttcctgca ccctaactac aaggttggag caggtgaggc 600
gaatggtcac gtgggaccag agcgtcttag ccattcactg cctggcagtc cggccgaccg 660
tagacttgct tccttcgaag tcgtaggctc tgcggaaagc ctggtaggnc gaatcctagc 720
cgagcaaggc ttaggtaagt actgtgatca ggatttcgtg cgctacacct nncgaagaga 780
tgcagaggca ttggatatga ctcaggagga aatggatcgc gcagcccacc agattctttt 840
cacagagaaa cttatacatc atcctctgca gca 873

<210> 196
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 196
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<210> 197
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 197
cgaaggaagc aagtctacgg tcgg 24

<210> 198
<211> 677
<212> DNA
<213> Diabrotica virgifera

<400> 198
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gttcaagaag agaaaagagc aggagatgag ggacggagat aaagatattc agaataccgt 120
tacacttcaa gctgggttgc gtacgttaca tgatgctggt ccagaactga aacgcgccat 180
ctcaggcaat ctagatgaat taattgatga caatcccgaa ccaatgcatc gtagaaatca 240
ttcactcttc ggaagtgtat ggtcttcaat gagacgaggt catactttca atagagcgaa 300
atctctgaag ttaaattcaa cccaaatcaa aattacaccg gcttccagcg tcgactatct 360
tccatacaat tctattaaga atgccgtcac agaagggatg aatcacatta cttccatgac 420
gaaaaacgtt caaaaccgtg ttagcgctag ttccttgaac aatcaggata actataagga 480
tgaagaaatt cctctgaggt ctcttagtaa tctgcataat ggagatgaga agaataacta 540
cacggtcatc gataaatctg gcttcctgca ccctaactac aaggttggag caggtgaggc 600

gaatggtcac gtgggaccag agcgtcttag ccattcactg cctggcagtc cggccgaccg 660
tagacttgct tccttcg 677

<210> 199
<211> 418
<212> DNA
<213> Diabrotica virgifera

<400> 199
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gagtctttat acgccgataa gtttccacag tttaatccta tacaaacaca ggttttcaac 180
tcagtataca atggagacga caacatattc ataggcgctc ccacgggatc aggaaagacc 240
acaatagcaa aatttgccat cctcagactc ttcgattgaa atcctgaagg tcgatgtgtt 300
tatctagttc ctaaggacgc cctcgctgaa ctgattttcg ccgattggca taataagttt 360
ggacaggcct tggcaaagaa agtggtattg ctgactggag aaactggtac tgatctaa 418

<210> 200
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 200
cacagttacc tgtatcgttc cgacatttg 29

<210> 201
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 201
gatcagtacc agtttctcca gtcagcaata c 31

<210> 202
<211> 408
<212> DNA
<213> Diabrotica virgifera

<400> 202
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aattgctgga cttgcaaccg ctgcctatta ctgctttgag aaacgaacaa tttgagtctt 120
tatacgccga taagtttcca cagtttaatc ctatacaaac acaggttttc aactcagtat 180
acaatggaga cgacaacata ttcataggcg ctcccacggg atcaggaaag accacaatag 240
cagaatttgc catcctcaga ctcttcgatc gaaatcctga aggtcgatgt gtttatctag 300
ttcctaagga cgccctcgct gaactgattt tcgccgattg gcataataag tttggacagg 360
ccttggcaaa gaaagtggta ttgctgactg gagaaactgg tactgatc 408

<210> 203
<211> 735
<212> DNA
<213> Diabrotica virgifera

<400> 203
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aagacctttt tgtatttcca aatacattgt catataaatt aaaaaagaaa tggctgccat 120
cagatctatg tctcgccttc ttattaatag atcacttcaa accactgcaa agaggaccta 180
tgccgaccaa atgaacttca catttgcagc tggaaatcag gtttactata ctgcaacttc 240
agttaaacaa gtagatgtac catctttctc tggtagcttt ggtatccttc ccgcccatgt 300
acccacactg gctgtgctaa aacctggagt agtcactgtt tacgaagatg gtggtaatgt 360
taagaaaatc tttgtttcca gtggtactgt caccatcaat gatgattcat cagttcagat 420
tcttgctgaa gaagcccacc cagtagaaaa cattgatgtc aatgcagcaa gagacatcct 480
taccaaagcc cagagccagt tatcatctgc aagtacagat gaggcgaaag ctgaagcctc 540
cattgctgtt gaagtgggag aagcgttagt caaagcggct gaataataat ttaatttttg 600
taatttttatg taaatttaat aaattagtgt ctcaatggta ctgttcattt taaaacaaca 660
acatattaga tctatacctc tatgagttga caatttttac aaaaacgaga atcaatccaa 720
atacataatt tttgt 735

<210> 204
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 204
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<210> 205
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 205
gctttgacta acgcttctcc cacttca 27

<210> 206
<211> 542
<212> DNA
<213> Diabrotica virgifera

<400> 206
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taaattaaaa aagaaatggc tgccatcaga tctatgtctc gccttcttat taatagatca 120
cttcaaacca ctgcaaagag gacctatgcc gaccaaatga acttcacatt tgcagctgga 180
aatcaggttt actatactgc aacttcagtt aaacaagtag atgtgccatc tttctctggt 240
agctttggta tcctccccgc ccatgtaccc acactggctg tgctaaaacc tggagtagtc 300
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atcaatgatg attcatcagt tcagattctt gctgaagaag cccacccagt agaaaacatt 420
gatgtcaatg cagcaagaga catccttacc aaagcccaga gccagttatc atctgcaagt 480
acagatgagg cgaaagctga agcctccatt gccgttgaag tgggagaagc gttagtcaaa 540
gc 542

<210> 207
<211> 686
<212> DNA
<213> Diabrotica virgifera

<400> 207
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cgtatcaata aataaatggg atggagtagc cgtcaaaaat gcattagatg atgcagttaa 120
agaggtactt acaaagaaat acaattatgc tgaaaatttt gctctcatgg atggtaggtt 180
agttatatgt ggcatagctg taggtgttgc aatgtttgcc ttgatttggg attatttgta 240
cccattccca caatctaagc ctattttaat attttctgtt actacatatt tttttatgat 300
gggaatttta actttatata ctacatacaa agagaaagga atctttgctg tttgtattca 360
gaaagatagt tctaagaagg aaaatacttg ggaagctagc tcttatattc aaaagtatga 420
tgataagtat actttgaatc ttgcatatat tgatggaaaa acacgccaaa gaagagagca 480
gagtattaaa aggagtattg ccaggtacat agaccagcaa ggaactgtag ttaaagaaaa 540
tgttgaagat gaaatcacca aaatgcacaa ttctctacta agtgagagga aagaaaaatg 600
atgtacacag agactaccta ctaaaagaag ttgacgtgta aattatttca ttttttatat 660
ttttcaataa gttttttttgg tttgag 686

<210> 208
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 208
gtatggcacc aaaggaaaaa gatgatga 28

<210> 209
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 209
cattttggtg atttcatctt caacattttc 30

<210> 210
<211> 536
<212> DNA
<213> Diabrotica virgifera

<400> 210
gtatggcacc aaaggaaaaa gatgatgaaa tcgtatcaat aaataaatgg gatggagtgg 60
ccgtcaaaaa tgcattagat gatgcagtta aagaggtact tacaaagaaa tacaattatg 120
ctgaaaattt tgctctcatg gatggtaggt tagttatatg tggcatagct gtaggtgttg 180
caatgtttgc cttgatttgg gattatttgt acccattccc acaatctaag cctattttaa 240
tattttctgt tactacatat ttttttatga tgggaatttt aactttatat actacataca 300
aagagaaagg aatctttgct gtttgtattc agaaagatag ttctaagaag gaaaatactt 360
gggaagctag ctcttatatt caaaagtatg atgataagta tactttgaat cttgcatata 420
ttgatggaaa aacacgccaa agaagagagc agagtattaa aaggagtatt gccaggtaca 480
tagaccagca aggaactgta gttaaagaaa atgttgaaga tgaaatcacc aaaatg 536

<210> 211
<211> 901
<212> DNA
<213> Diabrotica virgifera

<400> 211
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attccattga ttattaaaaa tctagatgaa catactgatg gggtctgtaa taatgctgct 120
tgggtgattg gaaagttgtg tgctgtgatg ggcaatgcaa tccaaccttt ccttccagaa 180
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t 901

<210> 212
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<212> DNA
<213> Diabrotica virgifera

<400> 212
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<210> 213
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<212> DNA
<213> Diabrotica virgifera

<400> 213
gaacattgcg aattgtctgc ttcaaatc 28

<210> 214
<211> 496
<212> DNA
<213> Diabrotica virgifera

<400> 214
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ttgattatta aaaatctaga tgaacatact gatggggtct gtaataatgc tgcttgggtg 120
attggaaagt tgtgtgctgt gatgggcaat gcaatccaac ctttccttcc agaaatcctt 180
aatgcctttg ttcatatatt aagaacacca gctgtagctc gtaccatgca caaaactgta 240
gctatttcct tatgcatcgt attctatgtg tgccccgatg tgactattcc agaaatggat 300
gtgattgtta agaattgctg tatgttagtg agaaatgtta gggattcaga tgagaaggat 360
cttgcttttc gaggcttgtg tgaggtgatt ataaggcatc cagaattcaa caagaactac 420
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acaattcgca atgttc 496

<210> 215
<211> 916
<212> DNA
<213> Diabrotica virgifera

<400> 215
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tacagcatgc gaccgcatgg gcataaggag atcgcagtga tcgcacccgt atcggctaat 180
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agaagtagcg cgtgtgttta aatagagagt tatggtgata acgtcaacgt gtgttgtgac 300
ggtgtttaag atcaacggtc ggcaccggag tcgacaacgc cagtgagcaa gcagtgcgac 360
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gcacaacccc tacttcttca gaagagtcat tgctagagga tccagcagca cgcaacgaaa 540
gaagcacaaa tctctctcac gtcactggta ccgccagaaa aatacaaatg ttcatcaaga 600
atcgacattt acaaattctt cctgacggga cagtcaacgg aaccactgac gacactagtg 660
cttattcgat attacaaagg acgacggtgg gaattggtca aatgaaaatt caaggtgtgg 720
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gacaagaatg cgtattcaat gagaccatcg agcaatccaa ctacaacacg tattcctccc 840
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gaaaggtcgt cctacg 916

<210> 216
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 216
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<210> 217
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<212> DNA
<213> Diabrotica virgifera

<400> 217
ggtctcattg aatacgcatt cttgtcc 27

<210> 218
<211> 789
<212> DNA
<213> Diabrotica virgifera

<400> 218
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aagacaaatc ctaaagatca agcgtcatcg ggtttagacc ggcatacagc atgcgaccgc 120
atgggcataa ggagatcgca gtgatcgcac ccgtatcggc taatagacac agacacagac 180
acggtgtgtt cggtattttt agttagtctg ttcgcgaccg gcgaagaagt agcgcgtgtg 240
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ggtgaaaacg tttctgggac tgttagctgc ttcaatttgt ggtctcgtat acgctgctcc 420
atagctgact cttgcaataa tctgaccccc tttcgaacag atagcacaac ccctacttct 480
tcagaagagt cattgctaga ggatccagca gcacgcaacg aaagaagcac aaatctctct 540
cacgtcactg gtaccgccag aaaaatacaa atgttcatca agaatcgaca tttacaaatt 600
cttcctgacg ggacagtcaa cggaaccact gacgacacta gtgcttattc gatattacaa 660
aggacgacgg tgggaattgg tcaaatgaaa attcaaggtg tggttacctg tcagtatttg 720
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aatgagacc 789

<210> 219
<211> 2176
<212> DNA
<213> Diabrotica virgifera

<400> 219
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atggcttcag cagtagcttt gttgtcacca gtgataacaa taactctgat accagcagcg 180
cggcattgaa caatggagtc aaatacttct ttacgtgggg gatccaacat accaacaaca 240
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ccacaaccat attgagcggt aagatcagtg attctctttt taagagtgct ggtaagtggt 420
acttttgag atccaacacg agcgtgtgta caccttcca aaacaccttc tggagctcct 480
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gacatagatt tacgatcacg tgagaattcc aaagtgaatt ccttcttcca tttagtttca 600
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ggattcattt tttctgctaa tacaatgaga gcagtttcag tagcttcacc aacttttttcg 720
aaagcttgtt tgaattcatt gaaatcaatg gcggagtcat tgcacataat acaaatggta 780
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<210> 221

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<210> 222
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<212> DNA
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<212> DNA
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<400> 225
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<210> 226
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<210> 229
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<400> 229
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<210> 230
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<400> 233
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<210> 234
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<210> 238
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ccataaatga ttgtgttata tcagttcctt cttactttac aaacaatgag aggaaggcac 420

tattagattc tgcagccata gcaggtctta atactctaag gttatttaat gaaacaacag 480
ctacggcctt gtcatatggc atttacaagc aggatttacc agctgttgaa gaaaagcctc 540
gtaatattat ttttgtcgat tgtggccatt catccttaca agtatttgca gttgcattta 600
ataagggcaa attgaagatg cttaccactg ctgcagatcc caatttaggt ggtagggact 660
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caaaatctaa tccaagagct tttctaagat tgctaacgga ggtagaaaag ttgaagaagc 780
agatgtctgc aaattctaca accttaccac tcaacataga atgtttcatg aacgataaag 840
atgtgtccag tgacatgaag ag 862

<210> 239
<211> 1188
<212> DNA
<213> Diabrotica virgifera

<400> 239
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caagaagccg aggaagaaag ggcagagatt gcccgactca gtagttttgt aggtgctata 180
gctataggag atttggttag aagcaccttg ggaccaaaag gaatggataa aattttagta 240
tccagtggta gatctgcagg atcagttgaa gttactaacg acggagcaac tatcctaaaa 300
tcggtgggtg ttgataatcc tgctgctaaa attttggtgg atatgtcaaa agtccaggat 360
gatgaagtag gagatggcac cacatcagtg acagtattag catctgaact acttaaagaa 420
gcagaaaaac ttgtagaaca gaaaattcac ccacaaacaa tcattgccgg ttggaggaaa 480
gcagtagata ttgccagaaa agctcttcta gaaactgcca aagacaacag ctctgattca 540
gaaaagttca gagaagatct gatgaacatt gccagaacta cactcagctc aaagattctt 600
tcacaacata aagaatattt tgccaaactg gcagtagatg ctgtgctgag attgaaaggt 660
acaggtgatt tacaatccat ccagctgatt aagaaaactg gtggtacttt ggaagattcc 720
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gaaaaaatga aagataaagt gaacaaaatt cttaaacata atgctaatgt atttattaat 960
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gaacatgcag attttgatgg aattgaaagg ctagcacttg tcacaggagg agagattgtc 1080
tcaacatttg accatccaga attggtaaaa cttggaactt gtaagcttat tgaacaaatc 1140
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<210> 240
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 240
ggtgggtgtt gataatcctg ctgct 25

<210> 241
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 241
caagagcaac accactgaaa cggag 25

<210> 242

<211> 884
<212> DNA
<213> Diabrotica virgifera

<400> 242
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agaaaaacct gtagaacaga aaattcaccc acaaacaatc attgccggtt ggaggaaagc 180
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aaagttcaga gaagatctga tgaacattgc cagaactaca ctcagctcaa agattctttc 300
acaacataaa gaatattttg ccaaactggc agtagatgct gtgctgagat tgaaaggtac 360
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tttggatgaa ggtttttttat tggacaaaaa acctggtgta catcaaccaa agagagtaga 480
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acagttgatt tacaattatc ctgaacaatt gtttgctgat gcaggagtta tggctattga 720
acatgcagat tttgatggaa ttgaaaggct agcacttgtc acaggaggag agattgtctc 780
aacatttgac catccagaat tggtaaaact tggaacttgt aagcttattg aacaaatcat 840
gattggagaa gatatcctgc tccgtttcag tggtgttgct cttg 884

<210> 243
<211> 1188
<212> DNA
<213> Diabrotica virgifera

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caagaagccg aggaagaaag ggcagagatt gcccgactca gtagttttgt aggtgctata 180
gctataggag atttggttag aagcaccttg ggaccaaaag gaatggataa aattttagta 240
tccagtggta gatctgcagg atcagttgaa gttactaacg acggagcaac tatcctaaaa 300
tcggtgggtg ttgataatcc tgctgctaaa attttggtgg atatgtcaaa agtccaggat 360
gatgaagtag gagatggcac cacatcagtg acagtattag catctgaact acttaaagaa 420
gcagaaaaac ttgtagaaca gaaaattcac ccacaaacaa tcattgccgg ttggaggaaa 480
gcagtagata ttgccagaaa agctcttcta gaaactgcca aagacaacag ctctgattca 540
gaaaagttca gagaagatct gatgaacatt gccagaacta cactcagctc aaagattctt 600
tcacaacata aagaatattt tgccaaactg gcagtagatg ctgtgctgag attgaaaggt 660
acaggtgatt tacaatccat ccagctgatt aagaaaactg gtggtacttt ggaagattcc 720
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gaaaaaatga aagataaagt gaacaaaatt cttaaacata atgctaatgt atttattaat 960
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gaacatgcag attttgatgg aattgaaagg ctagcacttg tcacaggagg agagattgtc 1080
tcaacatttg accatccaga attggtaaaa cttggaactt gtaagcttat tgaacaaatc 1140
atgattggag aagatatcct gctccgtttc agtggtgttg ctcttggg 1188

<210> 244
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 244
ctcactctga tggtgtaatc actatggaaa tc 32

<210> 245
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 245
gtcttctaca aatgctgatt tcaaatggtc t 31

<210> 246
<211> 820
<212> DNA
<213> Diabrotica virgifera

<400> 246
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tagaaggaca aaccagcaca ccagaacaac aagaactagc caacaaatta ctctattcag 180
gagacaggaa gtacattgaa catcctataa agccagctcc aattcctgta actgtgcgaa 240
aaccaatacc ctcatcaaat cctcaccctc tacaaccgaa atctaacaat cctagcacaa 300
atagtttagc gcattcttca tccacactca gtgttggaga tggagacaag aggacgccta 360
ggaaatatgg tagattagat tctactggaa gtccaaatag atcaagaagc gcaactaaag 420
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acttaaccat caatgatggt gaaagtctaa ccttgactgc acacgtaaag ggagatccag 540
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tcaaatacaa gaacggaata gcgaaattac acataaatga agtataccct gaagatgaag 660
gagaatatgt gtgcagagca accaactctg taggaacctc tgagaccaaa tgcaaactaa 720
ccattaaacc aatggccaat gccaccaacg gcaagaaaaa atcctcagaa gacaaacccc 780
caagaatagt agaccattga aatcagcatt tgtagaagac 820

<210> 247
<211> 815
<212> DNA
<213> Diabrotica virgifera

<400> 247
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gatactgaag atttgtacac taaatataaa aaacttcaac aacagttgga gttcttggag 120
gttcaagaag agtacattaa agatgagcaa aggaatctca aaaaggagta tttacatgct 180
caggaagaag tgaagcgtat ccagtctgtc ccgcttgtta ttggacagtt tttagaagct 240
gtagatcaaa acactggcat tgttggctca actacaggtt caaattatta tgttagaatc 300
ttatcaacaa ttgatagaga actcttaaaa ccttctgcta gtgttgctct tcataaacac 360
agcaatgcct tagtagatgt cctaccacca gaggcagatt cttcaataag catgctccag 420
gctgatgaaa aaccagatgt tcaatacagt gacattggag gtatggatat gcagaaacaa 480
gaaattaggg aagctgtaga gttacctttg actcacttcg aattgtataa acagattggt 540
attgatcccc ccagaggtgt gttgatgtat ggacctcctg gatgcgggaa gactatgttg 600
gccaaagctg ttgctcatca tactacagct gcctttattc gtgtagtcgg atcagaattc 660
gtacagaaat atcttggtga aggtcctcga atggtgagag acgtgttccg tctagcaaaa 720
gaaaattctc cagcaatcat ctttattgat gaaattgatg caatcgctac caaacgtttt 780
gatgcccaga caggtgctga tcgtgaagtc cagag 815

<210> 248
<211> 28

<212> DNA
<213> Diabrotica virgifera

<400> 248
cttcaacaac agttggagtt cttggagg 28

<210> 249
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 249
ctctggactt cacgatcagc acctg 25

<210> 250
<211> 722
<212> DNA
<213> Diabrotica virgifera

<400> 250
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cttgttattg gacagttttt agaagctgta gatcaaaaca ctggcattgt tggctcaact 180
acaggttcaa attattatgt tagaatctta tcaacaattg atagagaact cttaaaacct 240
tctgctagtg ttgctcttca taaacacagc aatgccttag tagatgtcct accaccagag 300
gcagattctt caataagcat gctccaggct gatgaaaaac cagatgttca atacagtgac 360
attggaggta tggatatgca gaaacaagaa attagggaag ctgtagagtt acctttgact 420
cacttcgaat tgtataaaca gattggtatt gatcccccca gaggtgtgtt gatgtatgga 480
cctcctggat gcgggaagac tatgttggcc aaagctgttg ctcatcatac tacagctgcc 540
tttattcgtg tagtcggatc agaattcgta cagaaatatc ttggtgaagg tcctcgaatg 600
gttagagacg tgttccgtct agcaaaagaa aattctccag caatcatctt tattgatgaa 660
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ag 722

<210> 251
<211> 1324
<212> DNA
<213> Diabrotica virgifera

<400> 251
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tttaaatcgg aaaatggaga agtcgccggt gatatgatgg atctccccat agactgttcc 180
ttacagcagc tcacgttaat ttgtaatgct ttgttaaaac aggaagaacc agtaccatac 240
ttattttacg ttaacgaaaa cgaaataacc catactttgg aaaaagcact aaatataagg 300
gaattaaata cagaaggtgt tgtagatatc atttatcaac aacaagcagt gtttagggta 360
cgccctgtaa caaggtgtac cagctcaata ccaggtcatg cagaagcagt tatttcagtt 420
agttttagtc cagacggtaa acatttagca agtggatctg gtgatacaac agtcaggttt 480
tgggatgttg atacgcaatc tccgttatat acttgtgaag gtcataaaaa ttgggtgttg 540
tgtatagctt ggtcctctga tagtactaaa ttggcttctg cttgtaaaga tgggaaaatt 600
atcatatggg atccttttac aggaaagcaa ataggtaaaa cgttaacggg acataaacag 660
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aagttcttca aaagatggag atgtaaggat atgggatact gtactcagca atacattttt 780
ttgtatatct ggtcatacaa agagtgtaac aatggtgaaa tggggtggag caggtctcat 840

ctattcagcc tcccaagaca gaacagttaa agtatggaga gctaaagatg gtgtactatg 900
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caagaaaaaa tctcaggact ttgccctcaa acgatactat gaagttacag aatctattgg 1080
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acctgatggt agaatattag cttcagcatc tttcgataaa tcaatcaaat tgtgggaggc 1260
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tttt 1324

<210> 252
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 252
gaaaacgaag gcgaagctgt aacagaac 28

<210> 253
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 253
gctccacccc atttcaccat tgttacac 28

<210> 254
<211> 757
<212> DNA
<213> Diabrotica virgifera

<400> 254
gaaaacgaag gcgaagctga acagaacaga agcgtctgtt gtgttgtttt aaatcggaaa 60
atggagaagt cgccggtgat atgatggatc tccccataga ctgttcctta cagcagctca 120
cgttaatttg taatgctttg ttaaaacagg aagaaccagt accatactta ttttacgtta 180
acgaaaacga aataacccat actttggaaa aagcactaaa tataagggaa ttaaatacag 240
aaggtgttgt agatatcatt tatcaacaac aagcagtgtt tagggtacgc cctgtaacaa 300
ggtgtaccag ctcaatacca ggtcatgcag aagcagttat ttcagttagt tttagtccag 360
acggtaaaca tttagcaagt ggatctggtg atacaacagt caggttttgg gatgttgata 420
cgcaatctcc gttatatact tgtgaaggtc ataaaaattg ggtgttgtgt atagcttggt 480
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cttttacagg aaagcaaata ggtaaaacgt taacgggaca taaacagtgg attactagtt 600
taagctggga gccttatcat aaaaaccctg aatgtagata tttggcaagt tcttcaaagg 660
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atacaaagag tgtaacaatg gtgaaatggg gtggagc 757

<210> 255
<211> 794
<212> DNA
<213> Diabrotica virgifera

<400> 255
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tgtctgtgat aaatagtaaa aaatattaaa gcgatatttt cgtcgaaact gatatgtatt 180
aaatttatct tttgtgttat taaagagagt taaacgtagc taaagaagaa aaactattag 240
tgatttaaac atgagtacga aagatgatga atacgattat ttatttaaag ttgtccttat 300
tggtgattct ggtgtaggaa aaagtaactt attgtcaaga tttactagaa atgaattcaa 360
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taaaactatt aaagcacaaa tatgggacac ggcaggtcaa gagagatacc gagcaatcac 480
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tgtgatcatg ttggtcggaa acaaatccga tctgaggcat ttgcgcgccg tgctgacaga 660
agaagctaag gctttcgccg aaagaaacgg cctcagcttc atcgagactt cagccctaga 720
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ccaaaaacag atca 794

<210> 256
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 256
ggaacgtatc ggaagtaatg tgtctgtg 28

<210> 257
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 257
cacaatgttc tgatctgcgt ggtcg 25

<210> 258
<211> 504
<212> DNA
<213> Diabrotica virgifera

<400> 258
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cgtcgaaact gatatgtatt aaatttatct tttgtgttat taaagagagt taaacgtagc 120
taaagaagaa aaactattag tgatttaaac atgagtacga aagatgatga atacgattat 180
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gagagatacc gagcaatcac ggcggcctat tatcgtggtg cagtcggtgc tctactcgtc 420
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gaccacgcag atcagaacat tgtg 504

<210> 259
<211> 1180
<212> DNA
<213> Diabrotica virgifera

<400> 259
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cttcccgcaa aaccgtaagc cgccgtggta ccacaaagaa acgtgcccaa agagccacat 180
ccaatgtatt cgcaatgttt gatcaggctc agattgctga gttcaaagaa gccttcaata 240
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<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 260
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<210> 261
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 261
caacggacaa gacttgatgg tctagtatga 30

<210> 262
<211> 607
<212> DNA
<213> Diabrotica virgifera

<400> 262
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tcctcaacga agaacgtctc agggagctcc tcacgtccat gggtgataga ttcactgacg 360
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aattcacccg cattttaaag cacggggcta aggacaagga tgagcaataa gagacgagtt 480
gatgatgaaa ggatttgtaa ttaatatgga acgatgtctt agtttgaatg atttggattt 540
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<210> 263
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<212> DNA
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gatggtgata ttggattcgt tgattaccaa acacgaatgg tggactgtgc gaagagtata 180
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gctgtagctg ctcaaaattc tgttgcgacc atagtacaat tagccgaagt agtgaaattc 780
ggagcagcca gcttaggcgt tgacaatcca gattcccaag tgatgcttat caacgcagta 840
cgtgacgttg ccagtgctct tggtgacttg attcaagcta ctaaggctgc tagcggcaag 900
cccatcaacg atccggccat ggctcattta aaagacagcg caaaggtgac ggattctgaa 960
actgat 966

<210> 264
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 264
ggtgtagttg ataatctcac aagagccatg 30

<210> 265
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 265
cagtttcaga atccgtcacc tttgcg 26

<210> 266
<211> 913
<212> DNA
<213> Diabrotica virgifera

<400> 266
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aagagtatag ctaaaatcgc cggagaaatt gctagcaaag ctgccactga ccctcagaag 180
gtggctcaat tatctgcaga tcttgcgcac aaatatgcac aactatctgg cgatagtatt 240
ggagctgcag cagctgccac taatgccgaa gttgcaatca gactaaggga agttgttcaa 300
caactgggtg gcgcctgcgt agaactcgtc caaacaggag gccagtgctt agtccgaaaa 360
gatgacgtac tcttgcgaga agtaggagat tgctcacgca acgtaactga gaaagtttcc 420

cgtgttcttg ccacattaca aaacgaatcc agaggtaccc aagcttgcat caatgcagct 480
tccaccgtat ctggtatcat cggcgattta gaaactacca tcatgtttgc cactgccgga 540
aatctcaatc ccgaaagcga acatgaatcg ttcgctaatc acagagagaa tatattgaag 600
actgctaagg cgttggtaga ggatactaag actttggtag ctggcgcagc ttcatcacaa 660
gaacaactgg ctgtagctgc tcaaaattct gttgcgacca tagtacaatt agccgaagta 720
gtgaaattcg gagcagccag cttaggcgtt gacaatccag attcccaagt gatgcttatc 780
aacgcagtac gtgacgttgc cagtgctctt ggtgacttga ttcaagctac taaggctgct 840
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gattctgaaa ctg 913

<210> 267
<211> 846
<212> DNA
<213> Diabrotica virgifera

<400> 267
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gttagcttca cagcggccgg cgagcccctt aagtcctacc agacattcta gattacagga 180
gaagcatgaa cttcagaatc ttaacgaccg tttggcggga tatatagatc gagtaaggta 240
tttagaaggt gaaaacaaca gattaacgag ggaaatacaa agtacccagg aaacagtaac 300
aagggaagtt tcaaacatta aatctatgta tgaccatgaa ttatcagatg ctagaaaact 360
attagacgag acccaccgtg aaaaagcacg tttagagata gatgttaaac gtcttttaga 420
agagaatgac gaactcaagt ctgagttagc aaagaagaac aaggatttgg ctctagctga 480
gaattctgcc aggatatacg agaccagatg taacgagtta cagctcaaag caaatcaagc 540
ggctgctgat gctaagaaag ctattgcaga tgctaaggaa cttgagaaag aacgtgataa 600
gctacgcaaa cttcttgata atcatcgtaa acagttagaa gaagaatcat tagcgagagt 660
ggaagtcgaa aatgccaacc aaagtcttcg agaagagctg tcctttaagg atcagatcca 720
tcaacaacag ttgacagaaa ctcgtactcg tcgtcaagta gaaatcagcg aaatcgacgg 780
tcgcctggca gaaaaatatg aggctaagct tcaagaggct ctacaagaac tcagagatca 840
atatga 846

<210> 268
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 268
gagaagcatg aacttcagaa tcttaacgac c 31

<210> 269
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 269
gatttcgctg atttctactt gacgacgag 29

<210> 270
<211> 595
<212> DNA
<213> Diabrotica virgifera

<400> 270
gagaagcatg aacttcagat cttaacgacc gtttggcggg atatatagat cgagtaaggt 60
atttagaagg tgaaaacaac agattaacga gggaaacaca aagtacccag gaaacagtaa 120
caagggaagt ttcaaacatt aaatctatgt atgaccatga attatcagat gctagaaaac 180
tattagacga gacccaccgt gaaaaagcac gtttagagat agatgttaaa cgtcttttag 240
aagagaatga cgaactcaag tctgagttag caaagaagaa caaggatttg gctctagctg 300
agaattctgc caggatatac gagaccagat gtaacgagtt acagctcaaa gcaaatcaag 360
cggctgctga tgctaagaaa gctattgcag atgctaagga acttgagaaa gaacgtgata 420
agctacgcaa acttcttgat aatcatcgta aacagttaga agaagaatca ttggcgagag 480
tggaagtcga aaatgccaac caaagtcttc gagaagagct gtcctttaag gatcagatcc 540
atcaacaaca gttgacagaa actcgtactc gtcgtcaagt agaaatcagc gaatc 595

<210> 271
<211> 901
<212> DNA
<213> Diabrotica virgifera

<400> 271
tcaacacgtg tgaattaaaa caaattcaaa aacaaaaatg tccatccaag aaaaagtttt 60
aatgaaaaaa ataaaaaaga gggaaaagca gaaattaaaa tttgttcaaa agaaagagtc 120
tgaaaagagc aaagaagttt tagaaacaga tctaccagag aaggcaaaag tgggaaatgg 180
cttgaaacgc ttgcagagca acgatgaagg accttctaaa aaaaaaaaga agaaaaataa 240
aaagaagaaa gagaaaatag tcgaagagga agatacagac gaagaacaac cagaggaaga 300
tgaaattgag tctgacattg aagatcaaga gattgacaat ggtgaagaag atacagatga 360
aaaatctgat ttaggaaaca aattaccagg atccagtgct acattagaaa ttctcagtaa 420
aagtacattt gactcattga cggataaagt atgtgaaaat actttgaaag ccattgcaga 480
tatgggtttt actactatga ctgaaattca agcaaaatct atacctccac ttctggaagg 540
tagagatttg gttggggctg caaaaacagg atctggaaaa actcttgctt ttctcattcc 600
cgctgttgaa cttatttata agttaaagtt tatgccaaga aatggtactg gtatcattat 660
catttccccc acacgagaat tatcaatgca gacttttgga gtattaaaag aactaatgaa 720
atatcatcac catacatacg gtttggttat gggtggaact gcaagacaaa cagaagcaca 780
aaagctttcc aaaggtatta atatcttagt agcaacgcct ggtaggcttc tggatcatct 840
tcagaatact cctgacttct tgtataagaa tttacaatgt ttagtcattg acgaggctga 900
c 901

<210> 272
<211> 22
<212> DNA
<213> Diabrotica virgifera

<400> 272
ggaaatggct tgaaacgctt gc 22

<210> 273
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 273
ctgaagatga tccagaagcc taccagg 27

<210> 274
<211> 672

<212> DNA
<213> Diabrotica virgifera

<400> 274
ggaaatggct tgaaacgctt gcagagcaac gatgaaggac cttctaaaaa aaaaaagaag 60
aaaaataaaa agaagaaaga gaaaatagtc gaagaggaag atacagacga agaacaacca 120
gaggaagatg aaattgagtc tgacattgaa gatcaagaga ttgacaatgg tgaagaagat 180
acagatgaaa aatctgattt aggaaacaaa ttaccaggat ccagtgctac attagaaatt 240
ctcagtaaaa gtacatttga ctcattgacg gataaagtat gtgaaaatac tttgaaagcc 300
attgcagata tgggttttac tactatgact gaaattcaag caaaatctat acctccactt 360
ctggaaggta gagatttggt tggggctgca aaaacaggat ctggaaaaac tcttgctttt 420
ctcattcccg ctgttgaact tatttataag ttaaagttta tgccaagaaa tggtactggt 480
atcattatca tttcccccac acgagaatta tcaatgcaga cttttggagt attaaaagaa 540
ctaatgaaat atcatcacca tacatacggt ttggttatgg gtggaactgc aagacaaaca 600
gaagcacaaa agctttccaa aggtattaat atcttagtag caacgcctgg taggcttctg 660
gatcatcttc ag 672

<210> 275
<211> 512
<212> DNA
<213> Diabrotica virgifera

<400> 275
atttagtcca ctgtacaaat gaaccaaatg tttcaattcc acagctagca aatttgttaa 60
tagaaagatc acagaataca aactgggtag tagtttacaa ggcattagtt acagttcacc 120
acatgatgtg ttatggaaat gagagattta ctcagtacct agcatccagt aacagtacat 180
ttcaacttag caacttctta gataaagggg gacttcaagg atatgacatg tctccattta 240
ttagaaaata ttcacgatat ctcaatgaga aggccttatc atacagaact acagccttcg 300
acttttgcaa agttaaaaga gggaaggatt gatggcatgt taaggacaat gaacgcagat 360
aaattattan aaactcttcc cactttacaa natcaactgg atatcctatt ggaantttga 420
tgttccgcan atgatttnna caacggagtg antaatatgt gtttcatgtt gctttttagg 480
gatttatacg cttatttttg ctgtataatg at 512

<210> 276
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 276
caaatgaacc aaatgtttca attccaca 28

<210> 277
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 277
cgtataaatc cctaaaaagc aacatgaaac ac 32

<210> 278
<211> 470
<212> DNA
<213> Diabrotica virgifera

<400> 278
tgaaccaaat gtttcaattc cacagctagc aaatttgtta atagaaagat cacagaatac 60
aaactgggta gtagtttaca aggcattagt tacagttcac cacatgatgt gttatggaaa 120
tgagagattt actcagtacc tagcatccag taacagtaca tttcaactta gcaacttctt 180
agataaaggg ggacttcaag gatatgacat gtctccattt attagaaaat attcacgata 240
tctcaatgag aaggccttat catacagaac tacagccttc gacttttgca aagttaaaag 300
agggaaggat gatggcatgt taaggacaat gaacgcagat aaattattaa aaactcttcc 360
cactttacaa aatcaactgg atatcctatt ggaatttgat tgttccgcaa atgatttaac 420
aaacggagtg ataaatatgt gtttcatgtt gctttttagg gatttatacg 470

<210> 279
<211> 978
<212> DNA
<213> Diabrotica virgifera

<400> 279
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aactacagac tctgcacaac ctgagaaaat tgttcgtgca agatttgcag gcacgtatga 120
agaaaaatct ttcgtcggaa gacaatgagg aagacggcgg ctctctggct caaaaacaga 180
agatatcgtt cctcgaaaac aatctcgatc aattgacaaa agtccacaag cagttggtac 240
gagacaacgc ggatctgcgc tgtgaacttc ccaaactcga aaagagacta cgagctacga 300
tggaaagagt caaagcactg gaaactgcac tgaaggaagc caaagaaggc gcgatgagag 360
accggaaaag ataccaatac gaggttgacc gcattaaaga ggctgtgagg cagaagaacc 420
tcgcaagaag aggcccagca gccacaatcg ctaaaccaat cagggcaggg caacacaaca 480
cggttaacgt agctggtaac cccgtcatta gaactggagg catcaacatg gccaacagat 540
cgaccgacga ccagaaacgt aggtctgtta ttggtggaga taaagattga gtcgccagcc 600
atcttgtcag gtgcttgaga cgtttttagt aagcaaaatc cataaaactg taataccaaa 660
aatattgccg atacttcgcg cgagtctgtc gccagcagtt tttggaacag acaagaaaaa 720
aaattgctcc tccagactcg ctcttcaatg tgcttacagc ttagatattt ctgtagtata 780
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gcaaattgtt ttaataaatc gttcattttt tgttttcgat cacttctagc ttcctgtcga 900
attaagtgtt aacactanaa aacaatttgc ttgctgtttt atccttaaaa cgttgcaacg 960
tttacggcga ttttttga 978

<210> 280
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 280
gaacaggcga gaaaagacct caaagg 26

<210> 281
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 281
cacattgaag agcgagtctg gaggag 26

<210> 282
<211> 741

<212> DNA
<213> Diabrotica virgifera

<400> 282
gaacaggcga gaaaagacct caaaggactc gaagacactg tcgccaaaga actacagact 60
ctgcacaacc tgagaaaatt gttcgtgcaa gatttgcagg cacgtatgaa gaaaaatctt 120
tcgtcggaag acaatgagga agacggcggc tctctggctc aaaaacagaa gatatcgttc 180
ctcgaaaaca atctcgatca attgacaaaa gtccacaagc agttggtacg agacaacgcg 240
gatctgcgct gtgaacttcc caaactcgaa aagagactac gagctacgat ggaaagagtc 300
aaagcactgg aaactgcacc gaaggaagcc aaagaaggcg cgatgagaga ccggaaaaga 360
taccaatacg aggttgaccg cattaaagag gctgtgaggc agaagaacct cgcaagaaga 420
ggcccagcag ccacaatcgc caaaccaatc agggcagggc aacacaacac ggttaacgta 480
gctggtaacc ccgtcattag aactggaggc atcaacgtgg ccaacagatc gaccgacgac 540
cagaaacgta ggtctgttat tggtggagat aaagattgag tcgccagcca tcttgtcagg 600
tgcttgagac gtttttagta agcaaaatcc ataaaactgt aataccaaaa atattgccga 660
tacttcgcgc gagtctgtcg ccagcagttt ttggaacaga caagaaaaaa aattgctcct 720
ccagactcgc tcttcaatgt g 741

<210> 283
<211> 876
<212> DNA
<213> Diabrotica virgifera

<400> 283
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ttgtttaaaa tccgttgaca tacttgctaa tttggatgga gtgctaagac aatgctactc 120
gtgtgtgatt gtagatgttt cccacttgat ccctgcttct gtttcctaga tacatcttgt 180
aattgggcta tttgttgatt caagttgcta agatcacctt ttatgatata tgtgagttct 240
tggatttctg atgttttgtc gtcaaataaa gattttcgtt ttgccaacaa tgtcaacttt 300
tccaatttag cataagtgct agctatatgc cgtcccacat tcttcgcaat tagcataaac 360
tcgctatgac tttgtataac cctcgatttc ttcgggtccc tagcagctac tgccctagca 420
atgttcctgc cttgtaatgt ctgtatagta tttacaaatt cactagttct gtctctggca 480
gtcatgacta attctggttc agtgtagtct tcgatataat cttcctctaa atagtagtca 540
gatgtaacat tgtttggata caccgtgtgt gactgattcg ttttaggctg agggttagtc 600
caataattat cgttacctac tataacttgg ggctcagttt cagagccagc tcgacgacgt 660
ctaggaagca ttgcattctt aagaggctac aaagttaatt ttgaaagtag cacaaccata 720
tttaaagcac tagaatttca ctttatatta tatttttatc acctactgta gtatatatca 780
tgactaattg tttaattggg tttaatatgt ttaattacaa ttaataatga actttacttt 840
ttcttttgaa agtacacgtc tatttgcccg gacgcg 876

<210> 284
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 284
ggttgtgcta ctttcaaaat taactttgta gc 32

<210> 285
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 285

cgttgacata cttgctaatt tggatggag 29

<210> 286
<211> 645
<212> DNA
<213> Diabrotica virgifera

<400> 286
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tcgtcgagct ggctctgaaa ctgagcccca agttatagta ggtaacgata attattggac 120
taaccctcag cctaaaacga atcagtcaca cacggtgtat ccaaacaatg ttacatctga 180
ctactattta gaggaagatt atatcgaaga ctacactgaa ccagaattag tcatgactgc 240
cagagacaga actagtgaat ttgtaaatac tatacagaca ttacaaggca ggaacattgc 300
tagggcagta gctgctaggg acccgaagaa atcgagggtt atacaaagtc atagcgagtt 360
tatgctaatt gcgaagaatg tgggacggca tatagctagc acttatgcta aattggaaaa 420
gttgacattg ttggcaaaac gaaaatcttt atttgacgac aaaacatcag aaatccaaga 480
actcacatat atcataaaag gtgatcttag caacttgaat caacaaatag cccaattaca 540
agatgtatct aggaaacaga agcagggacc aagtgggaaa catctacaat cacacacgag 600
tagcattgtc ttagcactcc atccaaatta gcaagtatgt caacg 645

<210> 287
<211> 883
<212> DNA
<213> Diabrotica virgifera

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ccactcaccc atgggaagtt atttttactg tcatcacctt cactgtatgt tttttgactt 180
tggataaacc gcaagggaca aaggcctttc cacggactac ctcaacatgt agcacctgca 240
ccgaagacca ttttatagcc gccgatgtaa tagtgatgac aataatcaga tgtcttgcca 300
tactgtacag ttatcatcaa ttcagaaatc tcagaaaact aggatccaaa tatatattag 360
gttttgcagg actatttgta gtctgctcca gtttcgtgtt tatatctgca gtattaaaca 420
tcctccaaat cgaagtagcg gacctaaaag atgctctgtt ctttttcttg ttgctaatag 480
atctctcaaa agctgttaaa ttggctcaat acgctctaac tgcctcaaac caagaagaaa 540
taagtaaaaa catagcaatg ggagttgctg ttttagggcc taccataacg ctagatacta 600
tcgtagaaac cttagtaata ggagtgggaa ctttgtcagg agttcagcgt ctagaaatgc 660
tatcgtattt tgcgtgtctg tcagtcattg tgaattatat aattttgtta acttttttacc 720
cagcttgttt agctttaatg ttagatttaa gcaaagtaag tgattattac aaacaagaac 780
aagttaccag aatactagtg gacgaaaaag ataagtccaa tccagctgca caacgtgtta 840
agatgattat gtctcttgga ctcacatagt acatattcat agt 883

<210> 288
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 288
gttatacggg gaactatgtg ccactcac 28

<210> 289
<211> 28
<212> DNA

<213> Diabrotica virgifera

<400> 289
gactgacaga cacgcaaaat acgatagc 28

<210> 290
<211> 586
<212> DNA
<213> Diabrotica virgifera

<400> 290
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cactgtatgt tttttgactt tggataaacc gcaagggaca aaggcctttc cacggactac 120
ctcaacatgt agcacctgca ccgaagacca ttttatagcc gccgatgtaa tagtgatgac 180
aataatcaga tgtcttgcca tactgtacag ttatcatcaa ttcagaaatc tcagaaaact 240
aggatccaaa tatatattag gttttgcagg actatttgta gtctgctcca gtttcgtgtt 300
tatatctgca gtattaaaca tcctccaaat cgaagtagcg gacctaaaag atgctctgtt 360
ctttttcttg ttgctaatag atctctcaaa agctgttaaa ttggctcaat acgctctaac 420
tgcctcaaac caagaagaaa taagtaaaaa catagcaatg ggagttgctg ttttagggcc 480
taccataacg ctagatacta tcgtagaaac cttagtaata ggagtgggaa ctttgtcagg 540
agttcagcgt ctagaaatgc tatcgtattt tgcgtgtctg tcagtc 586

<210> 291
<211> 816
<212> DNA
<213> Diabrotica virgifera

<400> 291
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cacctccgcg ttttcttcca aaaacaccgg atgctgataa ggaccagtat tgtttcatta 120
atttaaaaca gatggatggg tgcactgtca agttcagaga attcaattcg attatggttt 180
agcgatacgg tgacaataaa tttgaattat tgtcacattt atcaagaaag tgtacttaat 240
ttataaacag tctgtgataa tatagagctg aatatctaga ccagttatta acatgacgat 300
taagaatatt tgttgccttg gcgctggtta cgtaggtggg ccaacctgca gtgtgatagc 360
tttaaaatgt aaagatatta aagtaacagt tgctgatctt agcgaagaac gaatagctca 420
atggaactcc gacagactcc caatttatga gcctggatta gacaaagtag tacaagagtg 480
cagaggtagg aatttattct tcaccactaa ccttactcaa gcaatattag atgctgactt 540
gatatttata tcagtgaata caccaacaaa actgaacgga aatggcaagg gaagggcacc 600
tgatctaaaa tacatagagg gagcagcaag aatcatagct gatactgctc aaactaacaa 660
aatcgttgta gaaaaaagta ctgttccagt acgagcagct gaaagtattt cagatatctt 720
aacagctaat aaaaagccaa aagtgacaca tcagattttg tctaatccag aatttctagc 780
ggaaggtact gcaatcaatg atctgctcat cctgat 816

<210> 292
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 292
gatagtagtc aatcagccag ccatgtgg 28

<210> 293
<211> 27

<212> DNA
<213> Diabrotica virgifera

<400> 293
gcagtacctt ccgctagaaa ttctgga 27

<210> 294
<211> 792
<212> DNA
<213> Diabrotica virgifera

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cacctccgcg ttttcttcca aaaacaccgg atgctgataa ggaccagtat tgtttcatta 120
atttaaaaca gatggatggg tgcactgtca agttcagaga attcaattcg attatggttt 180
agcgatacgg tgacaataaa tttgaattat tgtcacattt atcaagaaag tgtacttaat 240
ttataaacag tctgtgataa tatagagctg aatatctaga ccagttatta acatgacgat 300
taagaatatt tgttgccttg gcgctggtta cgtaggtggg ccaacctgca gtgtgatagc 360
tttaaaatgt aaagatatta aagtaacagt tgctgatctt agcgaagaac gaatagctca 420
atggaactcc gacagactcc caatttatga gcctggatta gacaaagtag tacaagagtg 480
cagaggtagg aatttattct tcaccactaa ccttactcaa gcaatattag atgctgactt 540
gatatttata tcagtgaata caccaacaaa actgaacgga aatggcaagg gaagggcacc 600
tgatctaaaa tacatagagg gagcagcaag aatcatagct gatactgctc aaactaacaa 660
aatcgttgta gaaaaaagta ctgttccagt acgagcagct gaaagtattt cagatatctt 720
aacagctaat aaaaagccaa aagtgacaca tcagattttg tctaatccag aatttctagc 780
ggaaggtact gc 792

<210> 295
<211> 1215
<212> DNA
<213> Diabrotica virgifera

<400> 295
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acacgtgttt acagcaaata agttattttt taagtatatt gactgcaaat tttcacaatg 120
gctaacgatt tagaacaaaa gatcatcaaa caaatcgaat attacttcgg agacatcaat 180
ctgccgcgtg ataaattctt acaagagaaa atcaaagaag atgaagggtg gatcactctg 240
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gacgacaaaa aaaaagagat acaggacaga aaaaacgaga aagctgctag caaggtagct 720
gcaaaatcgg gcacaccgct tcagtttccc aaaggagcca ttattcattt ctctggaatc 780
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gatcaaaaag tcaaattgag agtgttagaa ggagacgaag aggaggaata tctgaagaaa 1020
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aaaggttttt tttac 1215

<210> 296
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 296
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<210> 297
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 297
ccaaagttgc cctttcgttt tctgttatta gaat 34

<210> 298
<211> 895
<212> DNA
<213> Diabrotica virgifera

<400> 298
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cgtctttcgt cgttatctac tgaccaagaa ttaatcgcaa aagcagttga aaagtctgaa 120
aatggcctag tgatggtaag cgaagaccgt aagaaactta gacgcaatcc agagaaaccg 180
agtccagaat tgaatgagga aagacgcaaa gagatcatgg ggaggacagc ctacgcaaaa 240
ggatttccat tggatgaaga atttaacaac attatcactt tcctagatgc atatggacca 300
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gaaacagaac taatcaggaa attccaacaa gtatattttg acgacaaaaa aaaagagata 480
caggacagaa aaaacgagaa agctgctagc aaggtagctg caaaatcggg cacaccgctt 540
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agggaagatc ttaaagaaaa ggtcaaggaa gtcggcaaaa ttgaagtaaa attcgttgat 660
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<210> 299
<211> 822
<212> DNA
<213> Diabrotica virgifera

<400> 299
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gagcgagctc gagatcgtaa tttagcgcgt gcagctcccg ataagcgcag taaacttcag 180
cgagagcgcg aaagagacat ctcagaacaa attgctctcg gtatgccagc gaaaggtgca 240
ccatccaacg acactcagtt tgatcaaaga ttatttggtc aggctcaagg tcttggtcac 300
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atggcaaatc acatttatcg accaagtaaa aatattgata aagatatgta tggtggagaa 420
gacattgaaa aagctattag aactaatagg tttgtaccag ataaagaatt tgggggtact 480
gatcgttctg gagcaggccg atcaggtcct gtgcaattcg aaaaagaaga agatccgttc 540

ggattggatc agttcttgtc gcaagctaag agagccagta aaagaaaaga acctgaaaag 600
agagacgaca gggataagag gaaaagaaga gagtaaaagt attttacagt ttctttttga 660
gacctttata aaataaatat aggtatactg gtatacataa ttctgatgta tttttaaaaa 720
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<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 300
caagggaggc gtggacgagg aag 23

<210> 301
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 301
ctctcttctt ttcctcttat ccctgtcgtc tc 32

<210> 302
<211> 573
<212> DNA
<213> Diabrotica virgifera

<400> 302
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gagcgagctc gagatcgtaa tttagcgcgt gcagctcccg ataagcgcag taaacttcag 120
cgagagcgcg aaagagacat ctcagaacaa attgctctcg gtatgccagc gaaaggtgca 180
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ggctatgggg atgatgaagc ttataatgtc tatgataaac cttggagaga tggagggtcc 300
atggcaaatc acatttatcg accaagtaaa aatattgata aagatatgta tggtggagaa 360
aacattgaaa aagctattag aactaatagg tttgtaccag ataaagaatt tgggggtact 420
gatcgttctg gagcaggccg atcaggtcct gtgcaattcg aaaaagaaga agatccgttc 480
ggattggatc agttcttgtc gcaagctaag agagccagta aaagaaaaga acctgaaaag 540
agagacgaca gggataagag gaaaagaaga gag 573

<210> 303
<211> 755
<212> DNA
<213> Diabrotica virgifera

<400> 303
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agagggaatt cagtttaatg tgaggcctcc gaaaaaatct tggaagaaaa tttctaactt 120
atctggagga gaaaaaacgt tatcatcttt ggcccttgtc tttgctctgc attattacaa 180
accttcgcca ctttatgtaa tggacgaaat tgacgcagcc ttagatttca aaaatgtgtc 240
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tcgatccaac atgttcgaac tgtgcgataa tctcatagga atttacaaaa cgtacgattg 360
cacgaagtct ataacgatag atccaagagt atatgacgag caaacaaaac ataacgaaaa 420
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ttcatctggt ctgtctagta gcatgagtga aaatgaaaat agtttacaag aatcccaagt 660
gcctgaaata tgaaggggtc agtttcgtga tttagttact acttcttgat ataaatgtag 720
cattttagt tactttaata catttacata tttgt 755

<210> 304
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 304
ggatgctgat tttgaaatgg ttgatacg 28

<210> 305
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 305
cttcatattt caggcacttg ggattcttg 29

<210> 306
<211> 656
<212> DNA
<213> Diabrotica virgifera

<400> 306
ggatgctgat tttgaaatgg ttgatacgta tgatccattt tcagagggaa ttcagtttaa 60
tgtgaggcct ccgaaaaaat cttggaagaa aatttctaac ttatctggag gagaaaaaac 120
gttatcatct ttggcccttg tctttgctct gcattattac aaaccttcgc cactttatgt 180
aatggacgaa attgacgcag ccttagattt caaaaatgtg tcaattgttg gaaattatat 240
taagcaacgt accaaaaacg ctcaattcat tataatctcc cttcgatcca acatgttcga 300
actgtgcgat aatctcatag gaatttacaa aacgtacgat tgcacgaagt ctataacgat 360
agatccaaga gtatatgacg agcaaacaaa acataacgaa aagcgagtgt cgcttggatc 420
gaccaacgaa gagagtagac gaacgtctgt gcccgcttct ggtactggag attctggaga 480
taaaaatcca gaaagaaatg ttagcaatga agttgtagac gaacaacgtt cgaacttgat 540
ggaggttgat aatgtcatcc agagtacaaa taatgccagg gattcatctg gtctgtctag 600
tagcatgagt gaaaatgaaa atagtttaca agaatcccaa gtgcctgaaa tagaag 656

<210> 307
<211> 428
<212> DNA
<213> Diabrotica virgifera

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atttaagcat gatttaacga aatattaaat ttttaacttt aaaatgccga actcagatat 120
tgatgataac gaaaaagtaa ctgggcccgt cgacaatgca tgggaactga aaattccaga 180
attcaaacca gaagataatc cacatggatt attagaggaa agtagtttcg ccacattatt 240
tccacaatac agagaacaat atttaagaca agtatggcct ttagttaaga aaactctggg 300
tgaatataat ataaaagcag aactagatgt tgtagaaggt agtatgactg ttaaaaccac 360
aaggcaaaca tgggatcctt acattattat taaagcaaga gatgtgataa agttaatgtc 420

tagaagtg 428

<210> 308
<211> 36
<212> DNA
<213> Diabrotica virgifera

<400> 308
cgaactcaga tattgatgat aacgaaaaag taactg 36

<210> 309
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 309
catgtttgcc ttgtggtttt aacagtcata ctac 34

<210> 310
<211> 265
<212> DNA
<213> Diabrotica virgifera

<400> 310
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tgaaaattcc agaattcaaa ccagaagata atccacatgg attattagag gaaagtagtt 120
tcgccacatt atttccacaa tacagagaac aatatttaag acaagtatgg cctttagtta 180
agaaaactct gggtgaatat aatataaaag cagaactaga tgttgtagaa ggtagtatga 240
ctgttaaaac cacaaggcaa acatg 265

<210> 311
<211> 657
<212> DNA
<213> Diabrotica virgifera

<400> 311
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cgttgctttg taaaattgtt gtgaatctac cggcatcaaa agcctaaaaa gcgtgtagct 120
tttacgtagt tatttaactg tagctacttt acaaatttca tcaaaatggg cgatgaaaag 180
aaggccagcg atagcgaaca cattaatctc aaagtacttg gtcaggataa tgcagtggta 240
caattcaaaa tcaaaaaaca caccccatta aaaaaattga tgaccgccta ttgtgaacgt 300
gctggtataa gcacacaagt agtcagattt agatttgatg gcaaccccat aaacgacaca 360
gatactccta attctttaga gatggatgaa ggagacacaa ttgaagtata tcaacaacag 420
acaggtggtt tcttctatcg gtttctattc atttaaataa tcacactgta ttgttcttgt 480
attttcttat ttgctaaatt aaactagttt taaataagta agttaatttt aatataattt 540
ttaattcatg tcaactgaag ttacaatagt tctgtaagaa ttcgactatt tgtgtttttg 600
gactcttatt ttgtaattaa aacacttaga atacaaacat ttttcttata aaaaaaa 657

<210> 312
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 312
gaaagattcg gcgttgcttt gtaaaattg 29

<210> 313
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 313
gaatagaaac cgatagaaga aaccacctgt c 31

<210> 314
<211> 401
<212> DNA
<213> Diabrotica virgifera

<400> 314
gaaagattcg gcgttgcttt gtaaaattgt tgtgaatcta ccggcatcaa aagcctaaaa 60
agcgtgtagc ttttacgtag ttatttaact gtagctactt tacaaatttc atcaaaatgg 120
gcgatgaaaa gaaggccagc gatagcgaac acattaatct caaagtactt ggtcaggata 180
atgcagtggt acaatttaaa atcaaaaaac acaccccatt aaaaaaattg atgaccgcct 240
attgtgaacg tgctggtata agcacacaag tagtcagatt tagatttgat ggcaacccca 300
taaacgacac agatactcct aattctttag agatggatga aggagacaca attgaagtat 360
atcaacaaca gacaggtggt ttcttctatc ggtttctatt c 401

<210> 315
<211> 822
<212> DNA
<213> Diabrotica virgifera

<400> 315
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aaggattttc tagagatgct tttggaaggc agagtatgtc agagaagagg catgcgacgt 120
tggatgccaa gaataccgac acatatcaga aatcgaagaa gattagggag gagaggaaga 180
tgaaagaaat aaatgctgat aaattaggcc aattaggacc aagtttaggc atgaagaaat 240
cttcaagctt ggaatcgtta cagacaatgg tacaagagat tcaaatgcaa gaagaaggcg 300
acccagctta tagttataga ggacccaatg gagctttaaa agtaatcagg gggaaaggct 360
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aaaagcattg gttgcttgac ggtccaatgg aaaacgaacg agaagtggat ggcttcagca 480
atgctcgagg aggtcctagg caatcttctc tgaatgcagc tattgatata aagaataaat 540
cagcaaagaa gaaacctggt atatttaaag gcattggttc gatgttcagg tttggcaaac 600
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tcgattcaaa tgccaacgta cctcaacaac acaccgcaga taccgaaaac cgaacgcaaa 720
gtagtcaaac agaacggacg caagagcatt cacaaaaagt acctctaaat agcaaccccc 780
agaaccaaaa cacttcccaa ggatctcacc accagacgca ag 822

<210> 316
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 316

gatgccaaga ataccgacac atatcagaaa tc 32

<210> 317
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 317
cttgcgtctg gtggtgagat ccttg 25

<210> 318
<211> 700
<212> DNA
<213> Diabrotica virgifera

<400> 318
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aaagaaataa atgctgataa attaggccaa ttaggaccaa gtttaggcat gaagaaatct 120
tcaagcttgg aatcgttaca gacaatggta caagagattc aaatgcaaga agaaggcgac 180
ccagcttata gttatagagg acccaatgga gctttaaaag taatcagggg gaaaggctgt 240
gaagaaagct ttagggcagc tgtagtggat ccaaatcacc gaagtgagat cggagccaaa 300
aagcattggt tgcttgacgg tccaatggaa aacgaacgag aagtggatgg cttcagcaat 360
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gcaaagaaga aacctggtat atttaaaggc attggttcga tgttcaggtt tggcaaacat 480
cgtaaactgg acttccaaac agcagaggct gcccaacact atcatcatac aaacgaattc 540
gattcaaatg ccaacgtacc tcaacaacac accgcagata ccgaaaaccg aacgcaaagt 600
agtcaaccag aacggacgca agagcattca caaaaagtac ctcaaaatag caacccccag 660
aaccaaaaca cttcccaagg atctcaccac cagacgcaag 700

<210> 319
<211> 1321
<212> DNA
<213> Diabrotica virgifera

<400> 319
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caaccatggc acaacctggt aaatactcat cattttcagg atcttctctt ctatctagtt 180
cgttaagtac catttcccat actgcatgtg atcttgttgg gcaattttgg aggtttccgt 240
gacatctgtg tggcattcta aaatacatag tatagggcca tagtggtggg ttatttaagg 300
gtgcggtgat agtggagtcg tataagaagg cttcttcttc catcatagta aattggttgt 360
tacctcctac tcttagataa ggggctctta ctcctactac gctgttatcg gtaatattgg 420
cgaatttctc agtgatgact cgcatacctc ccatttcttt aacccagtca tttacactgg 480
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gaccgatgtt gttattattt atggcgtcgt caaatgtgac agttatcatt tgaggtacat 720
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<210> 320
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 320
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<210> 321
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<212> DNA
<213> Diabrotica virgifera

<400> 321
ggaggtttcc gtgacatctg tgtgg 25

<210> 322
<211> 1075
<212> DNA
<213> Diabrotica virgifera

<400> 322
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cgaggccgaa atatgcaaag acaaagacgc gggcgagtgg tttcgtttag tgggagggga 180
gggggacacc tgtcgagacg tcattcaatg tacatcttcg ggcctgcaag ccattcgttg 240
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aactgtcaca tttgacgacg ccataaataa taacaacatc ggtctataca agaacatttt 660
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gatggaagaa gaagccttct tatacgactc cactatcacc gcaccattaa ataacccacc 1020
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<210> 323
<211> 1703
<212> DNA
<213> Diabrotica virgifera

<400> 323
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gcatggctga caaaagacta tggctgtgtt gtttttttatt attgacaatt gcttacgctc 180
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aagtcatcca atgggttcag aatcccacag aactcagtgg attaagagac ttccaagaat 1560
ggaaagaaaa gtgtgacatt aaaggtcaac cttactgttc attgcccaat tcatgtccat 1620
tacataccag agaactgcca nggtgaactc tacgattgtt tacctgtatg gaatgtccca 1680
acaattatcc atggattttg gat 1703

<210> 324
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 324
gacgaaccaa gatgtccaga aggaaagc 28

<210> 325
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 325
gttgggacat tccatacagg taaacaatcg 30

<210> 326
<211> 1221
<212> DNA
<213> Diabrotica virgifera

<400> 326
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gatcttttct gtaatggaaa gccagactgt aaagatgaat cagacgagaa tgcatgcgat 120
gttgatagtg atcccaaccg tgcacctgac tgtgacccaa ctcaatgtgt aattccggac 180

tgtttctgct cagcggacgg aactagaatt cctggcgcgc tagaaccagc aaatgtacca 240
caaatgataa ccatttcgtt caatggtgcc ngttaatgta gataacatcg atctatatga 300
agaaatcttt tcaggcacta gacttaatcc aaatggttgc caaattaaag gaaatttnct 360
tcgtttctca caaatacaca aactactcag cagtacagga cctacacaga cgtggtcatg 420
aaatcgcggt gttttcattg actcataaag agggtccaaa ctactggtcc cagggttctt 480
atgacgactg gttggctgaa atggctggag ctagattgat tattgaaaga tttgccaaca 540
ttaccgatgg atcaataatt ggagtgagag ctccatacct cagagtagga ggaaacagac 600
aatttgaaat gatgacagat caattcttta tttatgattc atcaattaca gcctctcttg 660
gacgtgtccc aatctggcct tatactttat acttcaggat gccacataag tgcaacggaa 720
atgcccacaa ctgtcccagc agaagccgtc ccgtttggga aatagtcatg aacgaattgg 780
acagacgtga tgatcctact tttgacgaat cactacctgg ttgccacatg gtagactcct 840
gttctaatgt tcaaactgga gatcaatttg caagactact cagacacaat ttcaacagac 900
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gattaagaga cttccaagaa tggaaagaaa agtgtgacat taaaggtcaa ccttactgtt 1140
cattgcccaa ttcatgtcca ttacatacca gagaactgcc aggtgaaact ctacgattgt 1200
ttacctgtat ggaatgtccc a 1221

<210> 327
<211> 826
<212> DNA
<213> Diabrotica virgifera

<400> 327
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tgcttgagcc attgcgctcc acaggaaaac aaaaataaat ttccagaaca ataccaaggt 120
caacacatac caattgtaag gcaagaacaa gaagtgaatt atgatggcac ctacgaatac 180
aactttgaaa ctggaaatgg catagtccaa gaagaaaaag gatttttgaa aaacgccggt 240
acaaaggaag aagctcaagt cgctcaaggt ttttcctcat atacttcccc cgaaggagta 300
aaaatagaac tccggtacat cgcagacgaa aacggtttcc agccaatcgg agaccaccta 360
ccgactccgc caccaatccc tgaggctatt ttacgagcgc taagtgtact gaaacagttg 420
ggtaatttga atgaagacca agaagaaaat aacaacatta gatgaagaga gagtgtgatc 480
aaatcgttat tttggataag tcccttcata tttcaaaatg gtaccatact aactatgaaa 540
tacttcaaag aattaagatc tttttaaaat acgtcaacac tttagagtag gaaacagcgg 600
tggaacctcg caaaatgtac acaagttcgg ttttattttt ttgcaggaaa atcaaggngt 660
gcttataatg aaactaacat tttnctaaaa aatttcgccc ctgaaccccc ctttttatcc 720
ctttgaaggg gggtatttgt ggtttttgcg aaacgaagcc cttcctgtat acgttttaca 780
aaagaatgta ctaaatagta aaatgaagag gactataatt tgctac 826

<210> 328
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 328
ccagaacaat accaaggtca acacatacc 29

<210> 329
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 329

gaggttccac cgctgtttcc tactc 25

<210> 330
<211> 505
<212> DNA
<213> Diabrotica virgifera

<400> 330
agaacaatac caaggtcaac acataccaat tgtaaggcaa gaacaagaag tgaattatga 60
tggcacctac gaatacaact ttgaaactgg aaatggcata gtccaagaag aaaaaggatt 120
tttgaaaaac gccggtacaa aggaagaagc tcaagtcgct caaggttttt cctcatatac 180
ttcccccgaa ggagtaaaaa tagaactccg gtacatcgca gacgaaaacg gtttccagcc 240
aatcggagac cacctaccga ctccgccacc aatccctgag gctattttac gagcgctaag 300
tgtactgaaa cagttgggta atttgaatga agaccaagaa gaaaataaca acattagatg 360
aagagagagt gtgatcaaat cgttattttg gataagtccc ttcatatttc aaaatggtac 420
catactaact atgaaatact tcaaagaact aagatctttt taaaatacgt caacacttta 480
gagtaggaaa cagcggtgga acctc 505

<210> 331
<211> 731
<212> DNA
<213> Diabrotica virgifera

<400> 331
ttggtaaagt ttgttgtagt ttcagtgatc ttcattttga actcttttt tttttcaata 60
tgcgaactac gtactttaca ttagttgtaa tattagctgt agctgtacaa gaacatgcat 120
ctcaacaatt accagtaacg caagcttgct tgggatgtat atgtgaagct atttccaact 180
gtaatgtaac tagcggttgt tctggtgagg tttgtggacc atttcggatc acctgggcat 240
attgggcaga tgctggaaag cccaccgtga aaggagtatc accagaagac aataatgcat 300
atggatcttg tgctactgat acgtattgtt ctgcattagc tgttcaagga tatatgaata 360
aatttcaaca ggattgcaat ggtgatggta aaatagactg tgacgattat gcaagtattc 420
acacgcatgg tggatatggc tgcaaaggaa ctaatctacc acaacctttt ggaaatcgat 480
attatcaatg taaagagata gttggacgta gaccagagta atgttggagt aaccccagga 540
ttgagaacag gaagattgat agaaacgcat ttactactct atgaattttg ttggatgatt 600
attgcaactt aatgtaattc aatatgttta agggctgtaa ttacaattaa ataaaaataa 660
ctgacatcat agaatacact attgtaacaa ctatttttt aggtatagta ttttaagtaa 720
actcttttt t 731

<210> 332
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 332
gcatctcaac aattaccagt aacgcaagc 29

<210> 333
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 333
gtttctatca atcttcctgt tctcaatcct gg 32

<210> 334
<211> 450
<212> DNA
<213> Diabrotica virgifera

<400> 334
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aactgtaatg taactagcgg ttgttctggt gaggtttgtg gaccatttcg gatcacctgg 120
gcatattggg cagatgctgg aaagcccacc gtgaaaggag tatcaccaga agacaataat 180
gcatatggat cttgtgctac tgatacgtat tgttctgcat tagctgttca aggatatatg 240
aataaatttc aacaggattg caatggtgat ggtaaaatag actgtgacga ttatgcaagt 300
attcacacgc atggtggata tggctgcaaa ggaactaatc taccacaacc ttttggaaat 360
cgatattatc aatgtaaaga gatagttgga cgtagaccag agtaatgttg gagtaacccc 420
aggattgaga acaggaagat tgatagaaac 450

<210> 335
<211> 878
<212> DNA
<213> Diabrotica virgifera

<400> 335
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cctctagtcc ttatagaaat gtccctactg gttacatcca gaataatata tgaccatcag 120
caagaagata atcacgaagg gcaacaagtt caatacacca attactatgg tcacgaagag 180
tctgccacaa cagcacattt ccaacaaccc gtccagtttc ccgaggaaca tagccaaggt 240
ttgcacaaag aggaacacat cgattattac gcaccagcca agtattcctt caaatatgga 300
gtcaacgact accacactgg cgatataaaa agccaacacg aatccagaga cggagatact 360
gtcaaaggcc aatacacact tgtagaaccc gacggatcta tcagaactgt agactacact 420
gctgacaaac acagtggatt taacgcagta gtgcgcaaat caggtcccac aaaacacata 480
gaaggaaggc atctggaaca ccaacccgaa gaagagcaac atatacctca gcatcatttg 540
gcagaagatc atgttttacc gcagtatcaa ctggaacacc aacaggcttt ggaagaagat 600
gttgaagaag gacatctgga agctgaagat gctagtcaat atgaagaaga agagcattag 660
gtgttatatt aagtttaagg acgtaatggt ttgtaaataa gcgaactcaa agattaaagt 720
agtatctttt aaaattattg gagaaaataa gaatttttgt ttgtaagaaa aagtatcatc 780
atcaactata ttttttttata acacttttaa cattttggga acgtaatatt cgaatttata 840
cactcacaga caaaaatctt gcatattttg aaattatg 878

<210> 336
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 336
ggtgttaaga caggatgggt ttcggtc 27

<210> 337
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 337
ggtgttccag ttgatactgc ggtaaaac 28

<210> 338
<211> 560
<212> DNA
<213> Diabrotica virgifera

<400> 338
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tgtccctact ggttacatcc agaataatat atgaccatca gcaagaagat aatcacgaag 120
ggcaacaagt tcaatacacc aattactatg gtcacgaaga gtctgccaca acagcacatt 180
tccaacaacc cgtccagttt cccgaggaac atagccaagg tttgcacaaa gaggaacaca 240
tcgattatta cgcaccagcc aagtattcct tcaaatatgg agtcaacgac taccacactg 300
gcgatataaa aagccaacac gaatccagag acggagatac tgtcaaaggc caatacacac 360
ttgtagaacc cgacggatct atcagaactg tagactacac tgctgacaaa cacagtggat 420
ttaacgcagt agtgcgcaaa tcaggtccca caaaacacat agaaggaagg catctggaac 480
accaacccga agaagagcaa catatacctc agcatcattt ggcagaagat catgttttac 540
cgcagtatca actgaacacc 560

<210> 339
<211> 831
<212> DNA
<213> Diabrotica virgifera

<400> 339
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ttggtgtttg gagcctgttc ggcagaacca cagaggcggc ctcattccta ctatgacaac 120
caggctgaac aagacacaaa cgtcccacaa aactaccaag ataactcaga tcaataccaa 180
cagaattctg tccaacaaaa cccaccgcaa catcaggaaa aatcgcaata tgaaccacga 240
gtaaaagaaa ctatcaaatt cataccaatt atcagattcg ataaagaaca aggagaagcc 300
ggtaattaca aagctgcata tgaaaccgga aacaacatta tcgctgaaga agaaggttac 360
ttgaaggaac tcggtccaga tccagaccag caaggacaag ttatcaaatc gcaagtacaa 420
cagggtcact tcacatatac atcccctgaa ggagtagtta ttgaaactaa atatactgct 480
gacgaaaacg gtttccatgt tgaaggagat catttgccaa ccccaccacc agttagcgcc 540
gaagtacaaa agggattgga ccttattttt gctggtatca gagctcaaca ggaggcgtta 600
gaacaaagat taaaagatca cccagaagaa agagacagac ctgaaaatta cgacgatggt 660
caataccgac cggcacaaca ggagtaattt tactctttat ttatagttta gcaccatcat 720
tctgtgattt tgtcgtcatt tctatagaat atcttctgta cagactgaat aagattgata 780
atacactgtg gaaaaaaaat tgataanaat caataaaaat ctttttacac a 831

<210> 340
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 340
gattgttgcc gcattggtgt ttgg 24

<210> 341
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 341

gacgacaaaa tcacagaatg atggtgc 27

<210> 342
<211> 690
<212> DNA
<213> Diabrotica virgifera

<400> 342
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ctactatgac aaccaggctg aacaagacac aaacgtccca caaaactacc aagacgactc 120
agatcaatac caacagaatt ctgtccaaca aaacccaccg caacatcagg aaaaatcgca 180
atatgaacca cgagtaaaag aaactatcaa attcatacca attatcagat tcgataaaga 240
acaaggagaa gccggtaatt acaaagctgc atatgaaacc ggaaacaaca ttatcgctga 300
agaaggaggt tacttgaagg aactcggtcc agatccagac tagcaaggac aagttatcaa 360
atcgcaagta caacagggtc acttcacata tacatcccct gaaggagtag ttattgaaac 420
taaatatact gctgacgaaa acggtttcca tgttgaagga gatcatttgc caaccccgcc 480
accagttagc gccgaagtac aaaagggatt ggaccttatt tttgctggta tcagagctca 540
acaggaggcg ttagaacaaa gattaaaaga tcacccagaa gaaagagaca gacctgaaaa 600
ttacgacgat ggtcaatacc gaccggcaca acaggagtaa ttttactctt tatttatagt 660
ttagcaccat cattctgtga ttttgtcgtc 690

<210> 343
<211> 633
<212> DNA
<213> Diabrotica virgifera

<400> 343
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cgttttagac tacagtcacg gccatgctac ctcatatgct tcctcaaacc taggtggttc 120
agaacatgga catggatatt cagctccagt tttaagtcac gcatatgctg cacctgttgc 180
tcacggatat tctgctcctg ttctcgccca cggacattcc gcacatcacg atgtagatta 240
caacgcttat cccaaatacg aattcaacta cggagttcaa gatggccaca ctggagacca 300
caaaactcaa cacgaagtcc gtgatggtga cgtagtcaaa ggttcctaca cagtagctga 360
acctgacggt actcttcgta ctgtccacta cactgctgat gaccacaacg gtttcaatgc 420
tgttgttgaa aaatctggac acccagttca cccagctcca gctcatggac acggaaaagt 480
actcctagct gctcccgctg tccaccacgc tccattgtac catcattaaa acctgaaaga 540
tgcatgttga ttattgttac tgtatttatt gactttgttg attgaattac tatgtaatta 600
atttttgtac ataaaataaa tttaattgaa tat 633

<210> 344
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 344
ctaggtggtt cagaacatgg acatgga 27

<210> 345
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 345

caggttttaa tgatggtaca atggagcgtg 30

<210> 346
<211> 421
<212> DNA
<213> Diabrotica virgifera

<400> 346
ctaggtggtt cagaacatgg acatggatat tcagctccag ttttaagtca cgcatatgct 60
gcacctgttg ctcacggata ttctgctcct gttctcgccc acggacattc cgcacatcac 120
gatgtagatt acaacgctta tcccaaatac gaattcaact acggagttca agatggccac 180
actggagacc acaaaactca acacgaagtc cgtgatggtg acgtagtcaa aggttcctac 240
acagtagctg aacctgacgg tactcttcgt actgtccact acactgctga tgaccacaac 300
ggtttcaatg ctgttgttga aaaatctgga cacccagttc acccagctcc agctcatgga 360
cacggaaaag tactcctagc tgctcccgct gtccaccacg ctccattgta ccatcaaaac 420
c 421

<210> 347
<211> 698
<212> DNA
<213> Diabrotica virgifera

<400> 347
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atcggagaag cctactctgc accacttgcc tatgcagctc cagcagtagc taaggtagcc 120
tactcagccg ctccagctgt atcatactca agtgtgtcat cacctgtagc ttacgcagca 180
ccagctgttg ctaaattagc tgcacctgta tcttatgctg caccagcttt atcttacgct 240
gcaccagtcg ctaaagttgc ctactcatca gctccagctg tctcttactc cagtgtatcc 300
gcaccagtag cctacgccgc tgccccagcc tacgccaaag tagctgctcc agtatcgtac 360
gcagctccag ctgtttccta cgccgctcca gctctctcct atgccgcccc agcccttaaa 420
gtagctgccc cagtagctta tgccgctcct gttgccaaag cagtttacgc cgaaccatca 480
gcaccagcta actacgattt tggatatgcc gtaaacgacc cccacaccgg agatagcaaa 540
agccaacaag aatctcgcca cggtgatgtt gtacatggaa gctattccct tattgaagcc 600
gatggcagca aacgtaccgt agaatacacc gctgatgaac acaatggttt taatgcagtt 660
gtacacaagg aaccagccac agttgcggtt aaagcagt 698

<210> 348
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 348
gctcgtgctg gtgtcatcgg agaag 25

<210> 349
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 349
gcaactgtgg ctggttcctt gtgtac 26

<210> 350
<211> 641
<212> DNA
<213> Diabrotica virgifera

<400> 350
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gtagctaagg tagcctactc agccgctcca gctgtatcat actcaagtgt gtcatcacct 120
gtagcttacg cagcaccagc tgttgctaaa ttagctgcac ctgtatctta tgctgcacca 180
gctttatctt acgctgcacc agtcgctaaa gttgcctact catcagctcc agctgtctct 240
tactccagtg tatccgcacc agtagcctac gccgctgccc cagcctacgc caaagtagct 300
gctccagtat cgtacgcagc tccagctgtt tcctacgccg ctccagctct ctcctatgcc 360
gccccagccc ttaaagtagc tgccccagta gcttatgccg ctcctgttgc caaagcagtt 420
tacgccgaac catcagcacc agctaactac gattttggat atgccgtaaa cgacccccac 480
accggagata gcaaaagcca acaagaatct cgccacggtg atgttgtaca tggaagctat 540
tcccttattg aagccgatgg catcaaacgt accgtagaat acaccgctga tgaacacaat 600
ggttttaatg cagttgtaca caaggaacca gccacagttg c 641

<210> 351
<211> 977
<212> DNA
<213> Diabrotica virgifera

<400> 351
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tagccccagc accagttcta gctccagctc cagttttggc caaagtttct gatgccacaa 180
ttgaccccaa tcctgcatat tcatttgcgt atgacgtgca ggatgcccta acaggagatt 240
caaaaggaca agttgaaagc agagccaacg gcgttgtaag aggacaatat caagtagcag 300
atccagacgg taccagaaga attgtagatt attacgccga tcctgtgcat ggattcaatg 360
ctgtggtcag aagagttcct ctaggtgttg cagttgctcc tgtcgtagcc aaagctgtag 420
ctcctgttgc tccaatcgct cccgtcgcta gatcattagt ccttcctgct ccagggcttc 480
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caccagctct tccatttgcc gctgctccag ctgtagcacc agctcttcca ttcgcagctc 600
cagctgtagc accagcattg ccgtatgctg cagctccagc tatttctcca tacttaacca 660
gagctggatt cttcccagct ccagctccag ccgtagttcc tgctgctcca ggtcctgcat 720
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caggtttgag gagtttagtg acccccttct cagcgggtcc tgctccacta gccgttggat 840
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tatttttaa gtagtttaca tttgttttat tgtttctagt atttttattg taaataaata 960
tcctatattt ttatctt 977

<210> 352
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 352
caagattacc ttcagcatcc ttatagcagt tc 32

<210> 353
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 353
gtcactaaac tcctcaaacc tgaaggcaag 30

<210> 354
<211> 777
<212> DNA
<213> Diabrotica virgifera

<400> 354
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agctccagtt ttggccaaag tttctgatgc cacaattgac cccaatcctg catattcatt 180
tgcgtatgac gtgcaggatg ccctaacagg agattcaaaa ggacaagttg aaagcagagc 240
caacggcgtt gtaagaggac aatatcaagt agcagatcca gacggtacca gaagaattgt 300
agattattac gccgatcctg tgcatggatt caatgctgtg gtcagaagag ttcctctagg 360
tgttgcagtt gctcctgtcg tagccaaagc tgtagctcct gttgctccaa tcgctcccgt 420
cgctagatca ttagtccttc ctgctccagg gcttccagtt gctgccgctc ctgtaccagt 480
agctccagca ttacctttcg ccgcaccagc agtagcacca gctcttccat ttgccgctgc 540
tccagctgta gcaccagctc ttccattcgc agctccagct gtagcaccag cattgccgta 600
tgctgcagct ccagctattt ctccatactt aaccagagct ggattcttcc cagctccagc 660
tccagccgta gttcctgctg ctccaggtcc tgcatacttg cctgctgctc catcaagatt 720
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<210> 355
<211> 1176
<212> DNA
<213> Diabrotica virgifera

<400> 355
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ccttttttaa gtctgcaggt gtaaggctca caactggctc catcgggcgc gtcagcagtt 180
ttaaaatcgc taatttttaac gggatttttt ataaaatcta ggacctgttt ttgtgagacg 240
aagaaggtat cttttgcttc acgtgcaact gtgttttcca agaattttcg aagcccatcg 300
aagctggtgt cagtttgttc aaaccagtat gagttgatca tcaaatttat gggagttcta 360
gatttacttc taattccttc aatttgatca tccaaatatt tggcgatttc atcaacacta 420
ccttctattc cacaagtagc cagtgaattg cattctgtac catttggtga agttaaatcg 480
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gaatcagact cacacggttt tgctacatca tttgcaatcg cactatcgaa tgctaaagta 1140
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<213> Diabrotica virgifera

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<212> DNA
<213> Diabrotica virgifera

<400> 357
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<210> 358
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<212> DNA
<213> Diabrotica virgifera

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tatgcctatt ttgtgtcatt tatattcttc tgttcgttct tgatgttaaa cttgttcgta 180
gccgtcatta tggacaattt tgattattta acacgtgatc cttccatatt gggtgctcat 240
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aaaatgcgaa cagctgatga aatggaccag gccgatgacg aactcaaaga gacaatcaaa 540
aacatctggc cgatccaagc caagaacatg gtggagctgt tggttccacc gaccaaccag 600

ctcaccaccg gaaaatgtcc gtcggcaagt tatacgccgg tcttctgat 649

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<212> DNA
<213> Diabrotica virgifera

<400> 360
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<210> 361
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 361
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<210> 362
<211> 547
<212> DNA
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tatgcctatt ttgtgtcatt tatattcttc tgttcgttct tgatgttaaa cttgttcgta 180
gccgtcatta tggacaattt tgattattta acacgtgatc cttccatatt gggtgctcat 240
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cactacagcg aaatgtacga catgttgaaa atatggatcc gccactaggc tttggaaaca 360
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atgggaaagt taattttact acgacattct ttgctctcgt cagagaaaat cttagcatta 480
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acatctg 547

<210> 363
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ccaaaaagcc cgaggaactg attaaattag acaattggta tcagaatgaa ctaccgaaaa 180
ggatcaaaag tcgtggcaaa gatgcccact tagtacacga ggagttggta caatgcatga 240
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tggcggctgc ttgtccagac agcgcccccc ttatggcaga tgaatgtctg atggccatac 480
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gttgctctct agtattt 677

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<213> Diabrotica virgifera

<400> 364
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<210> 365
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<212> DNA
<213> Diabrotica virgifera

<400> 365
ctaactcgtc cttgtgtggc gacc 24

<210> 366
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<212> DNA
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catctctaag agcgatttga gggccacctt cgatgctgtt ggtaaactcg ccagtgagaa 300
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tcaatgtaaa tcttcacggc taccgtgtgg ttccactaag acgaaaacat caattcggat 720
acatctaagt gtggtgtgtt tcttatataa ttccaatgaa cacataagaa aaggtgtact 780

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tcacgcgact canaagaaat aatatattat tttttgtttc at 882

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<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 368
ggcggataaa gaaaagaagg tcaagaag 28

<210> 369
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 369
cacaccacac ttagatgtat ccgaattgat g 31

<210> 370
<211> 711
<212> DNA
<213> Diabrotica virgifera

<400> 370
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gtctggttcc aatgacttct ccatgttttc gcaatctcaa gtagctgaat tcaaagaagc 180
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cggcggtact gacgatgatg aagtcgtcgt caaggctttc agatcctttg acgaaaacgg 420
caccattgac ggagacagat tccgccatgc cctcatgacc tggggagaaa aattcaccgg 480
caaagaatgc gacgacgctt tcgatgccat ggacatcgac gacaacaaca ggatcgacac 540
ccaggcactt atcacctct taacagcagc cgagaaggaa gaaggtgaag aaggcgaagc 600
agcataaaca ccatcataac ttacaactga nagtcaatgt aaatcttcac ggctaccgtg 660
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<211> 2918
<212> DNA
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aactaaacga taacttctgt ttatactgtt gtttttatcg tttaacaatg gctctctttc 180
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ccctattata tcaaggatct accggacaga cagaaaggga attccaaaca cttttaaatt 420
atcaaaataa agaatatgtc aggaacaatt acagccaaat tgtcgctgcc ctttataatg 480
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acgttttatc taaattcgaa gaccttgcaa gaaaaagctt caaaacagac atcataaaga 600
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<212> DNA
<213> Diabrotica virgifera

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<210> 373
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 373

ccttcttcat caacttctat tcccgatttc 30

<210> 374
<211> 1036
<212> DNA
<213> Diabrotica virgifera

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tagtgatatc tcccatcagc ctaaaaatca tattatccct attatatcaa ggatctaccg 180
gacagacaga aagggaattc caaacacttt taaattatca aaataaagaa tatgtcagga 240
acaattacag ccaaattgtc gctgcccttt ataatgcaga cagaactgaa tatatgctca 300
acattgggac atcgatgttt gtagatgaag gtctatacgt tttatctaaa ttcgaagacc 360
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aagttgatga agaagg 1036

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<212> DNA
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aatatgacgc cataggcaaa agttttgtcc aacaatatta tatgcttttc gatgatccaa 180
accaaaggcc taatttggta aacatgtata atgtagaaca ttcatttatg acctttgaag 240
gcaagcaatt acaaggatct gcaaagataa tggagaaatt aaattcctta ggattccaaa 300
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caactgaaaa tatgcaattt ttaaaatctc ctgtatctgt ttctgcttaa tatgaattca 600
caataataaa cttattttct 620

<210> 376
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 376
ctattaatct acaatatgac gccataggca aaag 34

<210> 377
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 377
cgaacataca acataaagaa ggagaggaga tg 32

<210> 378
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<212> DNA
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atacacaagt ttttgtttta aaaccattaa atggatcatt ttttgttcaa catgacattt 360
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gtatgttcg 429

<210> 379
<211> 846
<212> DNA
<213> Diabrotica virgifera

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ttatagaaga aaacatggaa actcccggcg ccagcagagc cccttccaaa ctggagcaga 180
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<210> 381
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<212> DNA
<213> Diabrotica virgifera

<400> 381
cacattgaac attttgacag gcgaca 26

<210> 382
<211> 656
<212> DNA
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aagcgtaacg tcggctcctc caaaatgaaa ttaaatgttt acggatcttt ctgtatttga 420
ttatatattc tgtatttgat tatatatatt tattgttgca ttatacttaa aaataagaac 480
aaaatatttt acaattctat gtttgcttta tgtcattatt ttaaatatat tattccatag 540
aatatggtgt ttctgtttaa aaagtgaaca cctatcagtt gtgtaagtat tgagaatttg 600
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<210> 383
<211> 841
<212> DNA
<213> Diabrotica virgifera

<400> 383
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ccaaggagaa tacagagaat cgttttggca acctttatat tttccgttct acatatattt 180
ggagtttttc atcatatttt tgagactgat ttttatacaa actttcatta tccctacgat 240
ggggatatag aacatttaat acagcaattg aaggatggca agccacctga tgttttacct 300
attaattcct atcactttga atataacaag aaatgtgttt caaaatgttc cagtatgaaa 360
cagttaagat tggtttatat aataaagagt gctccagagc attttgatcg cagaattgga 420
atacgcaatt catgggggta tgaaaggcga ttttctgatg cagaaataag aactgtcttt 480
ttggttggag aacgaaattc acatgcttta aaagagtcat taaaagaaga atactcaaag 540
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atgatgggct tgcagtgggc tgtcaggtat tgtccaaatt cacaatatta tatgtttgtt 660
gatgatgatt actacgtgtc caccaaaaat gttttaaagg atttgaaaat cccacaagta 720
ttcagaatat gtaaagaacc tcttaatgga gttagtccac tttttaataa aaaaaaaatc 780
ttgtttataa tgatttaaat gaggatgaaa aattattttc aggttatgta tttccatccc 840
c 841

<210> 384
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 384

ggagaataca gagaatcgtt ttggcaac 28

<210> 385
<211> 36
<212> DNA
<213> Diabrotica virgifera

<400> 385
ggactaactc cattaagagg ttctttacat attctg 36

<210> 386
<211> 636
<212> DNA
<213> Diabrotica virgifera

<400> 386
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atatagaaca tttaatacag caattgaagg atggcaagcc acctgatgtt ttacctatta 180
attcctatca ctttgaatat aacaagaaat gtttttcaaa atgttccagt atgaaacagt 240
taagattggt ttatataata aagagtgctc cagagcattt tgatcgcaga attggaatac 300
gcaattcatg ggggtatgaa aggcgatttt ctgatgcaga aataagaact gtctttttgg 360
ttggagaacg aaattcacat gctttaaaag agtcattaaa agaagaatac tcaaagtttc 420
atgatattgt ccatgccaat tttacagata gttactacaa caatacttac aaaactatga 480
tgggcttgca gtgggctgtc aggtattgtc caaattcaca atattatatg tttgttgatg 540
atgattacta cgtgtccaca aaaaatgttt taaggtattt gaaacatccc acaaagtatc 600
cagaatatgt aaagaacctc ttaatggagt tagtcc 636

<210> 387
<211> 2158
<212> DNA
<213> Diabrotica virgifera

<400> 387
gccattgggc gatagtctct ccatggaaaa ttaatatttg gaagaaagta tccataagta 60
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tcaacatgtg tctgtagaat gaagtctcgt ccggagaatt attgaatact tgaagaaatt 240
gagatcttct taagtgatac atgaactgtg ggtaaagact gaagttttga ccaagtctga 300
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tgtcaaccca tctaagaaca tctggactat catcagattc tgccctataa acggccatcc 420
tagccattat tacagcagca gcttcttgat cgaatccggc actgatatgg tgtatattag 480
cagttgcgtc agcccaattt cgagccactg ttgttactct gatttttctt tgaccacttg 540
aatgctggta ctgcgtaata aattgtatac aacctctacc accttgaggt atgggagcag 600
aatgttgatt tacgacctca aagaataaag acatggtagt acttggcgtt aaagtacaca 660
ttttccattg cacagtatta cccattccta tttctgtgtc ggaaaccaag gggctcttca 720
cgttaagtga tacacacgaa ccgatacctc cttgaacttt taattctcgg gaacacttca 780
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gttggaaagt ttgcttaaac aaggaagaat taaatgaatc ccccattacc atgtgtcccc 900
cagtagaatt acagcattgc ttcatttcca tcagacctgt ctgatccaaa gcacaagaat 960
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aatctacctg acacagtggg tttaatattg ctctacaagt atttctagta cataaaacag 1860
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attacaagtc ggaattccct aaggaaattc ctcaatatat attattagga ttctatcatg 2100
taaataacac tattattgag ctcctaaaaa ttacacctaa ttgtttcaga atttgaac 2158

<210> 388
<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 388
gtcactctgt tgatatttat tcttgtgctt tgg 33

<210> 389
<211> 35
<212> DNA
<213> Diabrotica virgifera

<400> 389
ctgtcaggtt gaatggagct agtatctagt aatac 35

<210> 390
<211> 913
<212> DNA
<213> Diabrotica virgifera

<400> 390
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aatgctgtaa ttctactggg ggacacatgg taatggggga ttcatttaat tcttccttgt 120
ttaagcaaac tttccaacgt gtgtttacca gagatcaaaa aagtgatctg aaaatggcat 180
ttaacggtac tttggaagtg aagtgttccc gagaattaaa agttcaagga ggtatcggtt 240
cgtgtgtatc acttaacgtg aagagcccct tggtttccga cacagaaata ggaatgggta 300
atactgtgca atggaaaatg tgtactttaa cgccaagtac taccatgtct ttattctttg 360
aggtcgtaaa tcaacattct gctcccatac ctcaaggtgg tagaggttgt atacaattta 420
ttacgcagta ccagcattca agtggtcaaa gaaaaatcag agtaacaaca gtggctcgaa 480
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aggacgaccc caattcattc agacttggtc aaaacttcag tctttaccca cagttcatgt 720
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tctacagaca catgttgatg agggaagatc ttactcaatc tttgataatg attcaaccta 840
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ttcaacctga cag 913

<210> 391
<211> 2158
<212> DNA
<213> Diabrotica virgifera

<400> 391
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aactataact atacaaatta ggttgaatca ttatcaaaga ttgagtaaga tcttccctca 180
tcaacatgtg tctgtagaat gaagtctcgt ccggagaatt attgaatact tgaagaaatt 240
gagatcttct taagtgatac atgaactgtg ggtaaagact gaagttttga ccaagtctga 300
atgaattggg gtcgtcctta ttgtattctc cgaatttttg acacaatcta atcagcattc 360
tgtcaaccca tctaagaaca tctggactat catcagattc tgccctataa acggccatcc 420
tagccattat tacagcagca gcttcttgat cgaatccggc actgatatgg tgtatattag 480
cagttgcgtc agcccaattt cgagccactg ttgttactct gatttttctt tgaccacttg 540
aatgctggta ctgcgtaata aattgtatac aacctctacc accttgaggt atgggagcag 600
aatgttgatt tacgacctca aagaataaag acatggtagt acttggcgtt aaagtacaca 660
ttttccattg cacagtatta cccattccta tttctgtgtc ggaaaccaag gggctcttca 720
cgttaagtga tacacacgaa ccgatacctc cttgaacttt taattctcgg gaacacttca 780
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cagtagaatt acagcattgc ttcatttcca tcagacctgt ctgatccaaa gcacaagaat 960
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taatcccatc tcgatcttca ttttgttgta tatactcttc atatgtgctc atttttgaag 2040
attacaagtc ggaattccct aaggaaattc ctcaatatat attattagga ttctatcatg 2100
taaataacac tattattgag ctcctaaaaa ttacacctaa ttgtttcaga atttgaac 2158

<210> 392
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 392
ccgacttgta atcttcaaaa atgagcac 28

<210> 393

<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 393
gctaacgcat cataatgttt aatacctttc ttc 33

<210> 394
<211> 1054
<212> DNA
<213> Diabrotica virgifera

<400> 394
ccgacttgta atcttcaaaa atgagcacat atgaagagta tatacaacaa aatgaagatc 60
gagatgggat tagatttacc tggaatgtat ggccttcaag cagaattgaa gctacccgtc 120
tcgtagtacc cttagcttgt ctgtaccagc ctataaagga acgtctggat cttccaccaa 180
tacaatatga ccctgtttta tgtactagaa atacttgtag agcaatatta aacnccactg 240
tgtcaggtag attatcgagc aaaactctgg gtatgcaact tttgtttcca gagaaatcca 300
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gttgttgaca cctgcatgga tgatgaagaa ctgggttccc tgaaagactc attgcaaatg 480
tcccttagtt tgttgccacc taatgcgtta ataggactaa tacatttggg aaaatggttc 540
aagttcatga atttggcact gaaggttgta gtaagtcata tgtgttcaga ggtacaaaag 600
atcttagtgc taaacaggtt caagaaatgc tgggaatagg caaagtggct ttaggtcagc 660
aagcccctca acagccaggg cagcctctaa gacctgggca aatgcaacct actgttgttg 720
caccaggaag caggtttcta caacctgtat ccaaatgcga tatgaatcta acagacctaa 780
taggagaaca acagaaagat ccttggcctg ttcatcaggg taaaaggtat ttaagatcta 840
caggtgtagc tttatcgatt gccattggtt tgttagaatg tacatattcc aatactggcg 900
cccgagttat gctatttgtt ggaggacctt gctcacaagg acctggtcag gtagttaatg 960
atgatttaaa acagcctatt agatcacatc atgatattca gaaagataat gcaaaatata 1020
tgaagaaagg tattaaacat tatgatgcgt tagc 1054

<210> 395
<211> 910
<212> DNA
<213> Diabrotica virgifera

<400> 395
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gcagcagtct gcacgaaagc aggcaaaaca attgtgtctc gacaatttgt tgaaatgacc 180
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atggttctta ttacaactag agctagcaac atattagaag atcttgaaac cctccgtcta 360
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gcattttcac ttatatttgc ttttgatgaa atagtggcat taggttatag ggaaagtgtc 480
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gccgtgagac agactcaaga gcgcgaggcc aagaatatga tgagagaaaa ggcaaaagaa 600
cttcagagac agaagatcga agcggccaaa aaaggaggga agacctcgtt tggtagtagc 660
ggtggctttg gcagctcgac aggttatact cctacgccat ctgttggtga tgtagctaac 720
cagacaaatg atgttaaaac ttcttcatac acaccagccc ctgcgcaaaa acctcggggt 780
atgaaattag gtggaaaagg tagagatgta gaatcattcg tagatcagct tanatcggaa 840
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gctatcaaaa 910

<210> 396
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 396
gagtacacgt caacgtcatc tcagtttgg 29

<210> 397
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 397
gctgatctac gaatgattct acatctctac ct 32

<210> 398
<211> 826
<212> DNA
<213> Diabrotica virgifera

<400> 398
gagtacacgt caacgtcatc tcagtttggt ttattgttgg gtgtaatgtt taaataaaat 60
aattattatt ttgtaaacct gtgccattaa acaaataaag cgatggtgct aattgcagca 120
gcagtctgca cgaaagcagg caaaacaatt gtgtctcgac aatttgttga aatgaccaaa 180
gctagaatag aaggtttgtt ggctgccttt cctaaattaa ttcctacagg aacccagcat 240
acatttgtgg aaacagattc agtacggtat gtttatcaac ccctagagaa actgtatatg 300
gttcttatta caactagagc tagcaacata ttagaagatc ttgaaaccct ccgtctattc 360
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cagagacaga agatcgaagc ggccaaaaaa ggagggaaga cctcgtttgg tagtagcggt 660
ggctttggca gctcgacagg ttatactcct acgccatctg ttggtgatgt agctaaccag 720
acaaatgatg ttaaaacttc ttcatacaca ccagcccctg cgcaaaaacc tcggggtatg 780
aaattaggtg gaaaaggtag agatgtagaa tcattcgtag atcagc 826

<210> 399
<211> 1057
<212> DNA
<213> Diabrotica virgifera

<400> 399
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cccggtgcgg gggcggcggg tagcggcggc gacgatggca ttgtgggcgg tccgcgaacg 180
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aaactaaaga gaaaattttg gttacagaat ttaaagatga tgataataat gggtgttatt 420
ggtcttgtaa tcttaataat catagtcatg aacttcatgt aactcatggg ccaaaaattc 480
gttcgaataa ttggcatata cagaaaacct acaattattg aatacaacac accaatacaa 540
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tggttgaaaa aaatataatc agttgttaaa ggttcaataa atggacactg gtgtttcacc 660
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ctttgttatt ttttttaagg tttaattaaa agaaaaaaat aaagttttaa ctttttttaa 900
ttttataaga caattaaaga agatttaatt taattggttg gttaaaaaaa agtattcttt 960
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ccctcccccc caacccgaat atttggaaaa ttttttt 1057

<210> 400
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 400
caatcatgtc agcaggggat gca 23

<210> 401
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 401
ccaacttgcc taatcgtcta tttcaatcc 29

<210> 402
<211> 511
<212> DNA
<213> Diabrotica virgifera

<400> 402
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acgatggcat tgtgggcggt ccgcgaacgc cacaacaaat cgcggcccaa cgacggcttc 120
aacaaacaca ggcgcaagtc gacgaagtcg tggatatcat gaaaacgaat gtagaaaaag 180
tattggaaag agatcagaaa ctatcagaat tagatgatag agcagatgct ttacaacaag 240
gtgcttcaca atttgaacag caagcgggaa aactaaagag aaaatttttgg ttacagaatt 300
taaagatgat gataataatg ggtgttattg gtcttgtaat cttaataatc atagtcatga 360
acttcatgta actcatgggc caaaaattcg ttcgaataat tggcatatac agaaaatcta 420
caattattga atacaacaca ccaatacaaa aaatcaatat taaagtaatt taatctatag 480
gttggattga aataacgatt aggcaagttg g 511

<210> 403
<211> 882
<212> DNA
<213> Diabrotica virgifera

<400> 403
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actccttatg ttgccagaca acagagtctc aaaacaagaa atattgttgt taaataatga 180
aataattaga ttattaaaat tctgctatga aactattgac aaatgcttca taactgaaaa 240
atacctccca caagtagacc acttcttttc gaaatttttt gcaagaactc ttagtagtgg 300
tttgtggagc acagctcaac aatctctggc tttggaaaac ctagaatcaa aagcaaaaga 360

agtcagcccc tgtcagtttg aggacttgat gcctgttgca cccactttgt gtctgcctga 420
cgaggctcag cttcagatag atgatgcctt atcagaattg gaggcaagtg attatagaga 480
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tcattcagga tacctgttgg cttcacattt tattcacgaa gatttgatag atgtcttttg 600
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tcctgaagga agaaggtatt tgctaatagt ggaaagtgga aaagatctgt tagcggtaat 780
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<210> 404
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 404
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<210> 405
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 405
cttggatgtg ggctaaagta gcttgc 26

<210> 406
<211> 763
<212> DNA
<213> Diabrotica virgifera

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<213> Diabrotica virgifera

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<211> 28
<212> DNA
<213> Diabrotica virgifera

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<210> 409
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 409
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<210> 410
<211> 1125
<212> DNA
<213> Diabrotica virgifera

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<212> DNA
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<213> Diabrotica virgifera

<400> 412
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<210> 413
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 413
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<210> 414
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<212> DNA
<213> Diabrotica virgifera

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<211> 1700
<212> DNA
<213> Diabrotica virgifera

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<212> DNA
<213> Diabrotica virgifera

<400> 416
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<210> 417
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<400> 417
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<210> 418
<211> 764
<212> DNA
<213> Diabrotica virgifera

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<210> 419
<211> 1638
<212> DNA
<213> Diabrotica virgifera

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ggaatagccc atactaaaat tataaaaaaa atgcactaga aataaacaac ccaagacacg 1620
ttgaatgtta caaggagc 1638

<210> 420
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 420
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<210> 421
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 421
gaaacctcca gtggacagca gcc 23

<210> 422
<211> 1005
<212> DNA
<213> Diabrotica virgifera

<400> 422
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tggagggttc attcatcaaa attcgcttta tgtgcacaca tagcacataa gcatacatgg 180
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<210> 423
<211> 1602
<212> DNA
<213> Diabrotica virgifera

<400> 423
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<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 424
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<210> 425
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 425
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<210> 426
<211> 453
<212> DNA
<213> Diabrotica virgifera

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aaaatctcat aataacttag aagtacaaat ttaaaatctt ctatgtattt aaatcatttc 180
aaacgatcta aaaatcgcgc gaattcttgt gacgtcatat gatcatattt tgtatgtcat 240
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atgaaagtgt tgtttaataa cattctgtta aattaaaacc attgaaactc ccaataaaat 420

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<210> 427
<211> 1529
<212> DNA
<213> Diabrotica virgifera

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cccaggtcta ccagcaagcg agtcagacat cctaccgctg aactacgccg gcccatacgt 540
agagtttata attatcttat atataataaa ggaatttgat taaaaaaggt aaaaatacat 600
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gagattcgat cattttgtg ggatatgtag ttgatgaatt aagtagtaag tagtagttga 720
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<210> 428
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 428
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<210> 429
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 429
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<210> 430
<211> 731

<212> DNA
<213> Diabrotica virgifera

<400> 430
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caggctgtca tctctagggc tacggtatac aagaaagata acagggccag tgctacgctt 180
caaccgccta ttattacccc tggttttagc caaggaactc attttattca ggctgagtcg 240
acctggggcc tatttaaaaa tgtctagttg ttcttgccgg cgctgggtct cgaacccagg 300
tctaccagca agcgagtcag acatcctacc gctgaactac gccggcccat acgtagagtt 360
tataattatc ttatatataa taaaggaatt tgattaaaaa aggtaaaaat acattgtatt 420
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cgatcatttt tgtgggatat gtagttgatg aattaagtag taagtagtag ttgaatacac 540
gttacatttt ctcaacattg attaatacat ttatttttt ccaaaataag aaaaatttag 600
ctactaaaaa aatatatgct aaatattgtt tatcatcagc taaaagttag gagatctgtt 660
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acaactggac g 731

<210> 431
<211> 1208
<212> DNA
<213> Diabrotica virgifera

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ttataacaaa tgtcctgaaa ccagccatat acgatcccta atttaccaga atacattgaa 180
ggggagagtt atacatgtac gcattccagg cacaggtttc tttgaagctc caatcacttg 240
tcttcaggtt accgatataa atgaaagttt cagtacacca gttgtagaag aaggtggata 300
tggaagggag tacgtagttt tacgtattga cccagttgaa tcaggagaac agttacaata 360
cgatgttcag atttatattg acgaagctgt tacagcctat cctcaataaa tgttcggtat 420
aaatgtttaa gaaattcgag tagccccttt aaagataagc agttgctggt attttaacag 480
cattactgat tgtaagttaa tcatttcaga ccttcacgta aactatgttg ttacaaaaac 540
gcatattagg acaataatcc aaattattag acaataaata ttaggcaaga gaaattaaac 600
gagtttctag ttttaagtac aaacaagtga agttcatcag caaaacagaa ttcagaatta 660
ttctacgtat tatattaaaa gcactatttg gttaaaagtt atcatttttg ggggtaaaag 720
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gtagattggg ccaagtacag tgggtgatca tattattaga gccacctaat atgttcagtg 840
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cctaatat 1208

<210> 432
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 432
cctttcgcca tccagtgcag aca 23

<210> 433
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 433
ctccaaaaca ctgaacatat taggtggctc 30

<210> 434
<211> 752
<212> DNA
<213> Diabrotica virgifera

<400> 434
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tttctttgaa gctccaatca cttgtcttca ggttaccgat ataaatgaaa gtttcagtac 180
accagttgta gaagaaggtg gatatggaag ggagtacgta gttttacgta ttgacccagt 240
tgaatcagga gaacagttac aatacgatgt tcagatttat attgacgaag ctgttacagc 300
ctatcctcaa taaatgttcg gtataaatgt ttaagaaatt cgagtagccc ctttaaagat 360
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cgtaaactat gttgttacaa aaacgcatat taggacaata atccaaatta ttagacaata 480
aatattaggc aagagaaatt aaacgagttt ctagttttaa gtacaaacaa gtgaagttca 540
tcagcaaaac agaattcaga attattctac gtattatatt aaaagcacta tttggttaaa 600
agttatcatt tttgggggta aaagaatcta ttaatttgtc ttgagtaaag gtagtatttg 660
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tagagccacc taatatgttc agtgttttgg ag 752

<210> 435
<211> 1290
<212> DNA
<213> Diabrotica virgifera

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attaactgca cttgtttaat aaaaggcact actacttact aacacaagat gtccgtattg 180
ggaatggtat cagccgtagc gggctttgtc aaagtccgct acttggttga taaagctcta 240
atcgacaata tggtgtttag agcccactat agagtcacgt cggccatatt gtttttatgc 300
tgtatcatcg ttactgcgaa taatctaatt ggtgacccca ttcagtgcat caacgacagg 360
ggtgttccag gtcatgtaat aaatacgttt tgctggataa cgcatacttt tacgttacca 420
catgaacaag gaaaacgcgt cgggacagaa gttgctcatc ctggtcttgg taacgaaaat 480
caggataaga gataccacag ctactaccaa tgggttccat tcgttttatt cttccagggc 540
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atcaccgaag gtatgagagg atcgatggtc ggagttgggg aaaaggcaga gagagaacat 660
agacagaata gactcgtaca atatcttatc gaaacgatgc acatgcacac ttcctatgca 720
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acaagagaaa cgattttgaa gaggagattc agattcaagg tacccaatgc tgttgagact 1140
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aaccaattgg tatttggcga aattttggac gaattcgtaa gaagactgaa tttcggtagt 1260

aacagcaact taccgtctgc tcccagcacg 1290

<210> 436
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 436
cacaagatgt ccgtattggg aatggtatc 29

<210> 437
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 437
gtaagtgaat caaaaggaaa tcaccaacct g 31

<210> 438
<211> 1023
<212> DNA
<213> Diabrotica virgifera

<400> 438
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gccatattgt ttttatgctg tatcatcgtt actgcgaata atctaattgg tgaccccatt 180
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tac 1023

<210> 439
<211> 845
<212> DNA
<213> Diabrotica virgifera

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aaagtcatgg ctcttgtagc cagctcctgg cgagagacat ccttaggtaa cccggtgagc 180
ctgaactctt tgcccaacgg tttgaatcct ttacctcaga ctagtacttt aactccttta 240

cccaccaaca ttaatcctat taatcttgaa acatccgatc cttcgctgat caatcgacaa 300
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tgcaaatcat tttttaaaag gagtgttaga agaaatttaa cgtactcatg tcgagggagc 480
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tgtatgaaaa tgggcatgcg gagagaagct gtgcagcgtg gcagagtacc accgtcgcag 600
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cctacgagtc gatatggtca atgtctgcaa agtaataaca ttatgggcat tgacaatata 780
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<210> 440
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 440
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<210> 441
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 441
gcagacattg accatatcga ctcgtagg 28

<210> 442
<211> 606
<212> DNA
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gtgttagaag aaatttaacg tactcatgtc gagggagccg aaattgtccg atagatcaac 360
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gagaagctgt gcagcgtggc agagtaccac cgtcgcagcc ttcgcttcca ggtttaccaa 480
atcagttcct taactcaaca gactcgatga atacatctct aagcaaccat acgtacctca 540
gtagttacat atcactatta ttaagagcag agccgtaccc tacgagtcga tatggtcaat 600
gtctgc 606

<210> 443
<211> 932
<212> DNA
<213> Diabrotica virgifera

<400> 443
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tacaacatta gctcttcctg atgaatgtag ttctatttcg cctgtaagaa gttgtttact 120
gaggacaaac tacatagata tacggctgtg gagatattac gctggctatt tttgctacat 180
ttatacaaat gaagccaggt tggatatcaa atataattcc actagttaca acataacatg 240
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tcaaaaagca caatggatcc aacaaactga ctacacaacg tgtgccatan gcgccggttt 660
acgaacgaag atacaacttc catattatat ttctggggag tctgtatcgg cttttgtata 720
ccggcaatat ctatattttt ctttttcgaa aaacttcgaa agaccatcag agttattctg 780
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atggagtccc atggtcggat attggctttt at 932

<210> 444
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 444
gctcttcctg atgaatgtag ttctatttcg c 31

<210> 445
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 445
cgtacgatga cttagagccg aagctt 26

<210> 446
<211> 817
<212> DNA
<213> Diabrotica virgifera

<400> 446
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gaagccaggt tggatatcaa atataattcc actagttaca acataacatg tggcggtgaa 180
aacgcaacga ttcccgtagc aagggtggag gagaacataa tagctagtta tgattataca 240
gataaagaag atgtccagca tatcagaaaa tcgtttaaga ctgacgaggt ttttaaaaat 300
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gaagtctgta ctttagaaag cgaaaaacac tgcatctgga acggaacaaa tcaaaaagca 540
caatggatcc aacaaactga ctacacaacg tgtgccatag cgccggttta cgaacgaaga 600
tacaacttcc atattatatt tctgggnagt ctgtatcggc ttttgtatac cggcaatatc 660
tatatttttc tttttcgaaa aacttcgaaa gaccatcaga gttattctgc ataggaacct 720
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<210> 447
<211> 880
<212> DNA
<213> Diabrotica virgifera

<400> 447
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ttgaaagtag tgaaaaaatc aggtgaaact ggatattggg tgatcaatac taaggtaggc 180
aaaggacaga tagtatttaa tggaaaagac aagccagatg ttactttcat tgttaaggaa 240
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aaagtaaaaa ttcaagggaa tatgggtgta gccatgcgat taatagaatt acagaaaaca 360
gccgctgcca aaattgaggt acttagggct aagttataaa ttacgtttat aggtaatttt 420
ctttatcttt ctgtattgtg tacactaagg ttttgtttta tctttttggg agtatatatt 480
atataagtga caaaacatac tttcttgttt tacacatcac ttcctgtaaa aatattgtac 540
acgctgtaca atgagtcctt tatgtaaaca aatatgtaag tataaatact tgctctgtta 600
tctccttttt attacatatt tttgttgata acttcagaat ctattgacct tttgtgaaat 660
actttcaata ttttgttaac agttgaagac cagtgtaatt tttcctgaga tactaaattc 720
aaatattttt gtttcanaca agtttgttcc gtaaataaac tagacatgta tatcattgta 780
tattattaat aatatgaaac cttgatgtct gtaggtaaat ggtcttaatg atttaatggt 840
ttttcataat ncatagtccn aagtcacaaa atagcatata 880

<210> 448
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 448
ggcaatgaat gaagatgaag aaggattagt 30

<210> 449
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 449
ccattaaatc attaagacca tttacctaca gaca 34

<210> 450
<211> 774
<212> DNA
<213> Diabrotica virgifera

<400> 450
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agtagtgaaa aaatcaggtg aaactggata ttgggtgatc aatactaagg taggcaatgg 120
acagatagtg tttaatggaa aagacaagcc agatgttact ttcattgtta aggaagagga 180
tgttttagaa ttattgtctg gcaaaattcc accacagaag gcatttttcc aaggcaaagt 240
aaaaattcaa gggaatatgg gtgtagccat gcgattaata gaattacaga aaacagccgc 300
tgccaaaatt gaggtactta gggctaagtt ataaattacg tttataggta attttcttta 360
tctttctgta ttgtgtacac taaggttttg ttttatcttt ttgggagtat atattatata 420
agtgacaaaa catactttct tgttttacac atcacttcct gtaaaaatat tgtacacgct 480
gtacaatgag tcctttatgt aaacaaatat gtaagtataa atacttgctc tgttatctcc 540
tttttattac atatttttgt tgataacttc ggaatctatt gacctttttgt gaaatacttt 600

caatattttg ttaacagttg aagaccagtg taatttttcc tgagatacta aattcaaata 660
tttttgtttc aaacaagttt gttccgtaaa taaactagac atgtatatca ttgtatatta 720
ttaataatat gcaaccttga tgtctgtagg taaatggtct taatgattta atgg 774

<210> 451
<211> 576
<212> DNA
<213> Diabrotica virgifera

<400> 451
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gctatggctg tcgcagctgc acttaaaatt ggcgccaaaa gtccaaaaga tcgagaagat 120
atcattaacg aaatcctaga cacacttgga ctgctggatc ataagaaaac aatgacaagc 180
gggttgtcgg ggggccaaaa gaagagattg tcaatcgcct tagaattagt tagtaatcct 240
ccagttatgt ttttcgatga acctactagt ggattggatt cttcatcatg ttttcaatgt 300
atatcactgt tgaaaacctt agctaaaggt ggaagaacta taatatgtac tattcaccaa 360
ccttcagcta gactgtttga aatgttcgac caactttata cactcgctga tggtcaatgt 420
gtttaccaag gttctacgac attcttggtg ccctttttgg caagtctgca gttacagtgt 480
ccttcatacc acaatccagc ctcctatatt atagaagtag catgtgggga atatggagat 540
cacacgagaa cgttagttaa cgctatagaa aatggt 576

<210> 452
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 452
ggataaccaa ctacatgcta atctaagagt ggat 34

<210> 453
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 453
ggaggctgga ttgtggtatg aaggac 26

<210> 454
<211> 482
<212> DNA
<213> Diabrotica virgifera

<400> 454
ggataaccaa ctacatgcta atctaagagt ggatgaagct atggctgtcg cagctgcact 60
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cacttggact gctggatcat aagaaaacaa tgacaagcgg gttgtcgggg ggccaaaaga 180
agagattgtc aatcgcctta gaattagtta gtaatcctcc agttatgttt ttcgatgaac 240
ctactagtgg attggattct tcatcatgtt ttcaatgtat atcactgttg aaaaccttag 300
ctaaaggtgg aagaactata atatgtacta ttcaccaacc ttcagctaga ctgtttgaaa 360
tgttcgacca actttataca ctcgctgatg gtcaatgtgt ttaccaaggt tctacgacat 420
tcttggtgcc ctttttggca agtctgcagt tacagtgtcc ttcataccac aatccagcct 480
cc 482

<210> 455
<211> 759
<212> DNA
<213> Diabrotica virgifera

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aataatatca tttcttttat ttatttatat attaatcttt gaagatgttg tctggtggct 120
atatattgga attgtgcaat gtttttttatt ctggacaggt aaaaaagcgc tctgttcttc 180
aaagaatggt tggcaacatt aaaactgcag taatcttaaa agatgtgtcc atgttggtac 240
attctggtga ggtcctagca gtgctgggat caaaaggtag tgggaagaaa gccttacttg 300
atgttatttc aagacgagca caaggcccta taagaggaca gatatatctg aacaaccatc 360
cagtcagtat gggtttattc cagcagaaat gtgcatatgt tacacataaa tgtgatttta 420
taccaggact aaatgttgaa cagacgttgt attatactcc gactaagttc actggctatt 480
taaaaatgtc taaagtaaag caagtgatag cagatttagc attgtcacaa gtcgctaaaa 540
aatgcgttga agatttgaca aaaagtgaat acagaagact gatgattggt gtccaactaa 600
tcaaaaaccc agtggtacta ttactagacg aacccacctg ggatctggac ccactaaaca 660
catacctaat aatttcaata ctttcaaatg cagctaaaaa gtatggaact gctataatct 720
tgacgatgga gaagcctaga tctgatgttt tcccgttct 759

<210> 456
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 456
ggtactgctt tagttgtgtt ttgacagatt cg 32

<210> 457
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 457
gcttctccat cgtcaagatt atagcagttc c 31

<210> 458
<211> 710
<212> DNA
<213> Diabrotica virgifera

<400> 458
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ttattctgga caggtagaaa agcgctctgt tcttcaaaga atggttggca acattaaaac 180
tgcagtaatc ttaaaagatg tgtccatgtt ggtacattct ggtgaggtcc tagcagtgct 240
gggatcaaaa ggtagtggga agaaagcctt acttgatgtt atttcaagac gagcacaagg 300
ccctataaga ggacagatat atctgaacaa ccatccagtc agtatgtgtt tattccagca 360
gaaatgtgca tatgttacac ataaatgtga ttttatacca ggactaaatg ttgaacagac 420
gttgtattat actccgacta agttcactgg ctatttaaaa atgtctaaag taaagcaagt 480
gatagcagat ttagcattgt cacaagtcgc taaaaaatgc gttgaagatt tgacaaaaag 540
tgaatacaga agactgatga ttggtgtcca actaatcaaa aacccagtgg tactattact 600
agacgaaccc acctgggatc tggacccact aaacacatac ctaataattt caatactttc 660

aaatgcagct aaaaagtatg gaactgctat aatcttgacg atggagaagc 710

<210> 459
<211> 837
<212> DNA
<213> Diabrotica virgifera

<400> 459
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agcagtgccc gcagcaatca ttatgcagtt tttgttattg tataagagga atctgctgat 120
aataaagaga tgttacggtc catcgctgaa cagagtattg gcccacattg ttattggtct 180
gatctttggc tatttgtata gaaacgttgg aagtgccgcg gatacagttt tagcaaatta 240
tgtatatttg tatggtactc ttttactcac agtatatact ggtaaaatgc ccgtaacttt 300
atcatttcct ctagaaatga agatactctc tagagagcat tttaaccgtt ggtataagct 360
aactccatat ttattgtctg tgatattagt tgaaattcct ttccaagtta tatgtacatg 420
gatgtacata gcagtatctt attcgttaac gaaccagcca ttagacttta ggttattctt 480
gtttgtcatt tttgtaacag cgtgttctct ctgtggccaa tccatgggat attttatagg 540
agccacaaca ccagtaaagg tagctgtatt catcgcccca gtgttagcct gcttcttatc 600
agtcttcggt ttttgcatca gagcaataga cacctctacc atgttcaaac cgatcttctt 660
catcagttac tttagagcag cattccaaag cgtcgtttat agtatttacg gctttaaccg 720
agagatattg gtttgcccaa tagaggagga atactgtcat tataaagatc ctcacaagtt 780
cctctcggaa atgaaatttt agatgtagat tttagttcaa attttatatt gattggt 837

<210> 460
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 460
ggtctctatt ccgacgaaac gaaagcag 28

<210> 461
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 461
cgtaaatact ataaacgacg ctttggaatg c 31

<210> 462
<211> 673
<212> DNA
<213> Diabrotica virgifera

<400> 462
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ttgtataaga ggaatctgct gataataaag agatgttacg gtccatcgct gaacagagta 120
ttggcccaca ttgttattgg tctgatcttt ggctatttgt atagaaacgt tggaagtgcc 180
gcggatacag ttttagcaaa ttatgtatat ttgtatggta ctcttttact cacagtatat 240
actggtaaaa tgcccgtaac tttatcattt cctctagaaa tgaagatact ctctagagag 300
cattttaacc gttggtataa gctaactcca tatttattgt ctgtgatatt agttgaaatt 360
cctttccaag ttatatgtac atggatgtac atagcagtat cttattggtt aacgaaccag 420
ccattagact ttaggttatt cttgtttgtc atttttgtaa cagcgtgttc tctctgtggc 480

caatccatgg gatattttat aggagccaca acaccagtaa aggtagctgt attcatcgcc 540
ccagtgttag cctgcttctt atcagtcttc ggtttttgca tcagagcaat agacacctct 600
accatgttca aaccgatctt cttcatcagt tactttagag cagcattcca aagcgtcgtt 660
tatagtattt acg 673

<210> 463
<211> 660
<212> DNA
<213> Diabrotica virgifera

<400> 463
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ctggacattc acggtaactt tattgaacat ctcgctaatt attacaagat tcaagacgta 120
atcagagtca aaactttaga tgctagtcat aatcgtatta ccgaaatttc tcctatgtct 180
attcctaata gtatagaact tttatttatt aataacaatt ttatcaaatc ggtgcaacca 240
aatactttcc tcgataaatc aaacttagct cgtgtcgata tgtatgctaa cgacatgaca 300
aatttagatt taaattctct gagaatcgct ccagttcatt cgaaccgttc cttaccagaa 360
atatatcttg gtggcaatac ctttcattgt gactgtacta tggagtggct acagcttatc 420
aacaacatgt cagcatccag gcagtatcct cgtgtaatgg acatggacaa cattgtatgc 480
aaaatgacac attctagagg tatgacacat atgccattaa atcaggcaaa acaaagtgac 540
tttctttgta actacgaaac acattggttt gctctttgcc attgctggga ttttgatgca 600
tgtgattgtg aaatgacttg tcctaataat tggacttgtt accacgatca gacgtggaat 660

<210> 464
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 464
ctaagtaatc tgaagtggct ggacattcac g 31

<210> 465
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 465
gcaatggcaa agagcaaacc aatgtg 26

<210> 466
<211> 543
<212> DNA
<213> Diabrotica virgifera

<400> 466
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tacaagattc aagacgaaat cagagtcaaa actttagatg ctagtcataa tcgtattacc 120
gaaatttctc ctatgtctat tcctaatagt atagaacttt tatttattaa taacaatttt 180
atcaaatcgg tgcaaccaaa tactttcctc gataaatcaa acttagctcg tgtcgatatg 240
tatgctaacg acatgacaaa tttagattta aattctctga gaatcgctcc agttcattcg 300
aaccgttcct taccagaaat atatcttggt ggcaatacct ttcattgtga ctgtactatg 360
gagtggctac agcttatcaa caacatgtca gcatccaggc agtatcctcg tgtaatggac 420
atggacaaca ttgtatgcaa aatgacacat tctagaggta tgacacatat gccattaaat 480

caggcaaaac aaagtgactt tctttgtaac tacgaaacac attggtttgc tctttgccat 540
tgc 543

<210> 467
<211> 894
<212> DNA
<213> Diabrotica virgifera

<400> 467
cgtaaataag attcttgtgt tattatttct tccttttttgc ttcggcaaaa gtgtagaagt 60
gacttttaaa gatgtcacgt tcaaaggctt tagtgttttt acagaaaagt tcaagaaaaa 120
gatcccatct ggaaacaaac tagcagattt tttgcccccg aaaactgttt atgatgccat 180
tgaaatgaag gaacaacata tacctgtact tgccaaaggc tcgttggcag atctagacca 240
gttggacgaa ttggttattg agtactgtgg tgttgaagaa gttgaatctg gagctatcag 300
taatgtacct aacctaagaa aactgtcact taaaggtaat gccatcaagt cgattgcaaa 360
ggacgtattt tcccatttag gaatatctac actagacctt agcctcaatc agatatcaac 420
aatccatcca caggcctttg acaacatgcc ggatctctta aacattcaac ttgctgacaa 480
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gcttcagaat aattccatag aaaagctacc agcccatgca tttaaaaaca tggtaggaga 600
taaaaagtat ggaaaaatag acctcactat taatctggta tttagtcata ataaaataag 660
tgagatagat cctgaagctt tcgcggatct cagcagaatt aacaacttgt ggttagataa 720
caatgttcta gaaagtttcg atganaacct tttatcggga ataaaagtta atgatttgag 780
actncacaaa aataatatca aatgtttaga tggtaatcta gataaaatac taaaagcaga 840
aacgaacaca tagattcgaa tccgtcgact gtaattgctt gagaagatca agga 894

<210> 468
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 468
gatgccattg aaatgaagga acaaca 26

<210> 469
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 469
ctaaccacaa gttgttaatt ctgctgagat cc 32

<210> 470
<211> 544
<212> DNA
<213> Diabrotica virgifera

<400> 470
gatgccattg aaatgaagga acaacatata cctgtactta ccaaaggctc gttggcagat 60
ctagaccagt tggacgaatt ggttattgag tactgtggtg ttgaagaagt tgaatctgga 120
gctatcagta atgtacctaa cctaagaaaa ctgtcactta aaggtaatgc catcaagtcg 180
attgcaaagg atgtattttc ccatttagga atatctacac tagaccttag cctcaatcag 240
atatcaacaa tccatccaca ggcctttgac aacatgccgg atctcttaaa cattcaactt 300
gctgacaatt tcataacgca atggaatcca gaatggctca agaatacacc gctattgacc 360

aggatctcgc ttcagaataa ttccatagaa aagctaccag cccatgcatt taaaaacatg 420
gtaggtgata aaaagtatgg aaaaatagac ctcactatta atctggtatt tagtcataat 480
aaaataagtg agatagatcc tgaagctttc gcggatctca gcagaattaa caacttgtgg 540
ttag 544

<210> 471
<211> 210
<212> DNA
<213> Diabrotica virgifera

<400> 471
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tgagtcgaac gaacctttca caactcaccg tactaatggt actatggtac tagctagcga 120
atgccaaata caaacacggg ctctttgccg gcaaaagact tcttcctcac tgaagatatc 180
ttgtaagttc ttcctctttt caaacgggcg 210

<210> 472
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 472
gctgacataa ccaaaaagcg caagc 25

<210> 473
<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 473
ccgtttgaaa agaggaagaa cttacaagat atc 33

<210> 474
<211> 203
<212> DNA
<213> Diabrotica virgifera

<400> 474
gctgacataa ccaaaaagcg caagcgccac cacacaaaaa accgtcttca ttttcctgag 60
tcgaacgaac ctttcacaac tcaccgtact aatggtacta tggtactagc tagcgaatgc 120
caaatacaaa cacgggctct ttgccggcaa aagacttctt cctcactgaa gatatcttgt 180
aagttcttcc tcttttcaaa cgg 203

<210> 475
<211> 1139
<212> DNA
<213> Diabrotica virgifera

<400> 475
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tgaaaaagat cttactgtat attttaaata tgtaatttac ttaactcatt cgctgcctgt 120
caagaaaatg gaactcggct agggccgttc tgttaaaagg cgcctgactg attggcgcgt 180

gaatggcacc tgactgaagt aaccatatca cgcgctggag tgtgatcgtc agcgaatggg 240
ttaaatgaca agtggttata gatgtttata cagtctaaat atatacagtg agttaaatat 300
tgggtcgagc tctccgtggg taataataat tattggttca aaaggatcca aacttgtcac 360
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atttttgtaa tccaatacaa taaaataaca acaaaatagt attcaattct ccgactattg 480
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taaaaataga cttcactgtc aggaggccag tgtaccacga agatatctca gaaactcttt 720
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<210> 476
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 476
ctcattcgct gcctgtcaag aaaatg 26

<210> 477
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 477
gcagagaact taccaacgat atcttgagac c 31

<210> 478
<211> 444
<212> DNA
<213> Diabrotica virgifera

<400> 478
cgctgcctgt caagaaaatg gaactcgcct agggccgttc tgttaaaagg cgcctgactg 60
attggcgcgt gaatggcacc tgactgaagt aaccatatca cgcgctggag tgtgatcgtc 120
agcgaatggg ttaaatgaca agtggttata gatgtttata cagtctaaat aaatacagtg 180
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aacttgtcac gggttagctc tgccggacaa tagattcagt aaaacacagg tttaatttaa 300
ataaaaatat atttttgtaa tccaatacaa taaaataaca acaaaatagt attcaattct 360
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agatatcgtt ggtaagttct ctgc 444

<210> 479
<211> 851
<212> DNA
<213> Diabrotica virgifera

<400> 479
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atctaagaag ctggaacagg gatagtcact acgggcataa ctgcacaagc ttgagaaggc 120
taaagaaacc taactggtgt cgcctgatac caggaattgg gtatactctc catctatatt 180
tgtttgcgcc tttcaagtag acttgcacct agtctcgttt ggcttctttc aatagatact 240
caaacctttt cgtctaagca ccacaaatgc acaccctttg gacatttttc ggccaatgtt 300
gagctctacc acggttttct gttctgttcc tattctattc ttgccccaca agaagctggg 360
gaattgatga tctctacggc ataccctcac atgcgggaaa aggctaaaga gatctatgtg 420
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tgaggctttt ggatagactt taacgcctct agagcttttt tgttttgttt caacagatac 540
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ttgatcgatt acatgtttct tacattgtct gtgtatatgt tgtaaatgct tgtttgtttg 780
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<210> 480
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 480
ctttaacgcc tagtgtcgag tctcgtg 27

<210> 481
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 481
gaacggattt aggcacatca aacaaac 27

<210> 482
<211> 797
<212> DNA
<213> Diabrotica virgifera

<400> 482
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tctaagaagc tggaacaggg atagtcactg cgggcataac tgcacaagct tgagaaggct 120
aaagaaacct aactggtgtc gcctgatacc aggaattggg tatactctcc atctatattt 180
gtttgcgcct ttcaagtaga cttgcaccta gtctcgtttg gcttctttca atagatactc 240
aaacctttc gtctaagcac cacaaatgca cacccttgg acatttttcg gccaatgttg 300
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aattgatgat ctctacggca taccctcaca tgcgggaaaa ggctaaagag atctatgtgg 420
tatcacctgc aagatctttt tgtggatacc ctgcttcttt tagaattaaa gcgtttattt 480
gaggcttttg gatagacttt aacgcctcta gagcttttc gttttgtttc aacagatact 540
caaacctttt ccaaattgaa cttcttagca gttttttat tcgttcctag tctacacatg 600
tcccaggaga agttactgag tcgcccctag cttcaactcg accgtgcgca ccttataaat 660
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<210> 483
<211> 1612
<212> DNA
<213> Diabrotica virgifera

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gttttggtat tggtttcaat gtgacaaaag tcaagaatca agcatttttg ttgtatccac 360
agtaggaata gtatagcaaa caatattcaa gtatttttat ttaaaatgaa aaattatttt 420
tagcttttta ggtcacctgt tggcaaataa ccttgaaaat gtagaacata ttgctgatga 480
attatgattc tcatatttgt tttttatgag tcaaaatacg ccgtaatatt ataacaatat 540
tatttattta aattattata aaatcagaag attttcatta aatgatgaat taggattgaa 600
cgagctgtga taaattaccc gaaaatatcc acaatgttgc caaaagcaac attttggaca 660
cagtaatgcg acattacagg atgtattatt ttaactgtaa aaggattgta ttcagacaaa 720
ttaatgatag ggcttgtcca gatagatcca tttatatctg ttcgaacagt caagcacctc 780
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<210> 484
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 484
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<210> 485
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 485
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<210> 486
<211> 1081
<212> DNA

<213> Diabrotica virgifera

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tacctcgatg gttttgatgg ttttttcgtt tgttggattg attgtttaaa aatattattt 180
gttttggtat tggtttcaat gtgacaaaag tcaagaatca agcatttttg ttgtatccac 240
agtaggactg gaatagtata gcaaacaata ttcaagtatt tttatttaaa atgaaaaatt 300
atttttagct ttttaggtca cctgttggca aataaccttg aaaatgtaga acatattgct 360
gatgaattat gattctcata tttgtttttt atgagtcaaa atacgccgta atattataac 420
aatattattt atttaaatta ttataaaatc agaagatttt cattaaatga tgaattagga 480
ttgaacgagc tgtgataaat tacccgaaaa tatccacaat gttgccaaaa gcaacatttt 540
ggacacagta atgcgacatt acaggatgta ttattttaac tgtaaaagga ttgtattcag 600
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<212> DNA
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agtggataaa catcattcga atgatgaatt tgttttattc tcacctgtaa aaaaaacaaa 180
gtgtaaatag tataagatta agtgtatatt gatattagaa ataaatggcg gcgtaccaat 240
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tgaaaattgc ttttgagctg ctggatcgga accaagatgg acaggtcaca ccgggagagt 360
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aaggcagcct ttcaagtttt tgatttggac ggagatggtt atattacaaa agaggaatta 600
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atttggtttt aagtaaaagc caggctgtga tccatgttta caattaaata tcattaagca 840
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<210> 488
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 488
cttgagcgtt gaatcagtag tggataaaca t 31

<210> 489
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 489
ccttccatcc ttatcagtat cagccag 27

<210> 490
<211> 589
<212> DNA
<213> Diabrotica virgifera

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acctgtaaaa aaaaaacaaa gtgtaaatag tataagatta agtgtatatt gatattagca 120
ataaatggcg gcgtaccaat tttctaaaag aaggagttct tcaatcaaaa aggaattcaa 180
cgagagtgag ctagaaggtc tgaaaattgc ttttgagctg ctggatcgta accaagatgg 240
acaggtcaca ccgggagagt tcaagatcat gctgaataat ttaggaattg acattaagta 300
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ggatatagct agtgacctaa aggcagcctt tcaagttttt gatttggacg gagatggtta 480
tattacaaaa gaggaattaa aaactgccat ggaaatgatt ggggaagctg ttacagatca 540
acaattagaa caggttattc gactggctga tactgataag gatggaagg 589

<210> 491
<211> 914
<212> DNA
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cagacttacc aagaagtatg atccacaagg aaactttaaa aaacgttacg aggaacactt 180
gcaaaaagaa aagaaagcgg cttagaaaat tatctttaaa gaagatgaaa agtcaaacat 240
tttgttgtgt ttaataattt tattgtaatt ttttttcac ttatagggga gtgcaattag 300
aacgaaaaga tacaatgttt cggaaaaaat caaacaaggt tatatttttc taaaactttt 360
tttgttagtt tataaatatg ttaaagtaaa aacttctact cacaaatttt gccgctaatt 420
gtttattaat tgtttaaaca ataacaattg ctttgtataa ataatgttaa gaatatgggt 480
gaattcaaca ttttattttg ataaaaaatg tttttatttt agttttgatt atgctgaacc 540
cgaatctgac attacaattt gcaaattcaa aatggcggat ttttttcctaa aaatccttaa 600
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cagatccaaa atggcggata gcttaaaaaa tagttgtaaa atcataattt ctttacaaga 780
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<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 492

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<210> 493
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 493
gttcagcaac ctctcaaaaa tatccaca 28

<210> 494
<211> 616
<212> DNA
<213> Diabrotica virgifera

<400> 494
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ccaagaagta tgatccacaa ggaaacttta aaaaacgtta cgaggaacac ttgcaaaaag 120
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gtttaataat tttattgtaa ttttttttttc acttataggg gagtgcaatt agaacgaaaa 240
gatacaatgt ttcggaaaaa atcaaacaag gttatatttt tctaaaactt tttttgttag 300
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acattacaat ttgcaaattc aaaatggcgg attttttcct aaaaatcctt aaaaagtagt 540
tgtaaaatcc gatttttttt tataaaatgt gtttgtttgc atattatatg tggatatttt 600
tgagaggttg ctgaac 616

<210> 495
<211> 802
<212> DNA
<213> Diabrotica virgifera

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tctaattgca gagatatctg gacatgggat gatgttaaat cccccaggaa gaagttcttt 180
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aaatttcaca tacagtctat gtgaactcga agattttgac gctccagaac ctgaaaattg 480
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agtagtcttc aataaggttc gactgccaaa tttccaatgc gagagatgtg ttcttagatg 600
gacttataaa gcaggaaaca actgggggct atgtgaggat ggaaaatgga gaagaggatg 660
tggacctcaa gaacatttca tatcatgcgc agatattgca ctattataat tataaagaca 720
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gaaggttgat tgatggcaag ct 802

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<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 496
ctttctggag gtttaacgac actgcac 27

<210> 497
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 497
gcttgccatc aatcaacctt ctttgg 26

<210> 498
<211> 625
<212> DNA
<213> Diabrotica virgifera

<400> 498
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gtggagctta tgtccaaaat gaactgaatg atggcaagtg tggtgtatgt ggagatcctt 120
atacagatcc tcatccccaa agaaacgaaa ataccggatt ttatggtata ggaattgtcg 180
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gatggactta taaagcagga aacaactggg ggctatgtga ggatggaaaa tggagaagag 480
gatgtggacc tcaagaacat ttcatatcat gcgcagatat tgcactatta taattataaa 540
aacatttaac actattcagt aattttatag atcttatcct ggataagcgt acccgcgtac 600
caaagaaggt tgattgatgg caagc 625

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<211> 899
<212> DNA
<213> Diabrotica virgifera

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aactgataat tccttcaatt acgacaactc tacctccaac aaccacaggc ataaggacaa 180
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gtcgaagcac cggtacatgc atcagttggt ttttcgtttg cgatggtaga aaagactgca 420
gcgatggatc agatgaagaa tgcttaccta acaaatgtcc ccaagaagct tttagttgca 480
aatcatcagg aaaatgcata tcgagagcga gcagatgcga tggatccaag gactgtgcct 540
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ttcagtgcag agatgggaaa tgtctacccg agtacgaatt ttgtaatgct ataattggtt 660
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cagaatattg tcctttacga tgtggaaatg gcagatgccg atctagcgca attgcttgtt 780
ctggaagaga tgngtgcggt gatggcacag atgaaagtca atgttcagtt tgtagatgtc 840
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<210> 500

<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 500
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<210> 501
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 501
ggtggttcgt cactgccatc actac 25

<210> 502
<211> 617
<212> DNA
<213> Diabrotica virgifera

<400> 502
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attccttcaa ttacgacaac tctacctcca acaaccacag gcataaggac aagggtcgaa 120
acgggcgacg aagctgtaag cttgggttta ccatgcgtga ctgacatgca atgcaaaatg 180
gctgattcat cttcaaaatg catagaagga atttgcgact gtattattcg gacaaatggc 240
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tcagatgaag aatgcttacc taacaaatgt ccccaagaag cttttagttg caaatcatca 420
ggaaaatgca tatcgagagc gagcagatgc gatggatcca aggactgtgc cttgggagag 480
gacgaaatga actgtcaggc tatcggaaga aaaggttgtc caccagatac ttttcagtgc 540
agagatggga aatgtctacc cgagtacgaa ttttgtaatg ctataattgg ttgtagtgat 600
ggcagtgacg aaccacc 617

<210> 503
<211> 1103
<212> DNA
<213> Diabrotica virgifera

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tataaaagtt acatgcagct acaacaatcg tgatatttat actgatttat ttgcttttgt 180
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tggtgacaat acatttccca atctaattcc agcattaaca ggaaaaactg taaaggaaat 420
cgagaacgat tgctggccaa ctaaaacaca ccattttgat aaatgtccgt tcatatggaa 480
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aggagcaagg tgggtatata aagttcattt gaactactta tccaatttcg ttcgaacgat 720
ggaagataac ttactaaagt attttggctt tttctggcag aacagtatat ctcatgatga 780
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aaatttttt tttcttttgg ttt 1103

<210> 504
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 504
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<210> 505
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 505
cgaacgaaat tggataagta gttcaaatga 30

<210> 506
<211> 691
<212> DNA
<213> Diabrotica virgifera

<400> 506
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atgtgaaaaa cgatctgatc caagacgagt cctctttaaa tattttagtg ttgggcttag 240
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<210> 507
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<212> DNA
<213> Diabrotica virgifera

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agttgcattc acacttacag agcactgcca cggagctcag tacttcggaa aactcatagg 180
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cgtccacaaa gcggctgaca aacacggttt ccggttgaga gatgagacgg gaagcggaga 360
agtaatcagg aggtacagga aggagggaat cactctcacg ctgccagaag gaaagaccat 420

acacagcatc aagatatttt atctttggtg cgaggaattt gacgttaact ttggtgatgt 480
taaagttcct cgtggttttg actatccacg accacaaaaa attgaatctc tcaaaggtgt 540
ccacgcaatt tcgtcagaca acatcgtcat cgtggatgcc cagacgctgt tgattccaaa 600
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<210> 508
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 508
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<210> 509
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 509
caacagtaaa catctcgcac cagattc 27

<210> 510
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<212> DNA
<213> Diabrotica virgifera

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ttacaccacg gcgtctccgg agaagtttac gcagtagatg cgaggacttt gtacatcaag 240
gatttcactt atgacggaca aggacccgcc gcctattttt acgccagcgt ccacaaagcg 300
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atccgagtcc ctgacgagaa tggcaaagaa gtgcccctta gaagatatga cagaaagaca 720
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<211> 1550
<212> DNA
<213> Diabrotica virgifera

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tttctgagga agttaacaaa taatatttcc tgagccgaaa ctgaaagaat acagcatgca 180
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gatatcctac agcctgagct acggcggccc ttattaaata gcaaaatgtt aacggacaaa 540
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<211> 31
<212> DNA
<213> Diabrotica virgifera

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<210> 513
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 513
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<210> 514
<211> 824
<212> DNA
<213> Diabrotica virgifera

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ctaggttata gcgtattttt aatcgactaa taaattattt aacatatcca ttatttgaat 360
caaaaataaa gaagccattc taaaatttac ataaagacac ataatattat attaactaac 420

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acagcaaaaa gacattcatg gaatattgaa aattgtaaaa gatttatgaa atttctaatc 780
atttcttttt tcctaacaag tagaatccag ttcaatggat aagg 824

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<211> 1452
<212> DNA
<213> Diabrotica virgifera

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tttcataaag tttataagtt atgctgatga gttttgttat cagaagatta cgtacctatc 180
agcttttaat cattcgcata ctttggtgtg tttttatcaa ataaggctaa taagaaaatt 240
catgataaaa cattcggaaa tgtttaaata caacacgcaa ttaaaaaaaa gcagcataaa 300
atttagacga attagtacaa agtgtaccta cttaaaattt acctttttga gtaatttttt 360
atgctgagaa tttaaaaaaa aatccgataa ttttgtctaa aagtacagaa aatatttttt 420
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gtaaatgcaa atttataaag taaaaaaaca ctaaactatc tatcattaat ataggtccca 660
tagataataa taaatagaaa gaatattata atagttattt tcctaagaag tgcagatagt 720
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ctgctctgct ga 1452

<210> 516
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 516
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<210> 517
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 517

ggaaaccaag atcgtcgtca tgctaac 27

<210> 518
<211> 828
<212> DNA
<213> Diabrotica virgifera

<400> 518
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<211> 1380
<212> DNA
<213> Diabrotica virgifera

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tactaatatc tcctctatag aaactaaata atataaaaaa tatataagac aaatataaaa 180
tctgttacac aactgtcatt agagattgaa ataaagctta agatttttta acttgcctac 240
aatagagttg ataacaggtt ttgtttcaca tctctatact tatgcctgta aactgtagaa 300
tctgttccga atgtcagcat taagttacac attaactgcc gatatctgtt ctttcttaaa 360
taattgccag aaaatttcgt ctaatcttca acgccataaa tgcaatgtaa aaattaatct 420
tagtatactt gtgagtgcag aaggtgtgct attgcctttt taaacacatg gcatacttac 480
attatattat cgttaaatgt attcctatcc agacctcgtt ccaacatatt gcggctagga 540
gcagaagaat aagacagctg acaagctaac ctactgacag ttgacattga cattattatt 600
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aactgtactt catagagtct agattatcct aataatactt agataataat cagttttaag 1380

<210> 520

<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 520
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<210> 521
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 521
gcttaacaca tatcgtaggt gtccgtaagt g 31

<210> 522
<211> 993
<212> DNA
<213> Diabrotica virgifera

<400> 522
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aattaatctt agtatacttg tgagtgcaga aggtgtgcta ttgccttttt aaacacatgg 240
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<212> DNA
<213> Diabrotica virgifera

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<212> DNA
<213> Diabrotica virgifera

<400> 524
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<210> 525
<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 525
gctacagtat tacaaatgtc ccaacaatta aac 33

<210> 526
<211> 845
<212> DNA
<213> Diabrotica virgifera

<400> 526
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<210> 527
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<212> DNA
<213> Diabrotica virgifera

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<210> 528
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<213> Diabrotica virgifera

<400> 528
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<210> 529
<211> 36
<212> DNA
<213> Diabrotica virgifera

<400> 529
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<210> 530
<211> 947
<212> DNA
<213> Diabrotica virgifera

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ggttccggtt cgttagaatt taacagaaat attcaagtgt tcaaggttag aaaactaaac 420
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<212> DNA
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gttttcaatg tgttttagat cattttagtt gcgtttcttt gtaattttgt tttgtacaat 240
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<212> DNA
<213> Diabrotica virgifera

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<210> 538
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<212> DNA
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tcatttagt tgcgtttctt tgtaattttg ttttgtacaa tgattaatta acattttcac 240
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cagtgcatct tagatgttta tcacgaggaa ataaggaaag aaattgaaaa ttatctttgt 780

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<210> 541
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<400> 541
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<212> DNA
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aataaaaccc gagttaaatt cagcttatcg tgatagtcta attaaacaca atgaacaaga 480
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gttccaaatc tttaaaagca tgtacctcaa aacaacacaa aatgaactcc ttcagtgcat 720
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attaagaatt taagcaagtt ttaagaattt aggcaagtta tctccacagc actaaagaaa 180

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agacaatcaa ttcaagacaa gtactcatct taacgcagtc aagaagtttg tttgtagata 360
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gaaacaagat ttgggcaaga ggttcgtaag agggaagaat agaagaaagc aactaataca 480
gtttgtagca ttttagaaaa aaaaattaga agataacttg aaaacggaga ctaaacttta 540
atgaactatc aagtttatta tcattaacac cttttattct cggtaacaag tatgtaaaag 600
caaatattat ttatggagta gaaaaaataa tgtttgttcc acttctgtca agaagacaga 660
atgaaattca agctggttaa attaaataaa agattctctt gtctaatgaa ttgcattgaa 720
gatatcttca cctgattgtc acatgcctgt cgaaaatatc tagctatatc agaataataa 780
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<213> Diabrotica virgifera

<400> 544
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<210> 545
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<212> DNA
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<400> 545
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<210> 546
<211> 508
<212> DNA
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attaagaatt taagcaagtt ttaagaattt agggccagtt ttgtcaagtt tagaaacaag 180
atttgggcaa gaggttcgta agagggaaga atagaagaaa gcaactaata cagtttgtag 240
cattttagaa aaaaaaatta gaagataact tgaaaacgga gactaaactt taatggaaga 300
actatcaagt ttattatcat taacaccttt tattctcggt aacaagtatg taaaagcaaa 360
tattatttat ggagtagaaa aaataatgtt tgttccactt ctgtcaagaa gacagaatga 420
aattcaagcc ggttaaatta aataaaagat tctcttgtct aatgaattgc attgaagata 480
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<211> 969
<212> DNA
<213> Diabrotica virgifera

<400> 547

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<211> 34
<212> DNA
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<210> 549
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<212> DNA
<213> Diabrotica virgifera

<400> 549
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<210> 550
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<212> DNA
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aatcacctaa agtatatgac ttaatatatc aaaacaacaa tttgtctgag gacatgtgaa 660
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<212> DNA
<213> Diabrotica virgifera

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<210> 553
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<212> DNA
<213> Diabrotica virgifera

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<210> 554
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<212> DNA
<213> Diabrotica virgifera

<400> 556
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<210> 557
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<212> DNA
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<210> 558
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<212> DNA
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atttgattaa attattaaag ttttgtattt tgataatgat ttccaagttg gaaattgaaa 180
cgtcaaataa atttaattta aaacttaaac tgtggcttga tcccctgtca caagaaaaaa 240
aaacacacca cgtctacgtc tatgcagata aggacacctg ttaacgagta aaatatttct 300
tggattctca ccctgccttg gacgtaaata tatagaccag cgaagtattg ataaggttac 360
caatgattca cagtgttcaa ggaatttgtt caacttagcc gcccgtaaat atgacccata 420
gaccggaggt atattgttac cgaggcaaat tttatgaaat catcttcctt tttcccttat 480
gcacattggc aaggcatacc caataaaaat gaccccggta taaatttagt tttaaaattt 540
aacattgttg ctgttctcag ttcaatttgt agatgagtcg ccttcaatta aaaatggttg 600
gagagagaac aaatgattga gtaaattagt aaaaaaacat taattagtag tcatcttaat 660
tataaatcaa attaataata aaaatatccc aactaaaata ttttactaaa cgtcataccg 720
ttggtcatac taaacgtcat acatatttat acctaattat gacagaagtc aacaagcact 780
taagataacg tctaaatgtg agaaactact atgtaatgta aatgtatagg tgtctaacga 840
caattttcca cctctacaag tttgatctct tttt 874

<210> 560
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 560
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<210> 561
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 561
gagatcaaac ttgtagaggt ggaaaattgt cg 32

<210> 562
<211> 658

<212> DNA
<213> Diabrotica virgifera

<400> 562
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aggacacctg ttaacgagta aaatatttct tggattctca ccctgccttg gacgtaaata 120
tatagaccag cgaagtattg ataaggttac caatgattca cagtgttcaa ggaatttgtt 180
caacttagcc gcccgtaaat atgacccata gaccggaggt atattgttac cgaggcaaat 240
tttatgaaat catcttcctc tttcccttat gcacattggc aaggcatacc caataaaaat 300
gaccccggta taaatttagt tttaaaattt aacattgttg ctgttctcag ttcaatttgt 360
agatgagtcg ccttcattaa aaatggttgg agagagaaca aatgattgag taaattagta 420
aaaaaacatt aattagtagt catcttaatt ataaatcaaa ctaataataa aaatatccca 480
actaaaatat tttactaaac gtcataccgt tggtcatact aaacgtcata catatttata 540
cctaattatg acagaagtca acaagcactt aagataacgt ctaaatgtga gaaactacta 600
tgtaatgtaa atttataggt gtctaacgac aattttccac ctctacaagt ttgatctc 658

<210> 563
<211> 849
<212> DNA
<213> Diabrotica virgifera

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ttcagttttt ttaagtctgc ttatttacat agaatgtgtt gccagtgtgg agtgcagtgc 180
attctatgta aatggcgtac ttaaacaagg ttgaggtttt ggacttctca ctgttgcttt 240
gatgtatcga tataagctac atagtagata catagaggaa atcttgtgct ttattctttt 300
ttagaatttc aatggttaat atattagata ttaaaataat gacccaaaaa atctatatag 360
tgctatctaa atattgctgc tgcaagaatt tttttattag ttctttaacc cagttttatg 420
accttcatgt acatatatcc aaatctatat tgccagggta ttggaaataa taccctggat 480
ttttagcctg aagtatatta ccaatgatgt acacaaacta ctagtctaaa gaaacaccga 540
ctattgaaga atattaagaa gctacaggtt acttttcatt tttccaaaat atcatttgta 600
tttttcagtt ctattctgtc acaactaaat tttattccac tttaccacga gagtaatctg 660
ttttttcgta actaaaagag gatcgatggg tagccaagaa gttgagaaac agtaagattt 720
caaatattgc aaaacgttgc aaatattttt aagaatgtat tttanaatgt taaatggata 780
catgaactaa tcagaaagca gtcttcaaaa aagaaaaagc agtgttaaga cacagtattc 840
gaaaacatc 849

<210> 564
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 564
cattcagtgg accaaaggat acatatcg 28

<210> 565
<211> 35
<212> DNA
<213> Diabrotica virgifera

<400> 565
gactgctttc tgattagttc atgtatccat ttaac 35

<210> 566
<211> 655
<212> DNA
<213> Diabrotica virgifera

<400> 566
cattcagtgg accaaggata catatcgata cattctatgt aaatagcgta cttaaacaaa 60
attgaaattt tggacttctc actgttgctt tgatgtatcg atataagcta catagtagat 120
acatagagga aatcttgtgc tttattcttt tttagaattt caatggttaa tatattagat 180
attaaaataa tgacccaaaa aatctatata gtgctatcta aatattgctg ctgcaagaat 240
ttttttatta gttctttaac ccagttttat gaccttcatg tacatatatc ccaaatctat 300
attgccaggg tattggaaat aataccctgg atttttagca tgaagtatat taccaatgat 360
gtacacaaac tactagtcta aagaaacacc gactattgaa gaatattaag aagctacagg 420
ttacttttca tttttccaaa atatcatttg tatttttcag ttctattctg tcacaactaa 480
attttattcc actttaccac gagagtaatc tgtttttttcg taactaaaag aggatcgatg 540
ggtagccaag aagttaagaa acagtaagat ttcaaatatt gcaaaacgct gcaaatattt 600
ttaagaatgt attttaaaat gttaaatgga tacatgaact aatcagaaag cagtc 655

<210> 567
<211> 848
<212> DNA
<213> Diabrotica virgifera

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caaatgagcc ggcacacgac atccgttctc atttataaag aaaaaatcga ttacgtcatc 120
acgcccagat ggatcgccgt caccggtgcg atatatgtgt caagggtcat aattggaaag 180
tcgaactttt gtattttaca ttttttttct agttctgtaa ataaggcagt ttgcaggggg 240
gtcaaaatat ggtgaatagc cctgtacatt cattggggcc gaccgatcgg ctctgtcccg 300
tcatgcagct gaccgactgt aataactttt atttatattc aatttggaat gtgtgtactg 360
attttcaacc ttagtaaatg gatttaatta ccttcgtagg aaagcaactt tgataccctc 420
ttagtaacca ctggttctac gtttcgtttg accgaccgca gtatgtttct ctacctacac 480
aatcacagtg atcaattatg aaaagtttag cttttgtgaa ttcacagatt ttttagcgct 540
ttatattgga aaattaacat ttttcaatat aaaccgtcca ctatattaat agatacaaaa 600
ttaggagctg tagcagaaaa gtatctcaac tgactcaatt tattttatta ataagtcctg 660
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aaaccgtgga ataaagtaaa acaatgttaa atattaccta ggtattttaa tgcataaaat 780
tatatactca atgcttgaag gataatataa agaagcattt gtttttttttt taatattttt 840
tctcttcg 848

<210> 568
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 568
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<210> 569
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 569
ctttacaaag atcgaagata gaaagcatcc a 31

<210> 570
<211> 610
<212> DNA
<213> Diabrotica virgifera

<400> 570
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ataattggaa aatcgaacct ttgtattttg catttttttt ctgattctgt aaataaagcg 120
gtttacaagg gggtcaaaat atggtgaatg gccctgtaca ttcattgggg ccgaccgatc 180
ggctctgtcc cgtcatacag ctgaccgact gtaataactt ttatttatat tcgatttaga 240
atgtgtgtac tgattttcaa ccttagtaaa tggatttaat taccttcgta ggaaagcaac 300
tttgttaccc tcttagtaac cactgttcta cgtttcgttt gaccgaccgc agtatgtttc 360
tctacctgca cagtcacagt aatcaattgt gaaaagttta gcttttgtaa attcacagat 420
tttttagcgc tttatattgg aaaattaaca tttttcaata taaaccgtcc actatattaa 480
tagatacaaa attaggagct gtagcagaaa agtatctcaa ctgactcaat ttatttttatt 540
aataagtcct ggtatttatt acgtttgaaa acggacattt tggatgcttt ctatcttcga 600
tcttgtaaag 610

<210> 571
<211> 828
<212> DNA
<213> Diabrotica virgifera

<400> 571
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gaacattaaa aaaaacttaa attcagtatt taaaacgtaa gtatatttaa ggtaaaaata 120
tataccacag ctttgaccaa ctaatattgt ttataattaa tgtttttaat tttaatttta 180
aattaatcac tttgacattt atgtcaaatt tccgataaac gtttacaaac ttgtcactac 240
tgcgttcgcg aatttgtaaa tatcccctct acgtacgagc tcacagcgta tacgctgtgt 300
gcttcgctgg tgtcgttcct agcggactac tattcaactt tcaccggtaa tttttaaatt 360
tattatttaa ttgttatcgc ttaatattta caacgcaaaa aagtaattaa attgtaatgg 420
atttttaag attttgctaa tcattttgac gttctattga caaaatatga atttcttact 480
tcggatactt tcacaattat cgtgtagatg gcgctaagat taatggatta atagattaat 540
agaacattaa aaaaacttaa attcagtatt taaaacgtaa gcatatttaa ggtaaaaata 600
tataccacag ctttgactaa ctaatatttt ttataattaa tgtttttaat tttaatttta 660
aattaatcac tttgacattt atgtcaaatt tccggtaaag gtttacagac ttgtcactaa 720
tggcgttcgc gaatttgtaa atatcccctc tacgtacgag ctcacagcgt ataactgaac 780
gacaacgaac gaacgaacac gaacactgaa cacagattca cagatagc 828

<210> 572
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 572
cgtttacaaa cttgtcacta ctgcgttcg 29

<210> 573
<211> 29
<212> DNA

<213> Diabrotica virgifera

<400> 573
gctatctgtg aatctgtgtt cagtgttcg 29

<210> 574
<211> 609
<212> DNA
<213> Diabrotica virgifera

<400> 574
cgtttacaaa cttgtcacta ctgcgttcgc gaatttgtaa atatcccctc tacgtacgag 60
ctcacagcgt atacgctgtg tgcttcgctg gtgtcgttcc tagcggacta ctattcaact 120
ttcaccggta atttttaaat ttattattta attgttatcg cttaatattt acaacgcaaa 180
aaagtaatta aattgtaatg gatttttttaa gattttgcta atcattttga cgtcctattg 240
acaaaatatg aatttcttac ttcggatact ttcacaatta tcgtgtagat ggcgctaaga 300
ttaatggatt aatagattaa tagaacatta aaaaaactta aattcagtat ttaaaacgta 360
agcatattta aggtaaaaat atataccaca gctttgacta actaatattt tttataatta 420
atgtttttaa ttttaatttt aaattaatca ctttgacatt tatgtcaaat ttccggtaaa 480
ggtttacaga cttgtcacta atggcgttcg cgaatttgta aatatcccct ctacgtacga 540
gctcacagcg tataactgaa cgacaacgaa cgaacgaaca cgaacactga acacagattc 600
acagatagc 609

<210> 575
<211> 824
<212> DNA
<213> Diabrotica virgifera

<400> 575
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agtagagcga agcgaggcaa agttgcacaa ggtgtccgtc tacactctcg tacttgttga 120
acctcgatcg acttcggcga gagtgtggag ctcacataac atttttttcat agagagtaat 180
aatgtaacag tttgtagttt ctaccagttg tgatgtaaca ggcgtaacgc tatgttattt 240
cacaatatgg agaagatcta ctacttcttc atttgtgacg agatctacca gcgaaatttc 300
aaaaattgtc ctcgagatgg acatttcaaa ctttttagg ttctatgatc ttaatttaac 360
ttccatcaac aataagattt actgtttttg attaaatagt taatctagca aagatagacc 420
agcaggtact tccttaaatc tagtaatggt cagcgtttac atagaccaat aatagtttat 480
taagcttttt tcggtcaact ttttaagtct tgtttttaaa ggaatgtttg tataacattt 540
taaacctttg taaaacatgt accattaatg ttgcccttct actcctttat aaaaataatt 600
gttaaaataa cttataaaat taatcttgtt taatgactcg aaatataaat tttaattttc 660
gtataaggtt cagatttaca gtattagtta tattataatt tacagaaatt tttcaatttc 720
ttttctaata actacacata cagcaaaaag tatgcctggt ggtaacgttc attaaattaa 780
gaagnttgtc gttgcttgaa acttgtgaaa attttgatag tttt 824

<210> 576
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 576
cgatgcgata ccgacaaagc tcc 23

<210> 577

<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 577
cacaagtttc aagcaacgac aatcttc 27

<210> 578
<211> 804
<212> DNA
<213> Diabrotica virgifera

<400> 578
cgatgcgata ccgacaaagc tcccttngac tcggacgcgc cagaccgaca gagaacggaa 60
gtagagcgaa gcgaggcaaa gttgcacaag gtgtccgtct acactctcgt acttgttgaa 120
cctcgatcga cttcggcgag agtgtggagc tcacataaca ttttntcata gagagtaata 180
atgtaacagt ttgtagtttc taccagttgt gatgtaacag gcgtaacgct atgttatttc 240
acaatatgga gaagatctac tacttcttca tttgtgacga gatctaccag cgaaatttca 300
aaaattgtcc tcgagatgga catttcaaac ttttttaggt tctatgatct taatttaact 360
tccatcaaca ataagattta ctgtttttga ttaaatagtt aatctagcaa agatagacca 420
gcaggtactt ccttaaatct agtaatggtc agcgtttaca tagaccaata atagtttatt 480
aagctttttt cggtcaactt tttaagtctt gtttttaaag gaatgtttgt ataacatttt 540
aaacctttgt aaaacatgta ccattaatgt tgcccttcta ctcctttata aaaataattg 600
ttaaaataac ttataaaatt aatcttgttt aatgactcga aatataaatt ttaatttttcg 660
tataaggttc agatttacag tattagttat attataattt acagaaattt ttcaatttct 720
tttctaataa ctacacatac agcaaaaagt atgcctgtgg taacgttcat aaattaagaa 780
gattgtcgtt gcttgaaact tgtg 804

<210> 579
<211> 812
<212> DNA
<213> Diabrotica virgifera

<400> 579
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agaattgccc tttaaagttt ttcatactta tttactaaca ccctgtatgt gtcgacaaca 120
catgtacaag tatgcatgca caatgcgcca ttttaaactt gaacatcagt agttgaagca 180
tccagtatcg tatgtctaca cgaatggtca aaactcaact gtattaaact ttgtacaagt 240
ctttcacaca cacactctca attacacttg cgtaaaaaat taacaagtaa aaattacaaa 300
atgttcacaa gtctcttgcc acttgtacag ttaacgtact tgtgctagca ttacccaaca 360
cccgttccag tatacttgtg caataaactt gtgcatggga acacgttggg aagaaaaatg 420
tgtaaggtta ggtcgaacac gttgaccatt cgcaaaatta aattccaaca gagggcgctc 480
aaaatttcaa agatggacga caactctagg aaaacaattc attttgtcat ttgaattcac 540
agttctaaaa cgttacatta aaatcattta caggagtgtt ttgccaaagt aaccactaag 600
ttttgcaact aagacatctt ataagttaaa gacgactcaa aattatgttt aaactgtatg 660
cattcattaa aatttgatgc taactactga tttgttttta ccttttttttc ataaaaaaat 720
ctggcccccg ataatcacac agcgttctaa aaattattaa tctatcttag gatttctaat 780
tttgttttta atttaattaa taggtgcact ac 812

<210> 580
<211> 24
<212> DNA
<213> Diabrotica virgifera

<400> 580
ggagacgagt catttgcgga catg 24

<210> 581
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 581
cttagtggtt actttggcaa aacactcctg 30

<210> 582
<211> 599
<212> DNA
<213> Diabrotica virgifera

<400> 582
ggagacgagt catttgcgga catgtgtttg tcgagcaaac cggcattgtt ttttcatgta 60
gaattaccct ttaaagtttt tcatacttgt ttgctaacac cccgtatgtg tcgacaacac 120
atgtacaagt atgcatgcac aatgcgccat tttaaacttg aacatcagta gttgaagcat 180
ccagtatcgt atgtctacac gaatggtcaa aactcaactg tattaaactt tgtacaagtc 240
tttcacacac acactctcaa ttacacttgc gtaaaaaatt aacaagtaaa aattacaaaa 300
tgttcacaag tctcttgcca cttgtacagt taacgtactt gtgctagcat tacccaacac 360
ccgttccagt atacttgtgc aataaacttg tgcatgggaa cacgttggga agaaaaatgt 420
gtaaggttag gtcgaacacg ttgaccattc gcaaaattaa attccaacag agggcgctca 480
aaatttcaaa gatggacgac aactctagga aaacaattca ttttgtcatt tgaattcaca 540
gttctaaaac gttacattaa aatcatttac aggagtgttt tgccaaagta accactaag 599

<210> 583
<211> 802
<212> DNA
<213> Diabrotica virgifera

<400> 583
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taacaaaaga aattcaaaat gtacaagtgg acaaaaaata ttaaacaaat gtatatagtg 120
tatctatttc taatcgaatc aacaaaatat gatcttactg aacagaatat gatgcaagct 180
aatattaaat gcaactcgta tgttttatta tatcctaaac caaagactta ttcatcttga 240
aggtgactgt gtgccgtcat ctcttttatt gagacaatta ggacgttttt cgttctcagc 300
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aaattaattt tgtatcttat atgaagcctc aaacgttttg gaaatatttc ttctctttat 420
caggaactgg aaagaagtat atgccctcag tttgttatct ttctctagat gatgggagga 480
aaaatttta aaatacctgt ttgtcagagt tttattacta ttaagaagaa ttcttcatct 540
taaaggtaac cgggtgtcgt catcactttt attgacacaa ttaggacgtt ttttgatctc 600
aatggctttt ggtgtggaca atagttatag aactttcaaa accaattttg tgtcctgtct 660
agatcatcaa acggttttga gaagatttct tcccttcata tggagctgga aagaagtatt 720
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<210> 584
<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 584
gtggcgtttt tctatttaca gtatgtgaat gtg 33

<210> 585
<211> 35
<212> DNA
<213> Diabrotica virgifera

<400> 585
gataactaac aggtgtcaaa tacttctttc cagct 35

<210> 586
<211> 737
<212> DNA
<213> Diabrotica virgifera

<400> 586
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aacaaaagaa attcaaaatg tacaagtgga caaaaaatat taaacaaatg tatatagtgt 120
atctatttct aatcgaatca acaaaatatg atcttactga acagaatatg atgcaagcta 180
atattaaatg caactcgtat gttttattat atcctaaacc aaagacttat tcatcttgaa 240
ggtgactgtg tgccgtcatc tcttttattg agacaattag gacgtttttc gttctcagcg 300
gcttctcgga aatccctggc ttacagaaac ggatggtgac tatagtcacg gaactgtcaa 360
aattaatttt gtatcttata tgaagcctca aacgttttgg aaatatttct tctctttatc 420
aggaactgga aagaagtata tgccctcagt ttgttatctt tctctagatg atgggaggaa 480
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aaaggtaacc gggtgtcgtc atcactttta ttgacacaat taggacgttt tttgatctca 600
atggcttttg gtgtggacaa tagttataga actttcaaaa ccaattttgt gtcctgtcta 660
gatcatcaaa cggttttgag aagatttctt cccttcatat ggagctggaa agaagtattt 720
gacacctgtt agttatc 737

<210> 587
<211> 778
<212> DNA
<213> Diabrotica virgifera

<400> 587
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gaactaaaat gtttgacgcg ccgtcaccaa aatggaacat ggagaacaaa ggattttcgc 120
ggagtgaccc tactgattat ttagcattat actaatctca aatacattag gtttgttcta 180
gcatcagttt caagcggttt gaaatcatca gaagcatgcg catttgtttg atggcgttta 240
agcacacaaa ttactagttt gaaactacta gtccagcgtt ctaactttga tttggaaact 300
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ttacttacca ttatttacgt ttataacatt aattttctca caatggagca ctgaggaacg 480
tttgtttttc tatacttcca caaaattttg tggaagtatg gaaaaacaaa cgtttttcag 540
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tgattttcaa tatttaacgt aaatcttgaa aatttggata acacaagaaa aatatatttc 660
taatctaacc tcaaaattat aaataaaaac aaacatgaac cagtctcatt tgacgttagt 720
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<210> 588

<211> 30
<212> DNA
<213> Diabrotica virgifera

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<210> 589
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 589
ctaacgtcaa atgagactgg ttcatgtttg 30

<210> 590
<211> 709
<212> DNA
<213> Diabrotica virgifera

<400> 590
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tactgattat ttagcattat actaatctca aatacattag gtttgttcta gcatcagttt 180
caagcggttt gaaatcatca gaagcatgcg catttgtttg atggcgttta agcacacaaa 240
ttactagttt gaaactacta gtccagcgtt ctaactttga tttggaaact agctttaaac 300
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tgtttgaggt ttataaattt taaatgaaaa tgatatgttt tgactgtttg ttacttacca 420
ttatttacgt ttataacatt aattttctca caataaagcg ctgaagggcg tttgtttttc 480
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tgagataaaa tgaacttcca tcaagtaacg gtcgaatcca tcaattacat tgattttcaa 600
tatttaacgt aaatcttgaa aatttggata acacaagaaa aatatatttc taatctaacc 660
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<211> 765
<212> DNA
<213> Diabrotica virgifera

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gaatgtgatt ctagatgata gttgttaaat gatcgtcaag tcgaatagtg gtgatctctg 180
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gagtcaccgt tgcatgccgg aacgagaaat agattcagtt tattgagagg agaaaaggct 360
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aatagtttgt tgcgagattg ctgactacat agggggctgc taagagtaaa ttgtaggcga 480
ccagagacaa gaatttggac aactcatcat ccgagagaca gttttatttt ttttgtagaa 540
ttattcataa cgcaaatttc aataagtact ttagatagtg gtaggagtat ttcaataatc 600
agaataggag atattatttt tagaggatat tttgagggtg aatttatttc aatagatgtt 660
tttgtaccat atatgtgttt tattccgtta gtctttgacc ttatttatca tatgtaaagc 720
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<210> 593
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 593
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<210> 594
<211> 726
<212> DNA
<213> Diabrotica virgifera

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cgtaaagcat tgtaagttat attgttctac ttatattcca agagtcaccg ttgcatgccg 300
gaacgagaaa tagattcagt ttattgagag gagaaaaggc tagcattgtt ttttgaaaga 360
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tttttagagg atattttgag ggtgaattta tttcaataga tgtttttgta ccatatatgt 660
gttttattcc gttagtcttt gaccttattt atcatatgta aagcaaagga gatattgaag 720
cacgag 726

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<212> DNA
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tatttcaatt gcttttaaat cagctgtcat atgatgtact tttccatttt aaaaaaatta 240
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cactttgatc attttaaaaa tcgacctgtc cgagcgtttt gcttatgtgc taaaaataaa 360
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tccattcata taaaatgtac acctagtaca gaaacttaat gagaatgatt atgaccgacg 540
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tatttttct gcggtgaata cactgttctc ataaaaaatg gaactagtgc aattactgga 660

gatggatatg agctattacc tccgatttcg ttgaacgaaa aatcgtcaca attgccgtta 720
ttggtctgat aaaac 735

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<211> 34
<212> DNA
<213> Diabrotica virgifera

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<210> 597
<211> 31
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<213> Diabrotica virgifera

<400> 597
gaaatcggag gtaatagctc atatccatct c 31

<210> 598
<211> 662
<212> DNA
<213> Diabrotica virgifera

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actcgaaaaa catgaatgcg tttaaaaata attcgatcga aattttgcgc ctacgctctc 120
aaaaaggtta aagtattata cattttgta atcagtattt caattgcttt taaatcagct 180
gtcatatgat gtacttttcc attttaaaaa aattaaagtt gtgcctgtca cctgaagagg 240
gatcgcatga agtccgaaac actgatgcta caatacactt tgatcacttt aaaaatcgac 300
ctgtccgagc gttttgctta tgtgctaaaa ataaataagc caataggggg ggggtaacaa 360
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gcgagcagtg agtgatccac agttgcgctt taatattttt tctgcggtga atacactgtt 600
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tc 662

<210> 599
<211> 711
<212> DNA
<213> Diabrotica virgifera

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aaaacaaaga acgtcttttc ctcttagttc ataaaggagc aaaattagga aagaaaaccc 180
tatcccacca acacctcttg taaaaatata aacggttaag acaagcagtg gatcttatgt 240
gtcaaattca cgtctattcc acgaattttc tgtttaagta aattgtagat ctttggttgt 300
atatatagtt acttttgttt catctaaaag ttatctacat taaccatata aaatgtttct 360
gaaatgttat tgaagaatta agatttcaag aagaatgtct ccaactaaaa tcgattttgg 420
taaaatcttg ttttgttaca agtgtacaaa tgtttgatgc aaaatatcta ttatgaggtt 480
gtactaaatt gtgagtatat ttaaaaataa aaaatactgt atctncttaa anaaccattc 540

aataaaaaaa taatttctta atttccccca aaaactttaa aattaaatta ataacttttt 600
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<212> DNA
<213> Diabrotica virgifera

<400> 600
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<210> 601
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 601
cgattttagt tggagacatt cttcttgaaa tc 32

<210> 602
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<212> DNA
<213> Diabrotica virgifera

<400> 602
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tcctcttagt tcataaagga gcaaaattag gaaagaaaac cctatcccac caacacctct 180
tgtaaaaata taaacggtta agacaagcag tggatcttat gtgtcaaatt cacgtctatt 240
ccacgaattt tctgtttaag taaattgtag atctttggtt gtatatatag ttacttttgt 300
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<210> 603
<211> 699
<212> DNA
<213> Diabrotica virgifera

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gttactgttt aaatttattt cttacgtttt aacctaacta cctgaggtat tagatttaat 240
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gaacaattta agcaacattt tagtacaaac ttttttctt 699

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<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 604
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<210> 605
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 605
ccaaatatgt tgcctcatcc acagaatg 28

<210> 606
<211> 488
<212> DNA
<213> Diabrotica virgifera

<400> 606
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agaaggtttc gagttggcag attcaggtag tagaaaagtt acgaattggc cggtgttctt 180
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atcagaaaat taattaatgc cggtacatgg acttcaagga ttaaagacaa tcacaggtaa 420
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atatttgg 488

<210> 607
<211> 688
<212> DNA
<213> Diabrotica virgifera

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taattggact tcgtaagtcc taggttttca cccaaagtaa tcgtcagtag aactgtaatt 120
cgatatttga actcttcgtg taactttgcg tcgatggata tacgatttta ctaattttga 180
gtcattttta ctaaactttg ggttatcatt gtcacagaaa tgacttcaaa accggaacta 240
aatattgaaa ctcaactttt caatacgctt cgattgatgt gttacatgta ctatttctgc 300
gactataatg gcacttctgg ttagaacttt ttaaccggaa atgatataaa aaccaaaact 360
ttatatttgt tctcatcttg ctaaggcacg tcaaatgata tatcgcttac actatttcgg 420
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atacttctgg tcgtatttct aaaaccgc 688

<210> 608

<211> 32
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<213> Diabrotica virgifera

<400> 608
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<210> 609
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<400> 609
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<210> 610
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<213> Diabrotica virgifera

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atacttctgg 550

<210> 611
<211> 973
<212> DNA
<213> Diabrotica virgifera

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ccacacaaaa aattattacc tccttcatga gacttttttt tattgagtta ttcatgtcgg 180
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agtgtcaaaa atc 973

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<211> 27
<212> DNA
<213> Diabrotica virgifera

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<210> 613
<211> 32
<212> DNA
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<400> 613
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<210> 614
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<212> DNA
<213> Diabrotica virgifera

<400> 614
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gatacacttg tatagtaata taggtcaatc atgtttatga taaacaacgc gtattcgttt 660
accaaggaca tttaaatatt aaaagaatta gtcttgccct taataagatg gttactaaga 720
gatgctgtga atcccaatac acatccgaca actggagtaa gtatccttga naatttgtcg 780
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<212> DNA
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<210> 617
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<212> DNA
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<400> 617
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<210> 618
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tcgagttatt aagccttgaa aatggccatt ttcgcgtttt tcaaatttga aattgcatgt 180
aactcggcaa cagtcaattt tatagaaaaa tcacaagata ccttttttgc tcagcttgat 240
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gacaagcata cagcgtggac tatttgcatt atgagccaaa cgtaaatggt ttgtaaaata 480
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<213> Diabrotica virgifera

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<210> 621
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<212> DNA
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<400> 621
ctgtggctca tttcgtattt agaacagtta gt 32

<210> 622
<211> 458
<212> DNA
<213> Diabrotica virgifera

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cggattaacg ggacaagcat acagcgtgga ctatttgcat tatgagccaa acgtagatgg 240
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ataattacta actgttctaa atacgaaatg agccacag 458

<210> 623
<211> 1376

<212> DNA
<213> Diabrotica virgifera

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atagtttatt tgaaataatc agaaatttcc ataattagtg gttagtatta ttagttgcgg 180
ttttattaat aagtgtcaac tgtcatttgt caaaatgtca actgtcattt gtcaaaatgt 240
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ggcgtaaaaa tatataaatt agttctgtag agtataaaag tcctttatgt aattcttact 360
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ttaacataca caattgaaga tcgttgtaac tgatatctgc agtcaacaat ttggaaattg 540
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<210> 624
<211> 26
<212> DNA
<213> Diabrotica virgifera

<400> 624
ggataacagt catggcgttc gtcacc 26

<210> 625
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 625
catgttctga caagtctcgc tccatagg 28

<210> 626
<211> 1148
<212> DNA
<213> Diabrotica virgifera

<400> 626
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gttagtatta ttagttgcgg ttttattaat aagtgtcaac tgtcatttgt caaaatgtca 180
actgtcattt gtcaaaatgt catctgttat ttgtcaaaat gacagatgac aataactcaa 240

ctgtcagttg tcaaaaagat ggcgtaaaga tatataaatt agttctgtag agtataaaag 300
tcctttatgt aattcttact ttcaaataaa ctcttgcact gacaaattaa atgtaatttt 360
gacagtttct gaaaggtttg actaaatgta aatgtcagaa ttatatatct gttgattttt 420
atacaggcac atcaaacata ttaacataca caattgaaga tcgttgtaac tgatatctgc 480
agtcaacaat ttggaaattg cttcacagct aactcaaatt agaagttatg tttcacaact 540
gcataaaata attgttaaca ggatcaatat tttattgttt atattagttt ttgtaaagat 600
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gaatgtatca atatgatttt atttttata tcaccttcat ttgtgcattc cggtctcaat 720
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attatgacag aagctcgaaa taaatgactg aatgaaaagc cctatggagc gagacttgtc 1140
agaacatg 1148

<210> 627
<211> 1142
<212> DNA
<213> Diabrotica virgifera

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tagataagat aggtagatgt taagtcatgt ttgttctcat tttttgtaac ttcggcttgt 180
aatatttgtg gaagttaaaa agtagattgt ttcattttct attagtacaa aaatgttgaa 240
caacaattca atattttaca aaagtcaagt ggttttaatg tatctttggt ttatttaaca 300
aaaaaattta attggataga aattgcatat attctgaaaa ccatgctata actgccagat 360
ttgtgaacaa acaatagcaa gttcctaaga agaacttccg tagcagctat acaaatttaa 420
acctctgttt aaaaaatctg aattaagagt atatgatata ggcacataaa agtgatgtcg 480
aaattaggag tacaaaatgt taatttttaa taattaattt ggcatatgag actaactgaa 540
ggcaaacaaa acttaataac atcataaaat cattgcaata aaaaactgaa aacttttttgt 600
cttccatgtt tttatgtggc gcagaaggta caaaaacgta aatctgtaat ttaaaacaat 660
tactgttttt ttatacgtag ttctggcaaa gttttacatt tgcattttag aaaaatgtgt 720
ttcatgttgt gtagtaaagc caaatttagt taactgtaaa aataaattac aaatttattt 780
tggttgtgaa ttggcccgaa aatttttttt atatctacat ttattcagtt ttgccaaact 840
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aagcttctag atgtgaaata aacggtcaac cacaaaaaaa aaaaaaaagg gcggccgccc 960
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tgtgacagtt ggaagctgac gaagatattc gcagcttgtc cttcaagtgg gtcaatatca 1140
tt 1142

<210> 628
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 628
ccatgctata actgccagat ttgtgaac 28

<210> 629
<211> 31

<212> DNA
<213> Diabrotica virgifera

<400> 629
gtggttgacc gtttatttca catctagaag c 31

<210> 630
<211> 593
<212> DNA
<213> Diabrotica virgifera

<400> 630
ccatgctata actgccagat ttgtgaacaa acaatagcaa gttcctaaga agaacttccg 60
tagcagctat acaaatttaa acctctgttt aaaaaatctg aattaagagt atatgatata 120
ggcacataaa agtgatgtcg aaattaggag tacaaaatgt taatttttaa taattaattt 180
ggcatatgag actaactgaa ggcaaacaaa acttaataac atcataaaat cattgcaata 240
aaaaactgaa aacttttttgt cttccatgtt tttatgtggc gcagaaggta caaaaacgta 300
aatctgtaat ttaaaacaat tactgttttt ttatacgtag ttctggcaaa gttttacatt 360
tgcattttag aaaaatgtgt ttcatgttgt gtagtaaagc caaatttagt taactgtaaa 420
aataaattac aaatttattt tggttgtgaa ttggcccgaa aatttttttt atatctacat 480
ttattcagtt ttgccaaact actaacagat acgtattttc gaatatcctt ttgattttaa 540
caaagagcat tgattatttt aagcttctag atgtgaaata aacggtcaac cac 593

<210> 631
<211> 1137
<212> DNA
<213> Diabrotica virgifera

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gaactggtta tatgcattat gtgataatag gctggcatta ataatatctg tccattagaa 180
aaactgttaa gtgctcctgt tagcgatccg atttttagct aggtttaaag tataggtaac 240
tctgtcgcct gattcctcct cggcacatcg gtcctacatc cgacaatatt ttacggagtg 300
tttcataaca taacacggat atattgatta acaaatatta taaatagttt ctgtgttaaa 360
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taacaagaga tgtaaagacg cagatatact cgactatcgt ccagatattt gtatatacag 480
cgtcttaaga tgtatcattt aacgaaatat acagttttta caagaagaaa agataatata 540
gtatggtaac cttatcatca aattaacatc gcataaaaac cgttcaagaa acacagagat 600
attgaggaaa agaaaagcac aacattaatt taatcaaaaa tatttctgtt ttacaatata 660
tctcactaag aaacatttct gatttataat attttagata tgtttagagg gagttataga 720
ccagggcgca tctgtaaaaa tattagtaca tttggacgtt gagaggtgac tcaaatttct 780
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tttttccttg gtcttttgat tataacttta aaactattca tttctgagaa aagttgtacc 960
gacatagaag ttgcgtaact aaatttcaca cattatagaa ttggtcaaaa attcaaaaaa 1020
tagtcacccc tgttgcaaaa cagcaataat tgcgaaaaaa ccatacaaaa acaagtattc 1080
gcattttacg cttttcaacc atttatgcta cacttaggac ccttttcngg acgcgtg 1137

<210> 632
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 632
gtgctcctgt tagcgatccg atttttag 28

<210> 633
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 633
gcaacttcta tgtcggtaca acttttctca g 31

<210> 634
<211> 781
<212> DNA
<213> Diabrotica virgifera

<400> 634
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aacacggata tattgattaa caaatattat aaatagtttc tgtgttaaat aagagttgta 180
cacaacatct acagttttgc atcgagctga cctagtttaa aaaaggatcg ttaacaagag 240
atgtaaagac gcagatatac tagactatcg tccagatatt tgtatataca gcgtcttaag 300
atgtatcatt taacgaaata tacagttttt acaagaagaa aagataatat agtatggtaa 360
ccttatcatc aaattaacat cgcataaaaa ccgttcaaga aacacagaga tattgaggaa 420
aagaaaagca caacattaat ttaatcaaaa atatttctgt tttacaatat atctcactaa 480
gaaacatttc tgatttataa tattttagat atgtttagag ggagttatag accagggcgc 540
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ttgcccgaaa acaactcaaa caacaatatt tgagttatcc tccctttcaa aaaggtccgg 660
aacattgttc aaacaatcaa aatgtcaaaa ataaaggaaa aactcgattt tttcttcgtc 720
tcttgactac aacttcaaaa gtattcattt ctgagaaaag ttgtaccgac atagaagttg 780
c 781

<210> 635
<211> 1142
<212> DNA
<213> Diabrotica virgifera

<400> 635
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tagataagat aggtagatgt taagtcatgt ttgttctcat tttttgtaac ttcggcttgt 180
aatatttgtg gaagttaaaa agtagattgt ttcattttct attagtacaa aaatgttgaa 240
caacaattca atattttaca aaagtcaagt ggttttaatg tatctttggt ttatttaaca 300
aaaaaattta attggataga aattgcatat attctgaaaa ccatgctata actgccagat 360
ttgtgaacaa acaatagcaa gttcctaaga agaacttccg tagcagctat acaaatttaa 420
acctctgttt aaaaaatctg aattaagagt atatgatata ggcacataaa agtgatgtcg 480
aaattaggag tacaaaatgt taatttttaa taattaattt ggcatatgag actaactgaa 540
ggcaaacaaa acttaataac atcataaaat cattgcaata aaaaactgaa aacttttttgt 600
cttccatgtt tttatgtggc gcagaaggta caaaaacgta aatctgtaat ttaaaacaat 660
tactgttttt ttatacgtag ttctggcaaa gttttacatt tgcattttag aaaaatgtgt 720
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aagcttctag atgtgaaata aacggtcaac cacaaaaaaa aaaaaaaagg gcggccgccc 960

tttttttttt tttttaacat aatagtgaaa tctttatttt aatacatatt atagtgacac 1020
attataaagc caatacatta acggcttata acgcatttgt cgttactcga tccatctact 1080
tgtgacagtt ggaagctgac gaagatattc gcagcttgtc cttcaagtgg gtcaatatca 1140
tt 1142

<210> 636
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 636
ggaacgtaca caaaagtttg ggagggt 27

<210> 637
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 637
gaacagcaac cagcctgata cgacg 25

<210> 638
<211> 582
<212> DNA
<213> Diabrotica virgifera

<400> 638
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gggtggacaa atttcactat aattttgttt aaagatggtt ctgccatgag aatgatacat 120
gtccattttc aataaaaagt atctaatagt tttcgatata ttgaaaaaga tcgattttca 180
ttttgtaact tcaaggggct gtaactttta tgatgagcac atttgtacca aggtaagtta 240
gattcaatca aactattttt gaccccagaa tgtgtggtat aatttgtgac caatcttttc 300
gggacaccct gtatacaata tatgttccct atgtccagct gaacgattta cgtaggttag 360
atcgactaat atagtaaacg acaattataa tacgttttgt cgacaattat aatacgtttt 420
gtcgtcatat tttaaaagac tcacatttta atgactgacg ttaaatatac acacttctcc 480
atcaattcga taccatgatg ttgaaatacg atatcaaaat gtaaaagagg cacaaactga 540
atgcagacgt tcagtgacgt cgtatcaggc tggttgctgt tc 582

<210> 639
<211> 1039
<212> DNA
<213> Diabrotica virgifera

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atatattatt tatggaaaat ccaagtattt caagtcatta aagttcaaat aaaagtatta 180
ttttataaga gtttgttccg ataaccgtaa ataggtacga gtttagctat aaagtaaagt 240
gaccgtggtg gcataaaatg tagtaaatgc taatgcttca agcacgtact acatttttga 300
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cagcctacat agaagaatgt actacgcttt ttaaatatgt gcttgtttag tactatttgg 420
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tatggcagca tttatgaatg tatgtcatag aaaaatttac aaactacgaa gaagattctt 540

aatttttggg gtcattcttt tatcaaataa aatttaataa ttgtgaagaa gattaacaaa 600
taacaattgt ttatttttat ccttgcgtaa ctctttggtc gcttcggatc tgagtcactc 660
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taacaaattt tttttttc 1039

<210> 640
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 640
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<210> 641
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 641
ctactgacca gaagtatcta ctacaaagcg tagc 34

<210> 642
<211> 798
<212> DNA
<213> Diabrotica virgifera

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gaaaaataat aatttattta aggcgtacaa ttaataaaaa gttatttatt gtttatatat 120
tatttatgga aaatccaagt atttcaagtc attaaaattc aaataaaagt attattttat 180
aagagtttgt tccgataacc gtaaataggt atgagtttag ttataaagta aagtgcccat 240
ggtgtcataa aatgtagtaa atgctaatgc ttcaagtacg tactacattt ttgaagattt 300
cactgcactt aaaaagcatt tgcctttctc cgcagtattt gctactattt accagcctac 360
atagaagaat gtactacgct tttgaagtat atgcttgttt agtagtattt tgcttcagtt 420
taagtgaagt tggtgggtgg tcgtcttcgg cgtaggtatt tttttgttac aatatggcag 480
catttatgaa tgtgtgtcat agaaaaattt acaaactaag aagaagattc ttaatttttg 540
gggtcattct tttatcaaat aaaatttaat aattgttaag aagattaaca aataacaata 600
attgttcatt tttatcctcg cgtaactctt tgtcgcttcg gatctgagtc actcattttt 660
actcatgtac aattctaata atttggtacg taaaaatgtg aatttacaaa tcacaagcac 720
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<210> 643
<211> 1035
<212> DNA
<213> Diabrotica virgifera

<400> 643

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gtgtttccca cctttagaca tatcagagct atatgtcaac taaaactgtc actgtcacag 180
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cctcaccaaa cctttttttat tcgtatctgt atatttatcg aagttcaaat gtatttttt 420
tattcttcca aatgagccag aaacttgaca aaaaaacaat tttctgaatc ccttcgaata 480
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gcgatttttg ggatttttc ccaaaaacta ctcaatgaat tataattcta caaaaggctt 660
tataatcctt aaaccctcaa gtataagtaa gaatattttg acaaggacac atggtttata 720
tctcgctgaa aacatggagt caaaaattca tctaaaatag gcccttcaga cagtctaccg 780
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cgaaaaatgt ttttt 1035

<210> 644
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 644
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<210> 645
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 645
gacaaggata agtggcttct atcttgctca 30

<210> 646
<211> 853
<212> DNA
<213> Diabrotica virgifera

<400> 646
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aaactgtcac tgtcacagtg tcagttaaca aacaagtcca atatgtctaa aggtgggaaa 180
caacagatag aatgtgaatt tataggtttt atcactaaat ttcgcacctc tactagttta 240
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attttttttg ttttttagcc tcaccaaact ttttttattc gtatctgtat atttatcgaa 360
gttcaaatgt attttttta ttcttccaag tgagccagaa acttgacaaa aaaacaattt 420
tctgaatccc ttcgaataaa attctttta agtttatctc atcggaataa ataatacctt 480
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taattctaca aaaagcttta taatccttaa accctcaagt ataagtaaga atattttgac 660
agggacacat ggtttatatc tcgctgaaaa catggagtca aaaattcatc taaaataggc 720
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gcacatgtca cataaatatt tgtataaatt taaaactatc gtttgagcaa gatagaagcc 840
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<210> 647
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<212> DNA
<213> Diabrotica virgifera

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aatctgaatc ctgacagatg taaacataga ctaaataaac tacactcaga gaaaaaaatg 180
atgtgaaata aaattattcg gaggtagata agtgaaaaaa tacgaacgaa cagtaggaaa 240
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gtttgctctt atttaaaaaa tgtgaaaaat tcattattac atcagcaatt tatccctttc 360
ttgagtttat ggaacttatc agtttttcta aattaagcgt ttcaaatcaa attttttagg 420
aagtgttttt aaagggacga ttattcttta gtttttaaaa tgcgttttat ccaatgttgc 480
ctacttctta aatgtatata acaataaaag caataccatt ttggatgtta cataggttgt 540
taataaacag atgaaaaggt gtgtttgtct aagaacaggt atatatttgc aatgatatag 600
agattactgt agttaaagaa actatgcaaa agattagagg tgatagtgga tacagttgat 660
agctaataaa tcaataattc tatacattta tcttcgatta aataattatg ttattgtggt 720
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tccatggctc tgtcagaaga tatgaagtgt tcatttatta ataagtttcc tagttggaag 840
ggatttctaa ctttgtaatt ataaaaaatt ttttaaaaaa tttcttctta tttatctgga 900
gggttttttg aatccaccgc tggtaccatt atttttaac aaataaatgg taaaaacaaa 960
aattttatgg gaaaattttc ttacgggggg ggctttcaca ccaggaaatt tgttttt 1017

<210> 648
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 648
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<210> 649
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 649
gaacacttca tatcttctga cagagccatg 30

<210> 650
<211> 806
<212> DNA
<213> Diabrotica virgifera

<400> 650
gtcccagaat gtgtgattta gtttgtgacc tgtatttttg ttacaccctg tatatgagat 60
acaaatgaat cgcgatgatt ttttctaact agcgatttcg gtatatgaat ctgaatcctg 120
acatatgtaa acatagacta aataaactac actcagagaa aaaaatgatg tgaaataaaa 180
ttattcggag gtagataagt gaaaaaatac gaacgaacag taggaaatta aaggccttgg 240

ggaaatgtgg ataaggtctg aaatgacagg ctgcgctctg ttgataggtt tgctcttatt 300
taaaaaatgt gaaaaattca ttattacatc agcaatttat ctctgggccc tttcttgagt 360
ttatggaact tatcagtttt tctaaattaa gcgtttcaaa tcaaattttt taggaagtgt 420
ttttaaaggg acgattattc tttagttttt aaaatgcgtt ttatccaatg ttgcctactt 480
cttaaatgta tataacaata aaagcaatac cattttggat gttacatagg ttgttaataa 540
acagatgaaa aggcgtgttt gtctaagaac aggtatatat ttgcaatgat atagagatta 600
ctgtagttaa agaaactatg caaaagatta gaggtgatag tggatacagt tgatagctaa 660
taaatcaata attctataca tttatcttcg attaaataat tatgttattg tggtttcaat 720
ggaaactatt aaactatttt aattaatgac gaaggtagaa taccttaaaa cttctccatg 780
gctctgtcag aagatatgaa gtgttc 806

<210> 651
<211> 1013
<212> DNA
<213> Diabrotica virgifera

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aaaacaactg ctagacgacc aaaaaaatga aatagataaa aattatataa aatttaattg 180
tctccatttt tgtataggta catttttgtc gtaaaactaa taataaacgc gataactcaa 240
taattctgct gttacttttt tcccccatta ctcggaaaat atcgaccgca caaaaaattt 300
gtaataaaag acattataga aaatcatatt ttcaacaatt tcagtcgtcg cacttttttgt 360
cgaaaagttg aaaatgacgg agatattgag caaaaacggc tctcctttaa attcaacatg 420
gcggctaacg taacggcgga attcactcgc gatattaaat ttacactact attgacaccc 480
gtaaagatta gaaaaattaa attttggaca tctcggcatg caaggtcaaa gctaaagtcc 540
tgtattttgg ctatctgtag gaaaacatca aaataactta ttataatgct gtttaatgac 600
atttttgagc cccttatgtt gaaacattat ttttttaat tgatactttc tgataanata 660
tacaaattta ttaaaataaa caccaaatca ctgtgaaatt gctacaaatg atatttaaaa 720
catttttat gttgcgcaga agctatgcac caagtttttt ggatccaaat tgagtggttt 780
gaaatgaatc gcccataaat atttgagttt attgtcattg gaaactataa gcaagtatta 840
caatacgctt aatttttaat tttaaatagg gatttggact gactatgaat ctgatcaata 900
ttttttaaat aattgtaaaa tttgatgagt cattatccct gtgtgggtct gattgttttt 960
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<210> 652
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 652
gatattgaac aaaaacaact gctagacgac c 31

<210> 653
<211> 29
<212> DNA
<213> Diabrotica virgifera

<400> 653
gatcagattc atagtcagtc caaatccct 29

<210> 654
<211> 789

<212> DNA
<213> Diabrotica virgifera

<400> 654
gatattgaac aaaaacaact gctagacgac caaaaaaatg aaatagataa aaattatata 60
aaatttaatt gtctccattt ttgtataggt acatttttgt cgtaaaacta ataataaacg 120
cgataactca ataattctgc tgttactttt ttcccccatt actcggaaaa tatcgaccgc 180
acaaaaaatt tgtaataaaa gacattatag aaaatcatat tttcaacaat ttcagtcgtc 240
gcacttttg tcgaaaagtt gaaaatgacg gagatattga gcaaaaacgg ctctccttta 300
aattcaacat ggcggctaac gtaacggcgg aattcactcg cgatattaaa tttacactac 360
tattgacacc cgtaaagatt agaaaaatta aattttggac atctcggcat gcaaggtcaa 420
agctaaagtc ctgtattttg gctatctgta ggaaaacatc aaaataactt attataatgc 480
tgtttaatga cattttgag ccccttatgt tgaaacatta ttttttttaa ttgatacttt 540
ctgataaaat atacaaattt attaaaataa acaccaaatc actgtgaaat tgctacaaat 600
gatatttaaa acatttttta tgttgcgcag aagctatgca ccaagttttt tggatccaaa 660
attgagtggt ttgaaatgaa atcgcccata aatatttgag tttattgtca ttggaaacta 720
taagcaagta ttacaatacg cttaattttt aattttaaat agggatttgg actgactatg 780
aatctgatc 789

<210> 655
<211> 1012
<212> DNA
<213> Diabrotica virgifera

<400> 655
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ctaatgtatt gtttgaaaga ccactaagta ccgattcggc attccagatt gtaaggaaaa 180
atgcaataag tgcaataatg agttttacca tgaaaccgaa attcacaatc ttggaaggaa 240
aaattcacta agtgcaataa tacgttttaa tgagttttgc cctgaaacca aaattcacaa 300
taatgcactt agtgaattgt accataaatt atctcagcaa ttagaagggt tagagtccca 360
ggtgacttct ccagagctgg gcagtaccgt atcgagttca aattaataaa aatgtcaata 420
tctcaaaaaa gtgcacttag ttagttttac ctctaatagg acgatttgtc ttgttttatc 480
cattatgata cattcacttc attatgtaca agcttatcga tatttgggta agtgtcgact 540
aggcagagtc agttcaatta ctatttcttc cttgagtgtt atgcttccat catcagccaa 600
gttaatgttg tataagtatc atactccata tcatagacaa atattcttca gtcacaaaat 660
atggctcagt aatagaagaa gagaagatag aaggactgga tggcagagaa cttgagaaag 720
tgaaatacac actacaaaaa ctttcaatgc cagtcttttg agatacatat ttggtcatta 780
ggtgatattc agattttgcg atattacata ttgtaggact ggtatgggag gagattctac 840
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cgaaaaatga acatcccatt tgaccctang ntgatggaag accaacaant tggaagaaag 960
tgtacagtca gccaggaccc accccagggt gtagcgctac gtgatgatga tg 1012

<210> 656
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 656
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<210> 657
<211> 27
<212> DNA

<400> 660
agagcattcc acagtgatct gttaaaatct ag 32

<210> 661
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 661
cgatttgaag tgaagtgaat aacacagttg a 31

<210> 662
<211> 688
<212> DNA
<213> Diabrotica virgifera

<400> 662
agagcattcc acagtgatct gttaaaatct agatgtcaca cgaagaactg gaattttcca 60
agagtatcga acaacaaaat atccaaatgt aacctcaaaa tagtatcatt cgcttataca 120
gaacaatgct ataatatgat ccttgctaca taaactcact aattacagtt aaggggggaa 180
gggtatggtt tgaaatcaac atttcgagcc cattttgtg aattatttag agttagtgtt 240
acctcacgaa atatctaaag aaagtctgtg caaaatttca ggtgratcgg taaaatagtt 300
ttggagttac aatatcyacc acctttgaaa aaagcagttt tgagaaaaat gckttcaaag 360
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gaaatatgtt tttgmatcgc ggagtaattt acaaaagggg aacagctgtt gaacgtttct 480
aactacgctc aagcacgctg tagcgaagct gccgcaawgc gagtcgaagg tagggatatt 540
yacttrctkt atctctggta attttactcc aatcaatctg aaattttcrg agagtagtct 600
traagttaat tttaaaattt caaaccgttt caacctcccc ccttaatcac aaaascttca 660
actgtgttat tcacttcact tcaaatcg 688

<210> 663
<211> 997
<212> DNA
<213> Diabrotica virgifera

<400> 663
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taccttttgtt caatcgcagt tagagtgtaa tccgaacaag tgtgctttat aaaaacgctt 120
tatattccac ttatacagat taaacgaaac aagttagggt atatttcttt atatttaaat 180
taatagaaat ctttcaatat tatttctacg cgtatataat aaaatatgtc tagtggctgt 240
aattccagtg taccctgcta aacgattcta aaaaggaaca cacctacgac ttaaataatc 300
gtgtgacgtc acgtgctata acgcggatga cgtgcaacgg tgtctatatt gtacggactg 360
tattgaatgt gttaagtgtg tttaatattt aatattccga taactaatcg aataaaggat 420
tacagattac ggtaaatatt tattaaacat atatgattac aaacttttgt acatgtttta 480
ttttagaccg tgacaagtgc tctgatctga ttgacgttga caatgtgaca aatacactga 540
cacctaaagg tgtgttcaca ctatacacta aacaaagtgt tcaccaggtt tcgcgtggta 600
aattgaaaac aaaacgtgac tttctgttat gcaagccata tttttgttga attcaacatt 660
ttattggtca ccatttatga ttagttaact agtaatttgt tatgttgaat ttggttatgc 720
gatatccgat aagaacttag cctctccgcc ctagtgcgtc actattgcaa gggatatata 780
ccatcgtata atacattctt gtagaccgcc tatgtcaaaa tctgagccaa atcgggactt 840
gtaatttttt taatttatta agaaaaacat acaatcccca tccacccccg cagggttatt 900
aaaaggagta gtaacgtacc caaaaattcc gttttaataa taataaaaaa gagggaatat 960
aaaaagtaaa atatttttaa aaaaatttaa acccctt 997

<210> 664
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 664
caatcgcagt tagagtgtaa tccgaaca 28

<210> 665
<211> 31
<212> DNA
<213> Diabrotica virgifera

<400> 665
gtacgttact actcctttta ataaccctgc g 31

<210> 666
<211> 848
<212> DNA
<213> Diabrotica virgifera

<400> 666
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ttatacaaat taaacgaaac aagttagggt atatttcttt atatttaaat taatagaaat 120
ctttcaatat tatttctacg cgtatataat aaaatatgtc tagtggctgt aattccagtg 180
taccctgcta aacgattcta aaaaggaaca cacctacgac ttaaataatc gtgtgacgtc 240
acgtgctata acgcggatga cgtgcaacgg tgtctatatt gtacggactg tattgaatgt 300
gttaagtgtg tttaatattt aatattccga taactaatcg aataaaggat tacagattac 360
ggtaaatatt tattaaacat atatgattac aaacttttgt acatgtttta ttttagaccg 420
tgacaagtgc tctgatctga ttgacgttga caatgtgaca aatacactga cacctaaagg 480
tgtgttcaca ctatacacta aacaaagtgt tcaccaggtt tcgcgtggta aattgaaaac 540
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acatttatga ttagttaact agtaatttgt tatgttgaat ttggttatgc gatatccgat 660
aagaacttag cctctccgcc ctagtgcgtc actattgcaa gggaaatata ccatcgtata 720
atacattctt gtagaccgcc tatgtcaaaa tctgagccaa atcggacttg taatttttt 780
aatttattta gaaaaacata caatccacat caaccacgca gggttattaa aaggagtagt 840
aaccgtac 848

<210> 667
<211> 996
<212> DNA
<213> Diabrotica virgifera

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aacgatttcc ataaacttaa ttacaattta cgccgttatt aatcaaaact catagttggc 180
gcaacgattt gaaattgttc taatttcgag gcgaatcatg taaattttat tgcgtttgag 240
tgacattgta ttttccataa tatgcgtgcg gtgtccttta cattgcaaac tatttgtatt 300
tgagtagtat cgttaaattt cgagaggtaa aatattgaat agctggtata ataattaaaa 360
gtacaataga ttaacaatac tttctacctg taccggaaac ttaccacacc attcaaatac 420
aaatgactgt aagcttaaaa tttttctgga atattttaat ggcaactata agtagtttcc 480

gcggtgaaac accttgtatg catttaaatg gtttcggctc acgtcagcaa tgaaagatgc 540
tcattctttt cagtataaaa tccaaaacta atttgagact gaatcgagtt gggtgataaa 600
gttgtaatac ggtgcgatat ggagtctggc gtaagatttt ttgtacacgc tgtatcgaca 660
caaattgtgc agtatttaat gtaagatcat ccattcttcc gtatcttcca aaacttttta 720
aatatactac gtttaaaact ctanagttga ttttagtttc cccaaaacag caatactcgc 780
ggtttagttg agttgaaagt gtgatagaca ggttttagtt actatataaa tatttttttt 840
acgatttgta ttagttgtaa tatacaatga aagacggaat tgtttttcgt tgtgtataaa 900
actttgtgtg actttttgaa atgtacatag ttctagtata agtttgttgt gctgagccac 960
gagaagtatc tcggttggaa ttgttccttt tttttt 996

<210> 668
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 668
acagttcctc taattggctt agctcacg 28

<210> 669
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 669
cttctcgtgg ctcagcacaa caaac 25

<210> 670
<211> 949
<212> DNA
<213> Diabrotica virgifera

<400> 670
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taatagtatt tatgaatgac tgtttaattg acttcaaacg atttccataa actttaatta 120
caatttacgc cgttattaat caaaactcat agttggcgca acgatttgaa attgttctaa 180
tttcgaggcg aatcatgtaa attttgttgc atttgggtga cattatattt tccataatat 240
gcgtgcagtg tcctttacat tgcaaactat ttgtatttga gtagtatcgt taaatttcga 300
gaggtaaaaa tattgaatag ctggtataat aattaaaagt acaatagatt aacaatactt 360
tctacctgta ccggaaactt accacaccat tcaaatacaa atgactgtaa taagcttaaa 420
atttttttct ggaatatttt aatggcaact ataagtagtt tccgcggtga aacaccttgt 480
atgcatttaa atggtttcgg ctcacgtcag caatgaaaga tgctcattct tttcagtata 540
aaatccaaaa ctaatttgag actgaatcga gttgggtgat aaagttgtaa tacggtgcga 600
tatggagtct ggcgtaagat tttttgtaca cgctgtatcg acacaaattg tgcagtattt 660
aatgtaagat catccattct tccgtatctt ccaaaacttt ttaaatatac tacgtttaaa 720
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gttgtgatag acaggtttta gttactatat aaatattttt tttacgattt gtattagttg 840
taatatacaa tgaaagacgg aattgttttc cgttgtgtat aaaacttgtg ttgacttttt 900
gaaatgtaca tagttctagt ataagtttgt tgtgctgagc cacgagaag 949

<210> 671
<211> 991
<212> DNA
<213> Diabrotica virgifera

<213> Diabrotica virgifera

<400> 657
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<210> 658
<211> 825
<212> DNA
<213> Diabrotica virgifera

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aatgtattgt ttgaaagacc actaagtacc gattcggcat tccagattgt aaggaaaaat 120
gcaataagtg caataatgag ttttaccatg aaaccgaaat tcacaatctt ggaaggaaaa 180
attcactaag tgcaataata cgttttaatg agttttgccc tgaaaccaaa attcacaata 240
atgcacttag tgaattgtac cataaattat ctcagcaatt agaagggtta gagtcccagg 300
tgacttctcc agagctgggc agtaccgtat cgagttcaaa ttaataaaaa tgtcaatatc 360
tcaaaaaagt gcacttagtt agttttacct ctaataggac gatttgtctt gttttatcca 420
ttatgataca ttcacttcat tatgtacaag cttatcgata tttgggtaag tgtcgactag 480
gcagagtcag ttcaattact atttcttcct tgagtgttat gcttccatca tcagccaagt 540
taatgttgta taagtatcat actccatatc atagacaaat attcttcagt cacaaaatat 600
ggctcagtaa tagaagaaga gaagatagaa ggactggatg gcagagaact tgagaaagtg 660
aaatacacac tacaaaaact ttcaatgcca gtcttttgag atacatattt ggtcattagg 720
tgatattcag attttgcgat attacatatt gtaggactgg tatgggagga gattcctaca 780
ggcaaaagac cactcggacg tcccagaatg tgatggagag ataca 825

<210> 659
<211> 990
<212> DNA
<213> Diabrotica virgifera

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caaaatatcc aaatgtaacc tcaaaatagt atcattcgct tatacaaaac aatgctataa 180
tatgatcctt gctacataaa ctcactaatc acagttaagg ggggaggggt atggtttgac 240
atcagcattt cgagcacatt tttgtgaatt ttttgaatct atattagaat tatttttaaa 300
ttaaataaat agattcagta gagataggcg ttacctcacg aaatatctaa agaaagtctg 360
caaaatttca ggtggatcgg taaaatagtt ttggagttac aatatccacc acctttgaaa 420
aaagcagttt tgagaaaaat gcgttcaaag ttttgaaaac tttattttca attttatttt 480
tgtttgtcaa atcgtaaagt aatgcacacc gaaatatgtt tttgcatcgc ggagtaattt 540
acaaaagggg aacagctgtt gaacgtttct aactacgctc aagcacgctg tagcgaagct 600
gccgcaaagc gagtcgaagg tagggatatt tacttgctgt atctctggta attttactcc 660
aatcaatctg aaattttcgg agagtagtct tgaagttaat tttaaaattt caaaccgttt 720
caacctcccc ccttaatcac aaaaccttca actgtgttat tcacttcact tcaaatcgag 780
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ttcataaata ttattaaaag cgcttaaaat ttcagctaga tggacgaaat ttacttttt 900
agatccctag tttttcaaat tttacgtgct atatttttc tgcgtacgat atacctcctc 960
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<210> 660
<211> 32
<212> DNA
<213> Diabrotica virgifera

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aacactatac aaaccttatt tattagatat ttaataaaca caaacattat gctgtttttc 180
tattactgtt atcagtattt tatcaatgta tattatgcct atgatcgatg attcatgata 240
gttgagttac agtaaaatta ttttagcaca gaaggaacgc agcgctgccg gctgtatttg 300
cttttctgtg gacattaatc aaatgcatta aaattaataa attatttttt tgaaaacggt 360
tgacttaaca aaaaaaattt attagacttt tttgctctaa atggtgcact tagcccatac 420
cttggaggaa cgcactattt tccgggacac cctgtatagt ttaaaaatta ttttctgttg 480
ctcaatcggt cattcgttcg tggaagtaga tacatcatgc attaattgaa agatctatcc 540
actggtggtt gtaacttaac gtccgcatca ttctgcgttt aattcaggtt ccaaaactga 600
catttaagtc caatattttt tgttcacgtt tggtacaaat atttttaga agggtatgcg 660
tccaagttct tacgagcttt gctgttgctg cctgctccta cgtcaaatgc tgaatttgca 720
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tcgtagcaag ctaagtaatg ttaacgaaga gaattatgac tttgcttagc aaatacagag 840
tttttatttt atagccttga atttttgtta attttgatat ctatacgtat atattgtttt 900
atattngtac atgtactttg ngtaatagct gccgatattg ccatttttta taaaaataac 960
gagagcagag gtgtataaat aaatttttgg t 991

<210> 672
<211> 28
<212> DNA
<213> Diabrotica virgifera

<400> 672
cttcccagaa gattgaatgg ataaatgc 28

<210> 673
<211> 30
<212> DNA
<213> Diabrotica virgifera

<400> 673
gaaagtaagg ttcagtgttc atgcaaattc 30

<210> 674
<211> 733
<212> DNA
<213> Diabrotica virgifera

<400> 674
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tacaaacctt atttattaga tatttaataa acacaaacat tatgctgttt ttctattact 180
gttatcagta ttttatcaat gtatattatg cctatgatcg atgattcatg atagttgagt 240
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gtggacatta atcaaatgca ttaaaattaa taaattattt ttttgaaaac ggttgactta 360
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ggcgcactgt tttcagggac accctgtata gtttaaaaat tattttctgt tgctcaatcg 480
gtcattcgtt cgtggaagta gatacatcat gcattaattg aaagatctat ccactggtgg 540
ttgtaactta acgtccgcat cattctgcgt ttaattcagg ttccaaaact gacatttaag 600
tccaatattt tttgttcacg tttggtacaa atatttttta gaagggtatg cgtccaagtt 660
cttacgagct ttgctgttgc tgcctgctcc tacgtcaaat gctgaatttg catgaacact 720

gaaccttact ttc 733

<210> 675
<211> 990
<212> DNA
<213> Diabrotica virgifera

<400> 675
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ccaatgtaaa atagttcaaa ctatcaaaaa cgcttgtgac gttacattac tgtattttct 240
actgacgttt atagtgtcta atttaaaatt atatacaatt ttgtttactt tgttggtgca 300
gaatgtacat gcacaactat atgacgtcaa tatgcgtttt ggaccacctg ttttaatttg 360
aatttttaat cgtctttagg ggccaaacga aagacaaaca aaacttttt tatctttgat 420
acatgtttta aattatgttc tgttgtgatt tataacattt ttttcgaatt taaaaattta 480
tgcaagttcc ctatttacac aaacaattta atatttccaa caagagcatt atttaaaatt 540
ccttgttccc gctaagggat agggacttca catcctagca gggggcgtta agacgctaga 600
aaaccggaag ataagtatag ctatcacaga agatatcggg gaagaacagg tatgtacatc 660
ggttatgact ataaatatct gaaaaataca tacatacttg taaagtaaac accactctta 720
ccatttttcta atattatcta agtattgact ggacttttct atctgcctca tgaataatga 780
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ataattatag gaatatctac cgatattatt actctggggt ccgtatatct atccttttt 900
tctacttttc tactatggnn atgagaaata aattnaaatt ttaaaaacaa tttggtggta 960
ttccctagag gaaatataaa attttatcta 990

<210> 676
<211> 32
<212> DNA
<213> Diabrotica virgifera

<400> 676
agaagaaccc ttagccaatg taaaatagtt ca 32

<210> 677
<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 677
gatagatata cggaccccag agtaataata tcg 33

<210> 678
<211> 729
<212> DNA
<213> Diabrotica virgifera

<400> 678
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ttactgtatt ttctactgac gtttatagtg tctaatttaa aattatatac aattttgttt 120
actttgttgg tgcagaatgt acatgcacaa ctatatgacg tcaatatgcg ttttggacca 180
cctgttttaa tttgaatttt taatcgtctt taggggccaa acgaaagaca aacaaaactt 240
tttttatctt tgatacatgt tttaaattat gttctgttgt gatttataac attttttttcg 300

aatttaaaaa tttatgcaag ttccctattt acacaaacaa tttaatattt ccaacaagag 360
cattatttaa aattccttgt tcccgctaag ggatagggac ttcacatcct agcagggggc 420
gttaagacgc tagaaaaccg gaagataagt atagctatca cagaagatat cggggaagaa 480
caggtatgta catcggttat gactataaat atctgaaaaa tacataatac atacttgtaa 540
agtaaacacc actcttacca ttttctaata ttatctaagt attgactgga cttttctatc 600
tgcctcatga ataatgaggt aaattagaat ttcatttatt ttgcataaaa aatacatgta 660
attccgttat cataaaataa ttataggaat atctaccgat attattactc tggggtccgt 720
atatctatc 729

<210> 679
<211> 988
<212> DNA
<213> Diabrotica virgifera

<400> 679
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acagatgcgc cctggactaa aacaatttta agtactctca ttgttaaaaa gttgattcac 180
cacattttca taacgatttt tagggcggct gtacacggac tgctgaggtc gtttatcact 240
gagcgacata cacggactgc tcgagcgatc gttgtagact tctggagcgg tccattgttg 300
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aatttcatta tgctattgac agcttgaagc ggtcttgact gctcgagctg tcgtgtgtat 420
ggcaacgaat atacaattat aattcaccgc gcaaacgctg cttcaaaaag tcgacctcaa 480
ctgcttgaag atgtccgtgt acggccgatc ttggggtatc ttttttactc ttatcgggaa 540
tatttaagaa ccgaaatccc taatgttttc cctatttgtt ccagaatgat atacgtgtta 600
atttccaact gagacttgac ggccagcacg accgtacgac aagacatttt cgaacagtaa 660
aatcattagt tttagtaaca aatacaaaga cagatgggaa ttcggttctc gatattatgc 720
agagtattta cctgatgatg aacacttatt ggaggataga aacgcataat ttgcagaact 780
gacttaccca tgtaatggac aggtatgatg gaaacgtatg tactttaatg ttttgttagt 840
atttttacga gagaagctaa gtaggtttgt gaagaattag ttatttgttg tactcgatac 900
tttttattaa ctcattaatt aattaaatcc tacaaataca caacgtaaga agctacatga 960
gcgcgcagca aaaatttttt tttttttt 988

<210> 680
<211> 25
<212> DNA
<213> Diabrotica virgifera

<400> 680
ggaccatttt gagtgggagg atagc 25

<210> 681
<211> 33
<212> DNA
<213> Diabrotica virgifera

<400> 681
ctaattcttc acaaacctac ttagcttctc tcg 33

<210> 682
<211> 862
<212> DNA
<213> Diabrotica virgifera

<400> 682
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tctgcaggga agtttgggtc acctctcaac gtccacctca aaacagatgc gccctggact 120
aaaacaattt taagtactct cattgttaaa aagttgattc accacatttt cataacgatt 180
tttagggcgg ctgtacacgg actgctgagg tcgtttatca ctgagcgaca tacacggact 240
gctcgagcga tcgttgtaga cttctggagc ggtccattgt tgactacctg agttgtccct 300
tgtcgcattg caaccgctct cgatctgtcg atagcacgat ggaatttcat tatgctattg 360
acagcttgaa gcggtcttga ctgctcgagc tgtcgtgtgt atggcaacga atatacaatt 420
ataattcacc gcgcaaacgc tgcttcaaaa agtcgacctc aactgcttga agatgtccgt 480
gtacggccga tcttggggta tctttttac tcttatcggg aatatttaag aaccgaaatc 540
cctaatgttt tccctatttg ttccagaatg atatacgtgt taatttccaa ctgagacttg 600
acggccagca cgaccgtacg acaagacatt ttcgaacagt aaaatcatta gttttagtaa 660
caaatacaaa gacagatggg aattcggttc tcgatattat gcagagtatt tacctgatga 720
tgaacactta ttggaggata gaaacgcata atttgcagaa ctgacttacc catgtaatgg 780
acaggtatga tggaaacgta tgtactttaa tgttttgtta gtatttttac gagagaagct 840
aagtaagttt gtgaagaatt ag 862

<210> 683
<211> 978
<212> DNA
<213> Diabrotica virgifera

<400> 683
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aacaaacaga cagagtggtg gtgacaaaaa aagaggtggc atagataggt gtcttttagg 180
aaatatttgg aaaagaacga ccatacttat aataatacaa ctgtaaatgt gtaaaaaatc 240
gtattgattt tgctacttgt gtctattgtg tcattttatt agatcacaat atatataaac 300
tgttgaactc gaccgtaagc tgctttaaaa acaataaaat gttttgaaat gtagtaaata 360
tgtcatcgaa taagtgacgt catagctaag tgtagacagt attgccaaaa taatttgtat 420
acataatggt tcttctattt atacaaaact ttaatctttt taatttcttc tctttgtatt 480
tgactattaa caaagtgaaa cgaattttgc aattatttta gtatattaac gtagaaaaag 540
atcaataatt gactctagag acttttaatt cttaacaaaa ttaaacaatt atattaaaca 600
ccaaaactac tctgatcaag tcatggtctc tgcatattat ttatacctta gagctacact 660
atttagaaca aaatgttaat ataaacattt tttaataggt attttgagat agaaagtgta 720
tgtgaaaatt ctgtgtttat aatgcaaaac cccatacacg gcttaggaat aagtttatgt 780
aggctaaaca cagacgaaat tagttatatt tatggaaact gagactacga cgtagttcga 840
cgaaatataa acagtctacg ggatgtccta tcgtgntata gccgaatcaa atttaatata 900
agggtagtta tgactaaaaa attgaaaacc gtacatgatc atatcacagt ttatggcata 960
cattatggtc aacacatg 978

<210> 684
<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 684
agcctcctca aacaaacaga cagagtg 27

<210> 685
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 685
gaccataatg tatgccataa actgtgatat gatc 34

<210> 686
<211> 857
<212> DNA
<213> Diabrotica virgifera

<400> 686
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gtcttttacg aaatttggaa aaggacgacc atacttataa tacagctgta aatgtgtaaa 120
aaatcgtatt cattttgcta tttgtgtcaa atgtgtcatt ttattggatc acaatatata 180
taaactgttg aactcaaccg taagctgctt taaaaacaat caaatgtttt gaaatgtagt 240
aaatatgtca tcgaataagt gacgtcatag ctaagcgtat acagtgttgc caaataattt 300
gtatacataa tggttcttct atttatacta aactttaatc tttttaattt cttctctttt 360
cgtatttgag tattaaccaa gtgaaacgaa ttttgcaatt attttagtgt attaacgtag 420
aaaaagacca ataattgact ctagagactt tcaattctta acaaaattag acaattatat 480
taaacaccaa aactaatctg atcaagtcat gatctcgctg catattattt ataccttaga 540
gctatactat ttagaacaaa atgttaatat aaacattttt aataggtatt ttgagataga 600
aagtgtatgt gaaattctgt gtttataatg caaaacccat tatacggctt aggaataagg 660
taaggtaggc taaacacaga cgaaattagt tatatttatg ggaactgaga ctacgacgta 720
gttcgacgaa atataaacag tctacgggat gtcatatcgt ggtatagccg aatcaaaatt 780
taatataagg gtagttatga ctaaaaaatt gaaaacgtta catgatcata tcacagttta 840
tggcatacat tatggtc 857

<210> 687
<211> 977
<212> DNA
<213> Diabrotica virgifera

<400> 687
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gcaacactta acaccttcag ctccaggcca atatctgata tttgccacat gtgtcacttt 120
tatacagtca ttggaaaatt gttgaattgt aaacacggta gccgtgtccg tgtcggtggc 180
acctgattga taagaggatg aacacgggag ccgtgtcggc agacttaaag tgttttgaga 240
aaaagtttgt tttaataatt aatatttcgt cctattagag gtaaaactca ctaactacac 300
ttttcagaaa gtggagaaaa atcgatttaa aggtacaaat tgtttttga attcacctga 360
cttgaatatt ggaatttttt aaatgcaact ttaaagaata aataaaaaca gatattttgt 420
gccatatttc gtcacaggaa ctatgataca atcaatatta gatcaatttt tgtacttaat 480
gagtttttcc atgaacaaaa ttattggata ttgatatcct atcagaggta aaactcacta 540
actacacttt gtacttgatg agtttttcct tgaacacaat tattggatat tgatatccta 600
tcagaggtaa aactctttaa ctacactttg tacttgatga gtttttcctt gaacaccatt 660
attggatatt gagaacttaa tgaatttgtc tccataaaat ttcgctgact tacaacaaac 720
gaactatcan aattaacagg caattatgtc acaggaacta tgatataatc atgatacaat 780
caatgttaga tcaatttttg tacttaatga gtttttccat gaacacaant attggatatt 840
gatatcctat cagaggtaaa actcgctaac tacactttgt attttgatga gtttttcctt 900
gaaacacatt attgaatatt gatatcccta tcagaggnta aaactcacta actacacttt 960
gtactttgat gagtttt 977

<210> 688
<211> 23
<212> DNA
<213> Diabrotica virgifera

<400> 688
ggagacgggt cacaggcttc atg 23

<210> 689
<211> 34
<212> DNA
<213> Diabrotica virgifera

<400> 689
caaagtgtag ttagcgagtt ttacctctga tagg 34

<210> 690
<211> 509
<212> DNA
<213> Diabrotica virgifera

<400> 690
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gatatttgcc acatgtgtca cttttataca gtcattggaa aattgttgaa ttgtaaacac 120
ggtagccgtg tcggtggcac ctgattgata agagaatgaa cacgggagcc gtgtcggcag 180
acttgaaagt gttttgagga aaagtttgtt ttaataatca atatttcgtc ctattagagg 240
taacactcac taactacact tttcagaaag gggagaaaaa tcgatttaaa ggtacaaatt 300
gttctttaaa ttcacctgac ttgaatattg gaatttttt aatgcaactt aaaagaataa 360
ataaaaacag atatttgagc catagttcgt cacaggaact atgatacaat caatattaga 420
taaatttttg tacttaatga gtttttccat gaacacagtt attggatatt gatatcctat 480
cagaggtaaa actcgctaac tacactttg 509

<210> 691
<211> 962
<212> DNA
<213> Diabrotica virgifera

<400> 691
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tttgaacaat taaaaaaaaa tgtacttggt cactttctgt tggcgaaaaa aattagaaat 180
ttgacttggt caatataagc gacaccgtat taggaaatta tatttattaa ctacggtctg 240
tacatagaaa aaaattaaaa tctaatcagt ttctgtgtcg tcgctttcag aagaagctgg 300
ttacggtatg aaaacttttt ttgactactg gaatcgattt ataccactca tggaactctt 360
gcggaataat tttatttcta cgcaaggagg ctgtttttat tttgctctgg tatagacaaa 420
agtttttttgt ataacattgg aatgttctta ggaataacag ctggtctgac cttgccacat 480
actcaagagt aacgcattta attttaacca cgatattttg tttccatttt aatcttagtc 540
tctgtttttt aagaacatct gtgcttaaga tcgaaaaagt ctgaccgtaa ttcttcaact 600
ctgtaggcac cgctcttttc gttgcgtctt gtagaacgga ctagcttgaa aatattaaca 660
gatcgttcat tgtaaaaaat ggcaacattt tcattaacag actatatggc actgtgcatt 720
gagtttaccg tttacctcca tgtacgaatg tcctttctcc ataaaattat gctgcaaaat 780
cttagtgtgt gcgttacaac aacatacaaa ttaatgcggc aatgaacgaa tataanaatc 840
tctgataagt cagaatataa actgatctct gtgatgcctt ttgatcatgt gattgcagan 900
gttttatccg ctttgatcat gctattccna ttncagagct tcccacgtga ccattaatct 960
ct 962

<210> 692

<211> 27
<212> DNA
<213> Diabrotica virgifera

<400> 692
tgacttggtc aatataagcg acaccgt 27

<210> 693
<211> 35
<212> DNA
<213> Diabrotica virgifera

<400> 693
gcatcacaga gatcagttta tattctgact tatca 35

<210> 694
<211> 697
<212> DNA
<213> Diabrotica virgifera

<400> 694
tgacttggtc aatataagcg acaccgtatt aggaaattat atttattaac tacggtctgt 60
acatagaaaa aaattaaaat ctaatcagtt tctgtgtcgt cgctttcaga agaagctggt 120
tacggtatga aaacttttt tgactactgg aatcgattta taccactcat ggaactcttg 180
cggaataatt ttatttctac gcaaggaggc tgtttttatt ttgctctggt atagacaaaa 240
gttttttgta taacattgga atgttcttag gaataacagc tggtctgacc ttgccacata 300
ctcaagagta acgcatttaa ttttaaccac gatattttgt ttccatttta atcttagtct 360
ctgtttttta agaacatctg tgcttaagat cgaaaaagtc tgaccgtaat tcttcaactc 420
tgtaggcacc gctcttttcg ttgcgtcttg tagaacggac tagcttgaaa atattcaaca 480
gatcgttcat tgtaaaaaat ggcaacattt tcattaacag actatatggc actgtgcatt 540
gagtttaccg tttacctcca tgtacgaatg tcctttctcc ataaaattat gctgcaaaat 600
cttaatgtgt gtgttacaac aacatacaaa ttaatgcggc aatgaacgaa tataaaaatc 660
tctgataagt cagaatataa actgatctct gtgatgc 697

<210> 695
<211> 765
<212> DNA
<213> Diabrotica virgifera

<400> 695
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taaaagggta aaagaaaaat ttaaaacaat ttacatgaag aaaaccaagt aatactgaaa 180
atataaacga tattaagcac ctgtatattt aaaaaagtat taaaacgaaa aaacttaata 240
gtaattggaa tggcgggaaa aatgtttaaa aagtatttaa taagcactgt accctcaccc 300
aaaaaaacta tacacatatt caacaattta cataatttat tttgtacagg ataatatcaa 360
aaaagagaaa acctatcttt agttactatc tttagtacgg ccatattaat attcacagaa 420
gtgagggata gaggccttat tattcttttt gataaatatc gctatatttt taaacttaca 480
ctgatgaaca aaataggaaa atttccttaa aaagatttaa tcttctaagt ttctgaaggc 540
ctgctgaata tcttcatata attgatcaaa atctgccttg attttagctt caccatcttt 600
tacgggatcc ttaaatttca tactgctaag ttgatataaa attccactca ttgaatctct 660
tattacgttc caagtgatct tattttctga ttgtgcggtt gattctacag cgtgtctcgc 720
catgtcgtac aaaccgatca tgtttctcaa cataccgaca gtttt 765

<210> 696
<211> 594
<212> DNA
<213> Diabrotica virgifera

<400> 696
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ccgagtcaag acctgtaggc atctataaag gcgactatat acaagaatta tatgcaagat 120
atgatgatgt cagtgatgct ccacctccac catctcttcc tgattggtgt acagaaagtg 180
acgatggaca agggaatggc cttgacgatt tcgatgattt tactgaagat gcaagaaaac 240
gagtagcttc aacttcttca aataatgatg atacttcacc aaaagctaaa aagggtcgct 300
tctaggaagt cgcatttatg gagggagtac ctaacgttac ccactttgta gaggaacaag 360
cgacccgaga ttgcaaacga atggtgccta ggatgtgtag gtgtacacca aaatggtgtt 420
ccaggaagtc atgtccgtgt ccaatggata tgacaaacat tactcttcta aaagaccacc 480
cctacagagt ttcctgcaaa gcagacggcc atgaggcatt atgaagctta tcaacggaga 540
acacaatgtt tatctttttg acagagatga tgaagcttat taaggcggaa ggca 594

<210> 697
<211> 884
<212> DNA
<213> Diabrotica virgifera

<400> 697
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ggatttggcc accgcaattc tccgtaagaa agatcgtcca aatagacttt tggtagaaga 180
agcagttaac gatgataact ccgtggttgc tttgtcacaa gcaaaaatgg atgaactaca 240
acttttcaga ggagacacag tcctactgaa gggcaagcga aggaaagaaa ctgtttgtat 300
agtattatct gatgatacat gtagcgatga aaaaattcgt atgaatagaa ataatttaag 360
agttaggctt tcagatgtag tttctatcca agcttgccct gatgtaaagt atggcaagag 420
aatacatgta cttcccatag atgatacagt ggaaggactc acaggaaatc tcttcgaagt 480
atacctgaaa ccctacttcc tggaggccta tcgaccaata cacaaagatg acgtattcgt 540
tgtacgtgga ggaatgagag ctgttgaatt caaagtcgtc gagaccgatc ccgctccgta 600
ctgtatcgtg gctccagaca ccgtcattca ttgtgatgga gatccaatca agcgcgaaga 660
ggaagaggaa gctcttaacg cagttggata cgacgaacat ccggaaggtt gtaaaaaaac 720
aggttgctca aatcaaagaa atgggtagag ttacccactg agacatccct agtctttttc 780
aggggtattg gaagtaaacc caccaaaagg tattttactt taccgggtcc accggggaac 840
tggtaaaacc cctccttgcc cccgcaagga acctaaacaa aact 884

<210> 698
<211> 642
<212> DNA
<213> Diabrotica virgifera

<400> 698
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aaccaaacgg taaaaattcc tgagggaatt acagtaacca ctaagtcaag ggtagtaact 120
gtaaaaggac cccgaggtaa tctgaagaga tccttcaaac atcttaccct ggacattcga 180
atgatcaacc ccaggttact gaaagtagag aaatggttcg gtaccaagaa ggaattagct 240
gctgtcagaa cagtatgctc tcatgttgaa aacatgttaa agggtgttac aaaaggatac 300
caatacaaga tgagagcagc atatgctcac tttcccatta actgtgtcac cactgaagga 360
aacacagtta tcgaaattag aaatttcttg ggagaaaaat acatcagaag agtaaagatg 420
gccccaggtg ttacagtagt aaactccacc aaacaaaagg atgaacttat cattgaagga 480
aactcattgg aggatgtttc aaagtcagct gcccttattc aacaatctac aacagttaaa 540

aataaggata tccgtaaatt cttagatggg ctttatgtat ctgaaaaaac aactgttgta 600
caagaagaat aacttgtatt tttgaaataa atttaagttt at 642

<210> 699
<211> 652
<212> DNA
<213> Diabrotica virgifera

<400> 699
cacgttgaga ggtgcatttg cacgatgagt tccttaaaac ttcagaagag gctagcagcc 60
tctgttatgc gatgtggtaa aaagaaagta tggttggacc ctaatgaaat caacgaaatt 120
gccaacacta actcaagaca gaacatccgt aagttgataa aggatggtct tattattaag 180
aagcccgtag ctgtacattc ccgtgcccgt gttcgcaaaa acactgaagc ccgcaggaaa 240
ggaaggcact gcggttttgg taaaaggaag ggtactgcta atgcccgtac cccgcaaaag 300
gaattatgga ttcaacgcat gagagttttg cgtcgtctcc ttaaaaaata cagggaagct 360
aaaaaaattg acagacatct ataccactca ctctacatga aggccaaggg taacgtattc 420
aagaacaagc gtgtccttat ggaatacatc cacaagaaga aggcagagaa agcccgtgcc 480
aagatgttgg cagaccaggc caatgccaga aggatgaagg taaaacaggc tagagaaaga 540
cgtgaggaac gtatcgccac aaagaaacaa gaagttttgc agaactacat gagggaggat 600
gaagctgcgg ccactaagaa ataagttaat tgttttataa gatgactata tt 652

<210> 700
<211> 890
<212> DNA
<213> Diabrotica virgifera

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ccatacagtt agtcgaccaa agaggttgtg tcacaagacc aaaattgatg tccagattta 180
ctaagattaa aaactttggc gcaagcgctt cagtgttatc atatgcccac ttccaggcat 240
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tgcatggtcc acctgatact ggttatggtg ctcctccacc gctacctatc gaagcatatt 420
tacatcctgg gcgaccaagg gatgaaagga gatcaaagag agctctcgct gtcgacccgg 480
aaaaggaagt gggggtgaat aggattatta gggttgtatc tacaggagat ttgacattta 540
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ttttattagc tatattaata gtatcttgtc ttatgtcagc tttcctttgt gtcaaactaa 720
gaccatttgc tgaaaacaac tcgcaggtgt cataggatat gccaattcac agaaaacaaa 780
gtcaaggagc tgcttttact cgtaatatta gagcagactg aaaggggtta gatcgaaaag 840
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<210> 701
<211> 888
<212> DNA
<213> Diabrotica virgifera

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aaagtattag gccaatataa aggagtatgc aaggatgaaa tggtaggagg acaggatagc 180
aaccaaatga atacggcagc gagggaaaat ggtattagca taataactta cagaagatcc 240
ttaatttcac ctgatcctgg agataaagag tttccagcag agggttccat atacgccgta 300

tgggggtag gaaaactaga cgaaatgaaa gaacctgctt ttcatgatct ctactcaaag 360
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agatcgaaac ctgaacccaa agaaccttgg aagaaaggtc aaatattcga taaaactata 480
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ggccactcat ccacagcttt agcatggtac ataaacggtt tcctcagccc tgagatatgg 600
ctacgacgag gtctttcata tgcatttaaa gtatatggag gaaacaatcc acacagtgct 660
gaatattatc atccattgat aataacagat gaaccccacg gaggttttga tagacttact 720
gacgatgctc agtctaaaat aagagtcttg gctggtgttg aatattctag aaggngaaga 780
cctagaccaa ctacatctgg tgtcctttgt ctatcagaac acaaagaagg aaaagacaga 840
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<210> 702
<211> 953
<212> DNA
<213> Diabrotica virgifera

<400> 702
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gagaagctag atgtgaagct gaatgtgtag ttacttcacc atctgctgcc cagaaacccg 180
ccaaacccac aactcccggt gcggaaaagg ctccagccct tctagaacct ctcaaagatc 240
agactattaa agaaggacaa gctgtcgtgt tcagatgtaa gatttcagct aaaccaactc 300
cagttattaa gtggcaaaag gctgataagg tcatcaagcc atctaaatac ttccaaatga 360
ccaaagaagg ggacttctgc acgttaaaga tctcagaagc tttccctgaa gatgaaggag 420
tctacaaatg cgtcgctgaa aatcctgcag gcgctgttag tactcaagct aagttgaagg 480
ttattgcacc agaaacgcaa gaagttgcac catcactaac cccaatgaaa gacgttactg 540
tacctgaagg tagccctgct caattcaaga ctactatttc tggaaaacct aagcccacca 600
tccaatggtt gagggaggga ttccttattc cagaatcgcc agatttccag atgatccaag 660
aagggaacaa cgttattcta ttgatttcct caacctacga agaagacact ggcttattca 720
cctgcagagc aacttcatca gccggtcaag ttgaacaatc tgcgaaacta accgtaaaaa 780
gtaagaaatg attgctataa aaatattctt ttctaattct caaattgtta atgtccatcn 840
catgtagtta ttgttangta tgacagcttn cagctggnta tttaacacag tataaataag 900
tgatcagtta gcagaactct tttgagatag tcatgatatt ggactaatgg gtt 953

<210> 703
<211> 905
<212> DNA
<213> Diabrotica virgifera

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aagaaaatca agaagactca ggaaggcaag tttaagatag tcgccaggaa cagggaagga 120
gaagcctcag taacatttac tctgaaagta attacttcag agaaagaagc acctgaggtc 180
ttatcacctc tagaatctat taccgtaagg aaaggagaac cagttacact ttccactact 240
atatttggaa acccggaacc tactatcgaa tggttgaagg atggtaaacc tttaaccaga 300
ccaaaattca aaaaagacgg aaacacatac actttaacta ttcccaagac atctacagat 360
gacactgcta catatacagt tcgagctacc aattctatgg gtacaataga aacaagtgca 420
aacctaactg ttgaagaatt cccagaaaac caggaaccac cattgttcgt caaacgattt 480
gaagagcaaa ctgtaccaca aaagtctcct ctcaccctca aagccaaagt ggttggcaat 540
cctactcctg aagtatactg gcttagaaat aatgagcctt tggaaccatc cgatagggta 600
aagatcacct tcgatggaga aaacattgaa ctaactatta aagaaaccaa ttctgaactt 660
gactctggag actacaaatg tattgctgtg aatccagcag gcaaagcctc gcatggtgcc 720
aaggtatcta ttgaggtaga tactgtcaaa tttactaaag aactgaaaga agtttacgaa 780
acaatagaaa gaaagaccat cgaattagaa tgtgaaacat cccactcagt tagaacaaaa 840
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gtacc 905

<210> 704
<211> 426
<212> DNA
<213> Diabrotica virgifera

<400> 704
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atttttaga aaagaagata gaagaattta ccatggtagc aaagaaaaat gcgtcgaaaa 120
ataaaagagt tgcactccaa gccctcaaaa agaagaaacg attggaaaag acccaactac 180
aaatagatgg aacccttaca actattgaaa tgcagaggga agccctcgaa ggagctagca 240
caaatactgc tgtattagat tctatgaaaa atgctgcaga tgcccttaag aaagctcata 300
agaatttgaa tgtagatgat gttcacgata tcatggatga catagccgaa caacacgaca 360
tagccaacga aatcacaaac gctattagca atcctgtcgg attcaccgac gatctggatg 420
acgatg 426

<210> 705
<211> 473
<212> DNA
<213> Diabrotica virgifera

<400> 705
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tagtgctgaa ggtattacgc cagacattat cattaatcct cacgctatcc cctcccgtat 120
gacgattggt cacttgatcg agtgcatcca aggtaaggta tcatccaata aaggagaaat 180
cggtgatgct acacctttca acgatgccgt caacgtacag aaaatctcca ctttgttaca 240
agaatatggt tatcaactca gaggcaacga agtaatgtac aacggccata ctggacgtaa 300
gataaatgct cagattttct taggacctac ctattatcaa agattgaagc acacggtgga 360
cgataagatt cattcaagag ctagaggacc gttgcagatt ctcgtcagac agcctatgga 420
gggtcgtgca agagacggcg gtctacgttt cggtgagatg gaacgagatt gtc 473

<210> 706
<211> 677
<212> DNA
<213> Diabrotica virgifera

<400> 706
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gacgattggt cacttgatcg agtgcatcca aggtaaggta tcatccaata aaggagaaat 180
cggtgatgct acacctttca acgatgccgt caacgtacag aaaatctcca ctttgttaca 240
agaatatggt tatcaactca gaggcaacga agtaatgtac aacggccaca ctggacgtaa 300
gataaatgct cagattttct taggacctac ttactatcaa agattgaagc acatggtgga 360
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gggccgtgca agagacggtg gtctacgttt cggtgagatg gaacgagatt gtcaaatttc 480
acacggtgct gcacaattct taagagagag gctgtttgaa gtttccgatc cttatagaat 540
ccatatttgc aacttctgtg gtttgatagc tatcgccaat ttgcgtaaca acacctttga 600
atgtaagggt tgcaaaaata agacacagat atcgcaagtt agactgcctt atgctgcgaa 660
attactgttt caagagc 677

<210> 707
<211> 250

<212> DNA
<213> Diabrotica virgifera

<400> 707
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ggcacactga atctattatg aaacgtaccg cattggtcgc gtttggcttc cttctacgaa 120
cgtgctggtc gcgttaaatg tttaggtaat attgtgcagc tggtaggtaa agcatctctg 180
gcagaaacgg acaaaatcac gatggtgaag ctaaaatcaa ggcagatttt gatcaattat 240
atgaagatat 250

<210> 708
<211> 250
<212> DNA
<213> Diabrotica virgifera

<400> 708
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ggcacactga atctattatg aaacgtaccg cattggtcgc atggcctgta cgtcaagcaa 120
ggccagtcag tgaaaaatta cctgccaacc gatggtgaag ctaaaatcaa ggcagatttt 180
gatcaattat atgaagatat gtttggcttc cttctacgaa cgtgctggtc gcgttaaatg 240
tttaggtaat 250

<210> 709
<211> 250
<212> DNA
<213> Diabrotica virgifera

<400> 709
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gtgatatggg ttacaacgta tctatgatgg ctgactcgac gaatacttcc gtgatatggg 120
ttacaacgta tctatgatgg ctgactcgac gaatacttcc gtgatatggg ttacaacgta 180
tctatgatgg ctgactcgac gaatacttcc gtgatatggg ttacaacgta tctatgatgg 240
ctgactcgac 250

<210> 710
<211> 273
<212> DNA
<213> Diabrotica virgifera

<400> 710
gaagaaagta cgttaatatg gttccagggc tccaacaaga cgagctattc ttactgggtc 60
gagaacattt taaaattttt ggataagtac tacgttccca gcaaaatagc taaaggaaat 120
ggccaaatta aaacatgctc tcatcacgac tatcctacta gtggagaagt atgcgaagtc 180
gatgtcagag attgggaaga atgcaacagg gatcaattct ttaattatca caagaattct 240
ccatgtattt ttattaaatt gaacaaaata tat 273

<210> 711
<211> 278
<212> DNA
<213> Diabrotica virgifera

<400> 711
acatttttcc cgccattcca attactatta agtttttttcg ttttaatact ttttttaaata 60

tacaggtgct taatatcgtt tatattttca gtattacttg gttttcttca tgtaaattgt 120
tttaaatttt tcttttaccc ttttaatctt gtatattaca ttacccaatt aaagttaatt 180
gtacagatta agataaacga gtatcttata acatctatta gattgttaga atcaataaat 240
gtagtgtaat tgttctgttt tgaacaaata aatgcatc 278

<210> 712
<211> 287
<212> DNA
<213> Diabrotica virgifera

<400> 712
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tatttgaatt tggtccagtg tgaaactctt gaagatttaa aactgcactt gcaaggcact 120
gactatggaa ctttttttggc caatgaacct tcacctttgt cagtatccgt catcgattca 180
agacttcgag aaaaactcgt gattgagttc cagcacatgc gtaaccaagc agtagagcct 240
ctctcgacat ttatggactt cattacctac agttacatga tcgacaa 287

<210> 713
<211> 250
<212> DNA
<213> Diabrotica virgifera

<400> 713
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cgtgctggtc gcgttaaatg tttaggtaat attgtgcagc tggtaggtaa agcatctctg 180
gcagaaacgg acaaaatcac gatggtgaag ctaaaatcaa ggcagatttt gatcaattat 240
atgaagatat 250

<210> 714
<211> 250
<212> DNA
<213> Diabrotica virgifera

<400> 714
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ggcacactga atctattatg aaacgtaccg cattggtcgc atggcctgta cgtcaagcaa 120
ggccagtcag tgaaaaatta cctgccaacc gatggtgaag ctaaaatcaa ggcagatttt 180
gatcaattat atgaagatat gtttggcttc cttctacgaa cgtgctggtc gcgttaaatg 240
tttaggtaat 250

<210> 715
<211> 250
<212> DNA
<213> Diabrotica virgifera

<400> 715
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gtgatatggg ttacaacgta tctatgatgg ctgactcgac gaatacttcc gtgatatggg 120
ttacaacgta tctatgatgg ctgactcgac gaatacttcc gtgatatggg ttacaacgta 180
tctatgatgg ctgactcgac gaatacttcc gtgatatggg ttacaacgta tctatgatgg 240
ctgactcgac 250

<210> 716
<211> 372
<212> DNA
<213> Diabrotica virgifera

<400> 716
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gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 240
gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 300
gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 360
gccctctcta ga 372

<210> 717
<211> 372
<212> DNA
<213> Diabrotica virgifera

<400> 717
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gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 120
gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 180
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gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 300
gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 360
gctagctcta ga 372

<210> 718
<211> 490
<212> DNA
<213> Diabrotica virgifera

<400> 718
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tgcaacaggg ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt 120
tgctactaaa ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa 180
ctacagaggt acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca 240
cacggtgctg cacaattctt aagagagagg ctgtttgaag tctcttcagc aatagacaat 300
ttgactccct ttcctcttgg gagggaaacg aaggccttag ctcccttacc tcatcgtccg 360
tttggattca caaaaacaca tcgacttctc tctgaaatca cctttgggag gcggtcgtcc 420
gatccttttc gatttgttgc tgccattggg gatccatctg gacttctgga ggaagcaagg 480
caggtgcagc 490

<210> 719
<211> 560
<212> DNA
<213> Diabrotica virgifera

<400> 719
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atggaagttc tccatcaggg gccaaaaggg gataccaagc cattaccggc cactcatcca 120
cagctttagc atggtacata tagtgatccc aaccgtgcac ctgactgtga cccaactcaa 180

tgtgtaattc cggactgttt ctgctcagcg cccgccacca gttagcgccg aagtacaaaa 240
gggattggac cttatttttg ctggtatcag agctcaacag gcaccacgtg ctcaacgata 300
aaagactggt caggaaggca cattcctttt tgccttactt attcaaggca gggtgcatac 360
agagtagcca cgtaacaaat agcacatagc gaagtgttgt accagcataa tgtataagct 420
cctgtactta ccaaaggctc gttggcagat ctagaccagt tggacgaatt ggttattgag 480
tactgtggtg cagcgccccc tttatggcag atgaatgtct gatggccata ccagacatcg 540
aaggtattga ttacaccacc 560

<210> 720
<211> 372
<212> DNA
<213> Diabrotica virgifera

<400> 720
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ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 120
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 180
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 240
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 300
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 360
ggagaatcta ga 372

<210> 721
<211> 372
<212> DNA
<213> Diabrotica virgifera

<400> 721
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acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 120
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 180
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 240
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 300
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 360
acgatgtcta ga 372

<210> 722
<211> 1000
<212> DNA
<213> Diabrotica virgifera

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agttatagta ggtaacgata attattggac gtggcattag gttatаggga aagtgtcaat 180
ctgtctcaaa ttcgcacatt tgtggaaatg gactcgcacg cgcggcccaa cgacggcttc 240
aacaaacaca ggcgcaagtc gacgaagtcg tggatatcat gaaaacgaat gtagaaaaag 300
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aacgttgtgt gcgcacttgg aaccgaaaca agcagaccat catccgcagc tcagtgcgta 600
gccgaatgtg gccgtgcaca ctgtgcattt gtaggacagg tgtgcgggtt tcaacgtcat 660
gttatgatcc cttgcatata ttgatggaaa aacacgccaa agaagagagc agagtattaa 720

aaggagtatt gccaggtaca tagaccagca aggaactgta atcaaaatgg gcgatgaaaa 780
gaaggccagc gatagcgaac acattaatct caaagtactt ggtcaggata atgcagtggt 840
gcagaaggtc agacctctcc tcaacgtcac ccgtatcgag gatgagattg ccaaacttga 900
agagaaagcc caaaaagccc aacgaacacg gcgtagacga aacatcttgt gtagttattg 960
tagaaggaca aaccagcaca ccagaacaac aagaactagc 1000

<210> 723
<211> 478
<212> DNA
<213> Diabrotica virgifera

<400> 723
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gctgtttttg caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc 120
aaatttcttc ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct 180
gaagcaacat ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca 240
cattgtcctt ggatgtagta tccatcacgc agaccgccga acaacacgac atagccaacg 300
aaatcacaaa cgctattagc aatcctgtcg gattcaccgt aatgcactcc tacgtcgttt 360
ggttcgtatt ggagtactag acgagaacag aatgaagctc gattacgtat tgggtctccg 420
aagtaatgta caacggccac actggacgta agataaatgc tcagattttc ttaggacc 478

<210> 724
<211> 584
<212> DNA
<213> Diabrotica virgifera

<400> 724
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caacattatc gctgaagaag gaggttactt gaaggcaagg atgaaatggt aggaggacag 180
gatagcaacc aaatgaatac ggcagcgagg gaaaatggta ttgttgccac atggtagact 240
cctgttctaa tgttcaaact ggagatcaat ttgcaagact actcagacac aatttcaaca 300
gacatttgaa ttcaaaccga gctccgttgg gtccagccac ataggactaa gtgtggaggg 360
ttcattcatc aaaattcgct ttatgtgcac acatagcaca taagcataca tggcaaatat 420
gcctatccat ccagttgtca gctaacagaa gtgcccttat ggagggtgtt ttgaagaaca 480
cgctggcgaa tgtgagttgc agatgggctc aagaatacac cgctattgac caggatctcg 540
cttcagaata attccataga aaagctacca gcccatgcat ttaa 584

<210> 725
<211> 869
<212> DNA
<213> Diabrotica virgifera

<400> 725
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agaagtggat ggcttcagca atgctcggcc aggctgattg ctctttattt tgacactgga 120
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caaacatctg acatacgaaa acgttgaacg ttggttgcgc gaattgcgcc attcttttct 240
caggtaccaa tgttgctgct ggtaaagcac gtggtattgt tattggaact ggtcttaaca 300
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cccgtgccga tacctacaca gaaagctata ttagtaccat tggcgtagat tttaaaatca 480
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tcactttccc attaactgtg tcaccactga aggaaacaca gttatccagt ttgcaagctc 600

tctggcagat ttcagtcaaa tcggcaccag aaaatccatg agttacttta gcaatgtata 660
caagatctac gtctttagct acaggcgatt tccgatgaaa tagtggcatt aggttatagg 720
gaaagtgtca atctgtctca aattcgcaca tttgtggaaa tggactcgca cgaagaaaaa 780
gtttatcagg ccgtgagaga attaaaagtt caaggaggta tcggttcgtg tgtatcactt 840
aacgtgaaga gccccttggt ttccgacac 869

<210> 726
<211> 737
<212> DNA
<213> Diabrotica virgifera

<400> 726
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aacaaaagaa attcaaaatg tacaagtgga caaaaaatat taaacaaatg tatatagtgt 120
atctatttct aatcgaatca acaaaatatg atcttactga acagaatatg atgcaagcta 180
atattaaatg caactcgtat gttttattat atcctaaacc aaagacttat tcatcttgaa 240
ggtgactgtg tgccgtcatc tcttttattg agacaattag gacgtttttc gttctcagcg 300
gcttctcgga aatccctggc ttacagaaac ggatggtgac tatagtcacg gaactgtcaa 360
aattaatttt gtatcttata tgaagcctca aacgttttgg aaatatttct tctctttatc 420
aggaactgga aagaagtata tgccctcagt ttgttatctt tctctagatg atgggaggaa 480
aaatttttaa aatacctgtt tgtcagagtt ttattactat taagaagaat tcttcatctt 540
aaaggtaacc gggtgtcgtc atcactttta ttgacacaat taggacgttt tttgatctca 600
atggcttttg gtgtggacaa tagttataga actttcaaaa ccaattttgt gtcctgtcta 660
gatcatcaaa cggttttgag aagatttctt cccttcatat ggagctggaa agaagtattt 720
gacacctgtt agttatc 737

<210> 727
<211> 867
<212> DNA
<213> Diabrotica virgifera

<400> 727
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acctccttca tgagactttt ttttttattg agttattcat gtcgagttgg acgtttctga 180
tatgaaaaat tttcaggagg gagacggttc gtaaatatgg gggtttataa actttggtgc 240
atctatggtg gttcctgttt atctgaacca tctcagatag ttaaggggtg gttacccact 300
actatagggg ttgatgaagt aacactactc acagtatatt catttattta taagttgaag 360
taactacggt aaagagttgg tggctaaata tttatccgct gtgatgttta cccgctggga 420
tctcaaatac ccatgattaa tctttacgca atgaatttag aacgtcgaat gtggaatccc 480
ctgtttatgt tttggtatat ataaaaagtg aaagtgtttg tattataaat gctgaatcaa 540
cttgattata aataaagaat aatatttgct actacagctg accttgcatt atcgataact 600
gatacacttg tatagtaata taggtcaatc atgtttatga taaacaacgc gtattcgttt 660
accaaggaca tttaaatatt aaaagaatta gtcttgccct taataagatg gttactaaga 720
gatgctgtga atcccaatac acatccgaca actggagtaa gtatccttga naatttgtcg 780
gaaaatatta ccagtgaatt gtatttttat caaaatatac tgcaaaaaaa cccatcattt 840
atgactctat agtggacgca catatcc 867

<210> 728
<211> 802
<212> DNA
<213> Diabrotica virgifera

<400> 728

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tatttatgga aaatccaagt atttcaagtc attaaaattc aaataaaagt attattttat 180
aagagtttgt tccgataacc gtaaataggt atgagtttag ttataaagta aagtgcccat 240
ggtgtcataa aatgtagtaa atgctaatgc ttcaagtacg tactacattt ttgaagattt 300
cactgcactt aaaaagcatt tgcctttctc cgcagtattt gctactattt accagcctac 360
atagaagaat gtactacgct tttgaagtat atgcttgttt agtagtattt tgcttcagtt 420
taagtgaagt tggtgggtgg tcgtcttcgg cgtaggtatt tttttgttac aatatggcag 480
catttatgaa tgtgtgtcat agaaaaattt acaaactaag aagaagattc ttaatttttg 540
gggtcattct tttatcaaat aaaatttaat aattgttaag aagattaaca aataacaata 600
attgttcatt tttatcctcg cgtaactctt tgtcgcttcg gatctgagtc actcattttt 660
actcatgtac aattctaata atttggtacg taaaaatgtg aatttacaaa tcacaagcac 720
atggaaaact aattccatca cgattggtgt aatgcagaca cggctggcac tacgctttgt 780
agtagatact tctggtcagt ag 802

<210> 729
<211> 862
<212> DNA
<213> Diabrotica virgifera

<400> 729
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aaaacaattt taagtactct cattgttaaa aagttgattc accacatttt cataacgatt 180
tttagggcgg ctgtacacgg actgctgagg tcgtttatca ctgagcgaca tacacggact 240
gctcgagcga tcgttgtaga cttctggagc ggtccattgt tgactacctg agttgtccct 300
tgtcgcattg caaccgctct cgatctgtcg atagcacgat ggaatttcat tatgctattg 360
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ataattcacc gcgcaaacgc tgcttcaaaa agtcgacctc aactgcttga agatgtccgt 480
gtacggccga tcttggggta tctttttttac tcttatcggg aatatttaag aaccgaaatc 540
cctaatgttt tccctatttg ttccagaatg atatacgtgt taatttccaa ctgagacttg 600
acggccagca cgaccgtacg acaagacatt ttcgaacagt aaaatcatta gttttagtaa 660
caaatacaaa gacagatggg aattcggttc tcgatattat gcagagtatt tacctgatga 720
tgaacactta ttggaggata gaaacgcata atttgcagaa ctgacttacc catgtaatgg 780
acaggtatga tggaaacgta tgtactttaa tgttttgtta gtatttttac gagagaagct 840
aagtaagttt gtgaagaatt ag 862

<210> 730
<211> 603
<212> DNA
<213> Diabrotica virgifera

<400> 730
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gaccagctat tccaacccta taacacatac acagtctccc gttacaacat caacttctgt 120
attagctatt acttacgata aaggagtatt gataaccgga gatctggttg cttcatacgg 180
atctttagct aggtacagaa attgcccgag ggttattaaa gtcaatcaga atatcatctt 240
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aattgatgaa gaatgcattg atgatggact aaaaatgaaa ccaaaatcat tgtactgctg 360
gcttactaga gtaatgtacc aacgcaggag taaattagac ccttttgga ataatctggt 420
tataggagga atccaggatg gagtcccctt tcttggaacc gtagataaat tgggaactgc 480
atatacagac aaagttatat gtacaggtta tggagcccac atagccttgc ctcttctgag 540
agactcttta gataaaaatg gagctcttaa cttggccgat gccaagactc tgattcacaa 600
atg 603

<210> 731
<211> 545
<212> DNA
<213> Diabrotica virgifera

<400> 731
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taaattaaaa aagaaatggc tgccatcaga tctatgtctc gccttcttat taatagatca 120
cttcaaacca ctgcaaagag gacctatgcc gaccaaatga acttcacatt tgcagctgga 180
aatcaggttt actatactgc aacttcagtt aaacaagtag atgtgccatc tttctctggt 240
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atcaatgatg attcatcagt tcagattctt gctgaagaag cccacccagt agaaaacatt 420
gatgtcaatg cagcaagaga catccttacc aaagcccaga gccagttatc atctgcaagt 480
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ggctg 545

<210> 732
<211> 496
<212> DNA
<213> Diabrotica virgifera

<400> 732
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cagggccaag caaggttttg ttatttaccg tattagagta cgacgtggag gacgcaagcg 120
tccagtacca aaaggtgcca cctacggtaa acccaaaagc catggagtta atgaattgaa 180
acctgtccgt aacttacaag ctattgctga ggaacgtgta ggaagaaggt gtggtggatt 240
aagagttcta aactcctact gggtagccca agattcaaca tacaaatatt ttgaaatcat 300
tttggtcgac ccctcacata acgctattcg caaggacccc aaaattaact ggattgtcaa 360
ctcagtacac aaacacagag aactccgtgg caaaacttcc tctggcaaat catctcgtgg 420
tttgggcaag ggtcacagat actctcaaac caagggagga tccaggcgtg ccgcttggct 480
cagaaggaat cactgc 496

<210> 733
<211> 512
<212> DNA
<213> Diabrotica virgifera

<400> 733
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agtgttcaac accaacttct tcagcttcct cagctccgat ttcactagga acatgctcaa 120
atgttttaga tgtaggtgaa ccgtcatcgt gtacttcttc tacagcttga taagcttcag 180
ttggtaaacc taaatctttt ggtttagcgt ctatgataac tagaacggaa tttggacaat 240
accttctgat taactcatta atggcaatat cattttgatg aagtttgggg ccggtgtggt 300
accaacctac tactcgttcc ctggcattaa ctttttttgaa cattccatac atgttttcta 360
agtaatcatg gtccaagaac cacacagact tatccttgtc atcttcgtca aaaggaactg 420
caaaactgtt agaaacatct aagactcctt tagcacgcca acagccaaga agaacaccaa 480
caacacgctt ttgattgccg attttgccca tg 512

<210> 734
<211> 669
<212> DNA
<213> Diabrotica virgifera

<400> 734
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ctcaagacgg gcttccagag tattgttgat tttgatcttg tttctcaagg ccaacagttc 120
gattcctccg gtggtttctt gagaaaggtg gctctcgtcg tcgattttta gatttacgtc 180
tttaccggtt atgtccttgt acttttggga gacgttaggc atgatagatt ttaccaattc 240
tctgtcctga gggcgtactc taatggtgat gtccttttcg aagagctgat agagcccttg 300
gaggatgaga ctttccagga tttgtgtata tttgcctgaa tctctggtta cctcaccaag 360
acgtttgcga gcatcttcca aaacggcacg tacatggtct tcccttactt tcaatacctt 420
caatcttgcc tggttcaaca tgtttgatga ttggattttt ttctggagtt ctacttgctt 480
ctctttttc tcgtagtact ccataatctt gagcctctgt tgttggacca gacggccctt 540
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ttgctcaatg aaagccatca tgtgcttgat ctgcttttgt acatctgcgt cgctgagagc 660
attttgaga 669

<210> 735
<211> 802
<212> DNA
<213> Diabrotica virgifera

<400> 735
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gcagccttga aaaaggaagc aaaaaaggca gagaaggcag caaagaaagc agaacacaaa 120
caagctgctg gtgaaactca acagaacgtt gtagaagaag ttgacatatc agttggaaaa 180
tatggaaatc ttccccttat aaaatcagaa actaagcaca acgagaggac tttcacctca 240
gtaagtgacc taaataaatc cgtgtctgga aaaactgtat ggataagagc aaggttacat 300
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caagccattt taaatgtctc agacgtcgtt tcaaaatcta tggttaaatt ttcaagtggg 420
gtacctaaag aaagtatcct cgatgtcgaa gccaaagtat cagtagtgcc caataacata 480
gcaagttgta gtcaacagga cgtggaacta gttgtttcac agttatgggt agtgtccttg 540
tctgctccac agcttccttt gcaaatagag gatgcatcca gacctgaaaa accagaggaa 600
gaagaaggtt taaatatccg ggtaaatcaa gacacaaggc tggacaatag aattttagac 660
ttgagaacac caactaacca agcaatttac cgattggaag gaggcgtctg tcggctgttt 720
agggaagcgc ttactaagaa agggttcgta gaaatacata cgccaaagat catatctgct 780
gcttcggaag gaggtgctaa cg 802

<210> 736
<211> 579
<212> DNA
<213> Diabrotica virgifera

<400> 736
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agagctgaac agtatgttaa ggaataccgt ttaaaagaaa gagacgaagt taggctagtt 180
agacaagcca aaaccagagg aaatttctat gttcctgctg aggctaaatt ggcttttgtt 240
gttcgtatta agggtatcaa taaagtagca cctaaagtac gcaaagtact ccaactattc 300
cggttacttc aaatcaacaa tggagttttc gttaagttga acaaggctac tattaacatg 360
cttaggatat gcgaacctta cattacatgg ggatatccta acttaaagtc agtaagagaa 420
ttaatctaca aaagaggatt tgccaaagtt aatggacagc gtgtagcaat taccagcaat 480
caaatcgttg aagacaggtt gggaaaatct ggaatcattt gtgttgaaga tttaatccac 540
gaaattttca ctgttggacc taagttcaaa tatgcctcc 579

<210> 737

<211> 640
<212> DNA
<213> Diabrotica virgifera

<400> 737
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caagttttac aaatttttca ggatggagta aaggtgtttc aacaacttct ctcaactttt 180
caatttgttc cttgcagcca ccaacatcac tgtatgtaac atcaggcttc tcctcaactt 240
gcatcatagt cacagtggga tcaatttttg gaggtagagg aatatgaatt tgatacttat 300
ttcggtcgac tccaactctc atgccttctt ctatgtctgt aggggccaca gagtctgcca 360
aatctactac gaatttggca aactgtttaa cgtttataat gtatttggga tcatctgtat 420
cagcgttgat aattttcgta caacgggcca cttgtaaggg ttgctcattt tgtaaggttt 480
gtttgtcagc tgccaaatcc cataaagctg gtggagctaa accagtatca gattctttta 540
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ttgtctttgt gtattgccct tgtccatagg ttttaagaag 640

<210> 738
<211> 669
<212> DNA
<213> Diabrotica virgifera

<400> 738
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ctttagtttt ccacacaaat agaggacaaa ttcgttttaa cgtatgggac acagcaggcc 180
aagaaaagtt tggtggtctg cgtgatggat actacatcca aggacaatgt gccataatta 240
tgttcgacgt tacatctaga gtcacttaca aaaatgttcc aaactggcac agagatcttg 300
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ggaaagttaa ggcaaagagc attgtcttcc ataggaagaa gaatttacaa tactatgaca 420
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tggatcccca atggcagcaa caaatcgaaa aggatcttaa agaagcctca gaaactgcac 600
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tccaaagcg 669

<210> 739
<211> 302
<212> DNA
<213> Diabrotica virgifera

<400> 739
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tatcaagtag agtatgcttt taaagccatt aaccaagccg gccccacttt ggtagcagtc 180
cgaggagtag atgctgcggc gtgtgtgacc cagagaaaga tcccggataa gctgattgat 240
cccaacacaa ttacacatct gttccagtta acagaacaca ctggatgtgt gatgactggc 300
at 302

<210> 740
<211> 838
<212> DNA
<213> Diabrotica virgifera

<400> 740
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caggttggtg aggagatggt attcccattt gaggatttgg caaacctgta ctcattgaat 120
tagcaggact aacagcacct ggtactactg attgcacacc agcaccaccc atagtgacat 180
tagcaccacc tggtatagga ttcgctgctg gtgctgttct agtcataaca gccattcttc 240
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ttatgtttga acagaatggt acaggacact tgttttctgg gcagtgtttg gcatgatagc 360
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atttggtgtg atttgtgact cgtttcatct tctgacagct tggtaaccga caattggcat 480
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cttctcctgg attggctttg ctatcactag gtgaacttcc atcatcaata tccaatccaa 600
gtttctccat tttgtgagga tgaccttctt tctcataaca ttggatgcac aagtcaaagt 660
cttcacacac agtacaatga taccttgttt ccacatgggc tttacaacta ttacaagtat 720
atacaaattt atcttgacct tgattatgca attcatataa catagacaaa gcactatatt 780
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<210> 741
<211> 1301
<212> DNA
<213> Diabrotica virgifera

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ccattctcca atgattttgt cgaaggcctt ttgtttcttc tcagcagcat tggcaatggc 180
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acgagcttgg agtttcctct tagcttcttc gagttcttca gagcgagcaa ctccttcaga 360
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<210> 742
<211> 824
<212> DNA
<213> Diabrotica virgifera

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ctgttttgtc catgccataa gctaaagctg cagctgtggg ttcatttatg actctcaaaa 180
cattaagccc agaaatttgt ccagcatctt tggtagcctg acgttgtgag tcattgaaat 240

aggcaggtac tgtgattaca gcattcttta ctttggtgtt taagtaggct tctgcagttt 300
ccttcatctt aaccaaaaca aatgctccta tctgactagg ggaatacatt tttccatcgc 360
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tatcttttt aacttcctca tcttcaaatc ttctaccaat caaacgttta gtggcataaa 480
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tatctttact aaaggcagct actgaaggtg ttgttctgga accttctgca ttttcgataa 600
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caataacagc ccccttgatt ccttctgatt tgtgtcgtaa ttgaatgtca tattttgggt 720
ttagagcgta cagggaagat ctattatttg acaaatggtt aaaatttctg tttccagctt 780
tttcgaaagt gattttcgag caatcgaggg ctttcctgct aagg 824

<210> 743
<211> 704
<212> DNA
<213> Diabrotica virgifera

<400> 743
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atggttctac tatgatgcca tagaatgcct accacaagat aaatcagaaa tcactgaaga 180
actagctgca cccactggta gcagatatga tggccaagtt gctgtttttg gaaaagaatt 240
ccaaaagaag ttagcatcac tgaaatattt tattgttggt gctggagcta ttggttgtga 300
attgttgaag aactttgcta tgatgggtgt aggaacacaa ggagaagtta cagtaactga 360
tatggattta attgaaaaat ctaatttgaa caggcagttc cttttcagac cacataacgt 420
ccaacaacca aaatctgcca cagctgcaaa ggtcattaaa aagatgaatc ctgatatcaa 480
tgttgttgca catgaaaatc gtgttggacc tgaaactgaa agtgtctaca atgacgattt 540
ctttgaaaag cttgatggag ttgctaatgc actggataac gtagatgcta gaatttatat 600
ggatagaaga tgtgtctact accgcaagcc tcttctagag tctggaaccc taggaactaa 660
gggaaatact caagtggtgg caccttactg atacaacagg gggg 704

<210> 744
<211> 971
<212> DNA
<213> Diabrotica virgifera

<400> 744
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catcaatgcc ggaaagcaaa tcgcggatgt gataaggaca tgccttggtc ctcaagctat 120
gttaaaaatg cttatggatc caatgggagg tattgtgatg actaatgatg gcaatgctat 180
tttacgtgaa attacagtac agcatccagc tgcaaaaagt atgattgaaa ttgcaagaac 240
acaagacgaa gaagttggag atggtaccac ctcagtaatt gtcttagcag gagaaatgtt 300
agtggcagct gaacagtttt tggaacaaca tattcatccg acaatcataa ttcgccagta 360
cagacaagca ctcgaagata tgattcagtt attggaaggt ccattaagta taccagtcga 420
tagaaacgat aaaaatgctc ttgcccaagt cgtgaaaggc tgcattggca caaaattcat 480
aagtaaatgg tcagatttgg cagtaaatat tgctttagat gcagtaaata cagtattatt 540
agaagaaaat ggcagaactg aagttgatat caagaggtat gccaaagtcg agaagattcc 600
tggaggatcc attgaagaat ctaaaatttt aagaggtgtt atgcttaata aagatgtaac 660
ccatcccaaa atgaaaagat atatacagaa tccgagaata atacttttgg attgtgcatt 720
agaatataaa aaaggggaat ctcaaacaaa cgtagaaatt tcagcagaaa cagacttcac 780
caaactatta gaactggaag aggagcatgt caagcgtcaa tgtgatgaga ttattgcact 840
caaacctgac gtcgtcttca cagaaaaagg agtatcagat ttggcccaac actttttact 900
gaaagctggt attaccgcta tcaggcgtgt tcgaaaatct gataataaca gaattgccag 960
agcctgtgga g 971

<210> 745
<211> 1049
<212> DNA
<213> Diabrotica virgifera

<400> 745
ggaagaggct agaagattgg ctgctcttca gaaacgcaga gaactgagag ctgccggaat 60
agaagttaca tctcgtagaa agaaaaaacg aggagtagac tacaatgctg aagtaccgtt 120
cgaaaagagg ccagcgattg gattttatga cacgtctaat gaagtattag atcctatggc 180
tcccgatttt tcaaaaatga ggcagcaaca cttggatggg gagctgagaa gtgaacaaga 240
ggagagagaa cgtaagaaag ataaacagaa actaaagcag cgcaaggaaa acgacattcc 300
tcaagctatg ttacaaaacc aggaaccagc taagaaacga tccaagttag tgcttccgga 360
accacaaatt tcagaccagg aaatgcacca agtggtgaag ttgggcaaag cgagtgaagc 420
agctagggaa atagttacag aaagcggtgt tgaaaccact gacactttgt tgaatgatta 480
tactttcaat cctcaagcgg ctgctacacc aaggactccg gcgccccaga ctgataggat 540
tttgcaagaa gctcagaaca tgatggcgct cacacacgta gatacgcccc tcaaaggcgg 600
cattaacact ccgttacaca attcagattt cagcggggtc ctgccccaag ctcagaccgt 660
cagcaccccg aataccgtgc ttgctacgcc cttcagatcc agtaggagtg acggagctgg 720
cactcctggc agtagcgttg gatttatgac gcctagaagt ggcgctttgg tgcctgtggg 780
gaagacgccg gtaggaatga cgccttcggt tagggataag cttagtatta atccagagga 840
agcaatggac gtaggaagca caccagctga gcacagaatg taccagatgt cgatgaaaga 900
tcaattaaaa atggggttga gcagtctacc acaaccgaaa aacgactatg aaatcgtggt 960
gcccgaaaat gaagaccagg aagaacccga gcaagctcag tcacaaatga tcgaagatca 1020
agctgatgta gatgcacgga aacaagaag 1049

<210> 746
<211> 547
<212> DNA
<213> Diabrotica virgifera

<400> 746
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gcttctgttt cctagataca tcttgtaatt gggctatttg ttgattcaag ttgctaagat 120
caccttttat gatatatgtg agttcttgga tttctgatgt tttgtcgtca aataaagatt 180
ttcgttttgc caacaatgtc aacttttcca atttagcata agtgctagct atatgccgtc 240
ccacattctt cgcaattagc ataaactcgc tatgactttg tataaccctc gatttcttcg 300
ggtccctagc agctactgcc ctagcaatgt tcctgccttg taatgtctgt atagtattta 360
caaattcact agttctgtct ctggcagtca tgactaattc tggttcagtg tagtcttcga 420
tataatcttc ctctaaatag tagtcagatg taacattgtt tggatacacc gtgtgtgact 480
gattcgtttt aggctgaggg ttagtccaat aattatcgtt acctactata acttggggct 540
cagtttc 547

<210> 747
<211> 508
<212> DNA
<213> Diabrotica virgifera

<400> 747
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cgactaagaa gcgtggcgga gcacctcaca agcgcctttc caccaacaaa cacgacgtcg 120
ccgtagtccc actacctcga gcgcctttta ccattaccat accaatcacg atttctacgt 180
tttctaacct gcaagataat gtctgctact attttgacgc gaattaattt agcagttcaa 240
aatttgaagc atcatgtact taatactttt ggaagaggtt ttccaccaga tgcactttgc 300
ctagcaggaa tagaattaaa caaaagtcct cagaatttgc ccaaattttc tattaaagat 360
ataataggcg agggattttt atgggcagtt cctaaacata ggcggtcagt agaaaaacga 420

tggaaaagaa aatttggtga tccctattat gtcttgaaaa ttttattgcc tagaaaggat 480
ttaaggacct gtaatgtttg tggtgatg 508

<210> 748
<211> 788
<212> DNA
<213> Diabrotica virgifera

<400> 748
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ctggcagcga taagaccgac tttacgacca gcagatgttc ctctcttaac tgtggatgct 120
ttaccaatgt gttgatggtt accacctccg tgaggatgtt caacagggtt catagcaaca 180
ccacgtacct taggccagca gttacgttta actttgtatt tgtggtaagc acgacctgct 240
tttaagattg gtttgtcaat acgaccacct ccagcaacga tacccaccat ggccctgttg 300
tttgatggaa taactttctt ggctccagaa ggtaacttaa ctctggtttt ctttgtgtcg 360
tgattatggg caattacggt agcatagttt ccagatgcac gagctagccg accacggtca 420
ccagtttttt cttctaagtt gcatacaatg gtaccttcag gcatagttcc tacaggcaat 480
acatttccaa tttgaaggtt agctttcttt ccacagtaca aaaattgtcc agtgtacatt 540
ccttcggggg caataaacaa ttccttccta gtttggaact tgtagggatc tctgaaatgt 600
actactgcca atggagcacc acggccaggg tcatgtatga tatcttttac aacacccttа 660
atgtaaccat gtctttctga gaaatctaaa taacgtagtt tgggtgctcc tttcctcttt 720
tttgtgtggg atttgaatac agatcccgca cctttacgtt gtgcacgaat tacacgaccc 780
attgtaga 788

<210> 749
<211> 752
<212> DNA
<213> Diabrotica virgifera

<400> 749
gaggcgtagg caaggaaaaa ctgattacta tgcccgtaaa cgattgattg ttcaagacaa 60
gaacaaatac aacactccca agtaccgttt gatcgtacgt atctccaaca ggaacattac 120
ttgtcagatt gcttactccc gtattgaggg agacaagatt gtatgtgctg cttactccca 180
tgaattgccc agatatggaa tcaaaactgg tcttaccaac tatgctgctg cctatgccac 240
tggtttactt ttggccagaa ggctcctcaa aaaattggga cttgacaatt tatacagtgg 300
caccactgat gttactgggg acgaatacaa tgttgaagct gctgaacaag gaccaggagc 360
attcaggtgt tacttggaca caggtttaaa ccgtaccagt actggcgccc gtgtctttgg 420
agccatgaaa ggagctgtcg atggaggctt aaacattccc cactctacaa aaagattccc 480
tggttttgac agcgaatcca aaagcttcaa tgctgaagtc cacaggaatc acatttttgg 540
catccatgtt gctgattata tgaaatcact ggaggaggaa gacccagagg cattcaagag 600
gcaattcagt caatacatta agctgggaat taatgctgac cagattgaaa atatgtacaa 660
gaatgcccat gctgccattc gtgcaaatcc tgaattagaa aagaaggctg aaaaggctcc 720
agcacctgca aagagatgga accgtaggaa gc 752

<210> 750
<211> 436
<212> DNA
<213> Diabrotica virgifera

<400> 750
ccacataagg gcaaacttgt tagtattgta gacgtaatcg accagacaag ggttttagtt 60
gatggcccca acagcaatgt acccagagga cagcttaggt taaacgaatt gcatttaaca 120
aagttccgca ttaggtatcc attttcagct ccaactcgtg ttgtaagaaa agcatggact 180
gatgctaaga ttgatgaaaa atggaatgaa tctgtctggg ccaaaaaagt agctgccaag 240

gaaaagagat cacaactcac agatcttgac cggttcaaac ttcgtagggc tcgttcacga 300
agaaaccaca tccgtacagc aactttcctt gctttaagga aggccgcatc aagaaacggt 360
ttcctctatg gtaaaaagaa gatggctaaa ggaggtgaca aacctaaacc aagcaagaag 420
gcgaagaaag aaaagc 436

<210> 751
<211> 1072
<212> DNA
<213> Diabrotica virgifera

<400> 751
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atatcacttt acgcttattc tacttgcaag tgaagaactc cattctctcc gatgaaatct 120
actgcccgcc cgaaacttcc gtccttctgg cttcgtacgc cgtacaagcc aggcatggag 180
attatgataa atcaactcac acgccaggat tcctagccaa cgataggttg ttacctcaaa 240
gggtaatgga tcaacataaa atgtcaaaag atgaatggga gaatagcatc atgacctggt 300
ggaaggaaca tagaggtatg ttaagggaag atgccatgat ggagtacttg aagatagctc 360
aagatctaga aatgtacgga gttaactatt tcgaaatacg taacaaaaag cagacagaat 420
tgtacttagg tgtcgatgcg cttggactta acatttacga aaaagatgac caacttacac 480
ctaaaatcgg tttcccgtgg tcggaaatcc gcaacatctc tttcaatgat aggaagttca 540
tcatcaaacc catcgacaag aaagcacccg atttcgtttt ctttgctcca cgcgtgcgca 600
tcaacaagag aattctcgct ctttgtatgt gcaaccacga actgtacatg cgcagacgta 660
aacctgatac catcgacgtg caacaaatga aagcgcaagc gcgtgaagaa aagatggcaa 720
aacaacagca gaaagaaaag ctccagtctg aaatagcggc aagagaaagg gccgaaaaga 780
aacagcaaga gtatgaagat agaatcaaag ccatgcaaga agagatggaa agaagtcaag 840
ctaactatat ggaagctcaa gagatgatta gacgattgga ggaacaattg aaacaattgc 900
aggctgtcaa agaagagatg gaaaagagac agaacgagtt acagtccatg atggagcgtt 960
tggaagagag caagaacatg gaagccgccg agaggcaaaa attggaagag gagatcaggg 1020
ccaaacaaga ggaggttcta cgtatccaac aagaagtcga ggctaaggac ag 1072

<210> 752
<211> 864
<212> DNA
<213> Diabrotica virgifera

<400> 752
gaatactatg aggacacctt cgccttggtc caaaattcca tgaaacttgg catctaaaat 60
catctgtgac aatttcttct ctacttgtag tactgggagt tttatggttt ttgctacata 120
ctctacttgt accctagaat atggttcgat aattctgcaa aggttctgct ccaacatatt 180
gtcatacaac gttcctaaat gtgctctaac aataacatca tcttctaatt catgtttaaa 240
ctgttttaca gcttgttgga aatctgctag tgatcttttg tgtgcagcct gtgcaactga 300
tttcatagcc tctatatctt gaccagcgta tttaaaggcc aatttaccac taacgatttg 360
ttggacgtct tccggactgt ttatcatgat ttttgacaaa agcatgtatt taagggctgt 420
gagggctttt ggggattcaa cactatcaaa accttcaaaa gcttcataaa aataagaata 480
agctgttttg aaatccttct catctgcagc gtgtaatact ccggattgta aatctaaagc 540
tgcctgcatc tttggagggc aatagatagc gttagctgtg gttcgtgctg aagttagtgc 600
agctctagcc ttcggtaaat tacttaaagc atgatatgtt ttgctttcaa gtagttgtac 660
ttccaccaac aaatttttgt catccaactt ttttaactct ttcagtaagg tcgattccag 720
ttgtagcgct tcgctgtaca ttccagtgtc aaaataaaga gcaatcagcc tggcttcaag 780
ggactgacgt agaaaagttc ttctctcttc ctttgcccat tctatacatt ctttgcagag 840
ttgtacttcg ataccaatac cagc 864

<210> 753
<211> 383

<212> DNA
<213> Diabrotica virgifera

<400> 753
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ctaaaatcca taaacaatgc tgaaaagcgc ggtaaaaggc aggtccttat caggccttca 120
tcaaaagtag ttgttaagtt tttaactgta atgatgaagc atggttacat tggcgaattt 180
gaaattgtag acgatcacag aagtggaaag atagtagtaa atttgacagg aaggttaaac 240
aaatgtggag taatttcccc taggtttgat gtaccaatta cacatattga aaaatggaca 300
aataatcttt taccttcccg tcagtttgga tatgttgtgc ttaccacaag tggaggtatc 360
atggatcacg aagaagctag aag 383

<210> 754
<211> 923
<212> DNA
<213> Diabrotica virgifera

<400> 754
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gctagaccgt agttagcttg gccagcgtta ccacgtccac atgaaactga tgagaagtta 120
acgaaatagt ccaaattgtt cgccatttct ctggaaacca tatctaacat tttgctgccg 180
tcaacttttg gtttgcagac agtcttaaag tcagcttcag attggttttc catcattgcg 240
tcacgcaaga ctactgccag gttaaagatt ccaccaacgg gtcctaattc actggcttct 300
gtaagaagtc ttctggcacc tttgtcagtt gttgcatcgg ctgtagaaac aagtacgttc 360
acacctttt ctctccatct tctgatacat agtgattggt atccagtttt aattccactt 420
ctggaggtca acaccatttt cttggcacct ctagtaacca accagttggc taattcaaga 480
ccaaatccac caagacctcc aaccaaaatg taactctttt caggatccat gtatgttctg 540
ggaatagcgc tgacagtctt aacagctggg cgagtggcag ttttaggttc ttcttctctt 600
atttggagca aaactttacc aatatgttta cctgaagcca taaatctaaa ggcttgttct 660
acttggtgtt cattgtatac agtctttgga agtggcctta cagctccgct cttaattcct 720
tcagttacca atctcattac ttgtctcttc tgaggactgt ctgaatcaaa gagagcgtca 780
agaaggattc cgtggaaagt agtgttcttc aagaagatgc tcattcccaa cgcagaattg 840
ttagaaagat ctacttttcc aatttccaag aagcgaccac caattgccaa acatcttaca 900
gaagcctgga gttggtgagc agc 923

<210> 755
<211> 1312
<212> DNA
<213> Diabrotica virgifera

<400> 755
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ggaggacagg tgaatgttat agcgtttttc aaagtgtaag gtgtttattt tcaaaaagtt 120
tataaaataa gcaatcacta tgggtaatgt gtttgcaaat ttattcaaag gcctctttgg 180
caaaaaggaa atgaggatat tgatggtagg actcgatgca gctggtaaaa ccacaatttt 240
atataaactt aaattaggag aaattgtaac aactattcca acaattggat ttaatgtgga 300
gactgtagaa tataagaaca ttagttttac agtatgggat gtaggtggtc aagataaaat 360
taggccattg tggagacact atctccaaaa cacacaaggc ctaattttcg tagtagacag 420
taacgacagg gaacgtatca ctgaggctaa agatgaatta atgcgtatgt tggccgaaga 480
tgaacttaga gatgccgtac ttctcatttt cgccaacaaa caagatttgc ccaatgcaat 540
gaacgctgca gaaatcaccg acaaactcgg tctccattca ctacgcaacc gcaactggta 600
cattcaagct acctgtgcaa ctagcggaga tggtctctat gaaggtctgg actggttgtc 660
caatcaatta aagaacgcca atcgctagaa cataggaaaa gagaggagtg cgcaaaaaag 720
tgtgcgagtg cagatggttt ttttcttgta ctcttgtcgt gtctactacc tcgcgcgcgc 780
gcgaaacgtt tcgtatacca tatgttgcaa tttttgtgtc cgatggggaa attcgtcatg 840

tttcactttg ggggttataa aattggctgt tggcgacaag tggtgtatga ggtgaatccg 900
aaaatagttt taggcaatat atcatatgaa tctcagcttt ctttaggttg agagttgttt 960
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tgggaattca attaaagact ttaactggca aattttaaaa tgttaaaggt tctagtcacg 1260
tatttagtct ggacttgcac tttatagcac ttgtcgcaga aagcatctaa cc 1312

<210> 756
<211> 442
<212> DNA
<213> Diabrotica virgifera

<400> 756
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gtagcttttc gttggatttt actctttgca agaagtcttg acgacacttg gagtggttta 120
catgttcaat acggagattg attcttttgg ggatgattct tcctcgaacc cttttgttta 180
caattacacc taatgcatgt gcagtaacgt tgaaaacacg tcctgtctta ccatggtaca 240
ctttgtgggg catacccttt tgaactgcac cattaccctt gatatctaca atatctccaa 300
ctttgtagac tctcaaatat gtggaaagtg gaattacacc acgtttttta aacttgcggg 360
caaatagatc cctggttcct cggcggtaac ctttagagtt ggtcattttg taccttccaa 420
atcctaagaa acacagtaaa cc 442

<210> 757
<211> 404
<212> DNA
<213> Diabrotica virgifera

<400> 757
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ttccttgaat gccaaggatc tgagactgtt ggagaaatta aggaccgtat tgcatctttg 120
gaatcgctta aagcatccga aatcagtctt tatgctgctg gagttccagt ttctgaggaa 180
aggttggtag ccgattttga gaacacagac attgaattga ctgttggctt gcctggtggt 240
aaagttcacg gatctttagc tcgtgcaggt aaagtaaagg gacaaactcc aaaagtagaa 300
aagcaagaaa agaaaaagaa gaagactggt agagctaaga ggcgtattca atataacaga 360
agatttgtta atgtagttgc atctttcgga cgcaggaggg gacc 404

<210> 758
<211> 747
<212> DNA
<213> Diabrotica virgifera

<400> 758
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aaacctgtgc cattaaacaa ataaagcgat ggtgctaatt gcagcagcag tctgcacgaa 120
agcaggcaaa acaattgtgt ctcgacaatt tgttgaaatg accaaagcta gaatagaagg 180
tttgttggct gcctttccta aattaattcc tacaggaacc cagcatacat ttgtggaaac 240
agattcagta cggtatgttt atcaacccct agagaaactg tatatggttc ttattacaac 300
tagagctagc aacatattag aagatcttga aaccctccgt ctattcgcaa gagtgattcc 360
tgagtactgc aaatctttgg atgaaaatga aattgcagag aatgcatttt cacttatatt 420
tgcttttgat gaaatagtgg cattaggtta tagggaaagt gtcaatctgt ctcaaattcg 480
cacatttgtg gaaatggact cgcacgaaga aaaagtttat caggccgtga gacagactca 540
agagcgcgag gccaagaata tgatgagaga aaaggcaaaa gaacttcaga gacagaagat 600

cgaagcggcc aaaaaaggag ggaagacctc gtttggtagt agcggtggct ttggcagctc 660
gacaggttat actcctacgc catctgttgg tgatgtagct aaccagacaa atgatgttaa 720
aacttcttca tacacaccag cccctgc 747

<210> 759
<211> 1285
<212> DNA
<213> Diabrotica virgifera

<400> 759
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tatcttctgt ggccaaacat actaatttac cactatctga ccagtaaact gcttttggtt 180
gtatctcgat tcttctgact aaatcgagag tttcccaatc atagaaagtc aaaccagaaa 240
ccgatttgac tcccaaaagg tatccaccgt atataccttc agctccaaaa tcggacttaa 300
aattcttctt ctctttgaaa ttcttaaaaa ttctgatagt agatccggat tctctgatgg 360
catattcgct ggaatcttga gcccacacaa attcttgtgc gctaccaaac gctttgtttc 420
ttaaagccat tgctgtgtag attatgtatt ctccatcccc acagacaaca acaaaacggc 480
cattgggatt gtgttgaatt gtctgagggt atatctcgca agcacccata tcttttacag 540
aaactggaag gcgttctcca tctcttattt ccgcaccttc agctaacgcc ttgagatttg 600
cctgttgaag ttcagagtgt ctggcccaaa taattttgcc tccactggca tccatactaa 660
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cgttattgga tccctttagg cagaaaatag tccatactct ttcaaagcca taatttaagc 780
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taagagctac aggaagttct ggatggaaac atgcagcggt tacattttga gcatgtcctt 900
ccaaagtttg aacacaagtt ttgttttgat aatcccagat ttttactaat ctatcatcag 960
cgcctgagat taaataaggt ttatctccac cgtgataata gtccacacag ttaacgcctt 1020
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caatacatct cacataatcc gaatg 1285

<210> 760
<211> 442
<212> DNA
<213> Diabrotica virgifera

<400> 760
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acttgtctgg tagagaaact atctccagag tcactggagg tatgaaagtc aaagctgaca 180
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aaacattagg aatcactgca ctccacatca aattgagggc tacaggtggt aacaaaacca 300
aaacccctgg accaggagcc caaagcgcac tcagagcttt ggctcgttca aacatgaaaa 360
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gccgtggtcg tagattgtag ac 442

<210> 761
<211> 959
<212> DNA
<213> Diabrotica virgifera

<400> 761

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gatatgagaa ccagattcgt cataaccagc tactagaaga cctacgccaa atggtctgcg 600
gtcgtatctt tgggtacatg tctgcatttt gttacctaaa atactgataa gcctattcaa 660
tggcatataa gtatccaaag agtacttata attcaagcat tcgtttcgca tatatctact 720
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gataatttc ttctggtagg cagacagttc tgaagaagcc ctcttcaaag cgataagtac 840
agcatgagtt ttacttttca gtcccactgt ggctgaacct aggttaactg cttccatggc 900
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<210> 762
<211> 429
<212> DNA
<213> Diabrotica virgifera

<400> 762
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tgatatcatt taaagaagca cctacaatag ccctttggaa tttctgtgtc cttctggtac 180
gttttttggt ggcttcttcc tcctgaccct tcttatgttt acgtctgtac aagacagtcc 240
atgttacttt acgggggttc cttttcatca agtgcgccct ttcacatttt gagttgagga 300
aagtgaaggt ctttccatca actttaacca ttgttttgcc atgtccgggg taaattttgt 360
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gatgacaac 429

<210> 763
<211> 828
<212> DNA
<213> Diabrotica virgifera

<400> 763
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cgtatgtagc tttggcaaag ttacctaaag taccagtgga acctctagcg gatgtgtagc 180
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aaggtacagt gtggggttga ccaatcttgt taccccagta tcctcttcgt actggaacga 360
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tacgttgacc agcacgagtt tgcttctgga caggcatgat tttcaatacc tcatcattca 540
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gtacccattc tttttgatct tcctttccac gaccacgtcc tctgccacga cctctacctc 720
ggcctctggg accacctcta ccgcctccac ggccaccacc tccaaaacct cctcggaatc 780
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<210> 764

<211> 664
<212> DNA
<213> Diabrotica virgifera

<400> 764
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tgaaacggca actacagagg tacagaaaaa gggtgtcaag ggcacatatg tatcaataca 120
cagttctggg tttagagatt ttctgttaaa accagcaatt ctcagagcta tagtggactg 180
cgggttcgaa catccttcag aagttcaaca tgaatgtatt cctcaagctg tcattggcat 240
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agagttagcc ttccagataa gcaaagagta cgaacgtttc agtaaatata tgcccaatat 420
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taattgcccg catatcgttg tgggtactcc aggaagaatt ttagcattgg tcagatcgaa 540
aaaacttaat ctcaaacatc taaagcattt tattttggat gaatgtgata aaatgttgga 600
gttattagac atgagacgtg atgttcaaga aatatatcgt aacactcccc acgaaaaaca 660
agtc 664

<210> 765
<211> 434
<212> DNA
<213> Diabrotica virgifera

<400> 765
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aggagcagta attaattgtg cagataatac aggagcaaag aacttatatg ttatcgctgt 120
acaaggtatt ggtggacgac ttaaccgtct gccagctgca ggatctggtg acatgattgt 180
agccacagtc aaaaagggta aaccagaact caggaaaaaa gtcatgcctg cagtagttat 240
caggcagcgg aaaccattta gaaggaagga tggtgtcttc atttactttg aagataatgc 300
tggggttata gtcaataaca aaggtgaaat gaaaggatca gccatcactg gtccagttgc 360
aaaagaatgt gcagatttat ggcccagaat tgcatcaaat gcaagcagta ttgcttgatg 420
tgtatatgtt taag 434

<210> 766
<211> 1283
<212> DNA
<213> Diabrotica virgifera

<400> 766
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cttatactta gcctatagtt ccttaaaact gtcatgatac ctacttttac ttgaatgatg 120
ccaaacctca tacctaaaca taacctaggg ccttctccaa aaggaacata tgtgtatgga 180
ataatgttct ttctgttctc ttctgaaaat cgttctggat cgaatacatc tggattatca 240
taatattctt catcatagtg aatacctatg gtaggtatga cgactcttgt gccttttca 300
actactatgt ttgtctcagg tatctggtaa tcttgagaac attctctggt gagaaaagga 360
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agggactcgt aggtgatttc gccgttgtga ttgtttagta cttcttctat ttcttctcta 480
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acaaactttc gtgaaaaatt ccttaatagt cttcggtatc caagtcaatc tgatagcact 780
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tctaaggctc ttccattttg tcccaccaag tgcaaataag tgagcgccta taggttcatc 1140
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<210> 767
<211> 685
<212> DNA
<213> Diabrotica virgifera

<400> 767
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atttcaatag taacatgaat ctagaagtgc ccccctttga aagtcctgcc accaacttat 120
ctagatttac aaaagatgat actggaaagg ctctaaaaat taattttgat catggtacca 180
caaccttggg attcatgtat cagggaggag ttgtacttgc agtagattcc agagctactg 240
gaggccagtt tattggttca caaacaatga agaaaattgt agaaatcaat gattttctgt 300
taggtactct ggctggaggc gcagcagatt gtgtctattg ggacagagtt ttggccaagc 360
agtgtagaat gtatgaactc agaaatagag aacggatttc agtagcggct gcttctaaat 420
taatggcaaa tatggtttac aattataaag gaatgggatt gtcaatgggt atgatgttag 480
ctggatggga caaaagggga ccacaattgt attacgtgga ctcagaaggt ctgagaacag 540
caggaaaagt tttcagtgtt ggttccggtt ccatatatgc ttttggtgta ctagactctg 600
ggcacaaatg ggatcttacg gacgaagaag catatgattt gggccgtaga tcgatttatc 660
acgctaccca cagagatgct tactc 685

<210> 768
<211> 859
<212> DNA
<213> Diabrotica virgifera

<400> 768
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ccggttgaaa ctattaaagt tggaaagaat aaaggattat ttgcttatgg aagaagagtt 120
catcagaaac caagaaaggc tgaaaccaca agaagaaaaa aatgaggagg agagatcgaa 180
ggttgatgat cttagaggaa ctcccatgtc tgttggtaca ttggaagaaa tcattgatga 240
caaccatgca attgtttcca catcagtagg cagtgaacat tacgtgagca ttttatcctt 300
tgttgacaag gatcaacttg aaccaggatg ttcagtactt ttgaaccata aggtgcacgc 360
cgttgtaggt gttttaggtg atgatactga cccaatggta acagtaatga agcttgaaaa 420
agctcctcaa gaaacctatg ccgatattgg tggtctagat acacagattc aagaaattaa 480
agaatctgtt gaattacctc ttacccatcc tgagtattat gaagaaatgg gtatcaaacc 540
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tgttgctaac cagacttctg caacattttt gagggttgtt ggttcagaac ttatacaaaa 660
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tccttccatt gtatttatag atgaaatcga cgctgttggt acgaagaggt acgattccaa 780
ttctggcggt gaaagagaaa ttcagagaac tatgttagag ttattgaatc agttggatgg 840
attcgattca aggggcgac 859

<210> 769
<211> 586
<212> DNA
<213> Diabrotica virgifera

<400> 769

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atcaagaatt gaaaatcatc ggagcctttg gtctccgaaa caaacgtgaa gtgtggagag 120
taaaatacac tctagccaaa atccgtaagg ccgccagaga actgcttact ctagaagaga 180
aagaacccaa aaggttgttt gaaggtaatg cactcctacg tcgtttggtt cgtattggag 240
tactagacga gaacagaatg aagctcgatt acgtattggg tctcaagatt gaagatttct 300
tggaaagacg tctgcaaaca caagtcttca aatctggtct agctaagtca atccatcatg 360
ctagggtatt gatcagacaa cgacacattc gggtccgcaa acaagttgtg aacattccct 420
ccttcatcgt ccgtttggat tcacaaaaac acatcgactt ctctctgaaa tcacctttgg 480
gaggcggtcg tccaggacgt gttaagagga agaacctcac caagaagagc ggtggtggag 540
gtgcagctga agaagaggaa gactaagctg tatgtcgtgc tagttg 586

<210> 770
<211> 563
<212> DNA
<213> Diabrotica virgifera

<400> 770
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atgttgaagc acggccgagc tggagtaccc atggaagtaa tgggtcttat gttaggagaa 180
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ggtgtcagtg tagaagctgt tgatccagtg tttcaagcaa aaatgcttga catgttaaga 300
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tggttgtctg gagtggatat caacacccag caaagttttg aggctctctc ggaaagagct 420
gtagcagtag tagttgatcc aatccagtca gtgaaaggca aagtcgttat tgatgccttt 480
aggttaataa atccgaatat gatggtattg ggccaagaac ctcgccaaac tacatccaac 540
ttaggacatc tacagaaacc atc 563

<210> 771
<211> 1216
<212> DNA
<213> Diabrotica virgifera

<400> 771
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gaacttattt gtaaagatgc tggttggaaa cttgatgcta atctactgag tgcattaaaa 180
gctaagaacg ctgagaagat caagcttttg gatgaagcca tagaagatgc cgagaaaaat 240
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ggtcatcgtt tagatattat ttttcacttg ataagaattg gtttgttctt catggaccat 420
gatctcatca caagaaatat tgaaaaagct aaaaccctta ttgaagaagg aggtgattgg 480
gatagaagaa atcgtttaaa agtgtatcaa ggtgcatatt gtatgtcagt acgagacttc 540
aaatcagctg ctaacttgtt tttggacaca gtaagcactt ttacatcata cgaactaatg 600
gactataaag catttgtcag gtatactgta tacacctcta ttattagttt gccaaggaac 660
caattaagag ataaagtggt caaaggttcc gaaatattgg aagtactgca ttcagaacca 720
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gaaactaata gaccagattt aaagaatgcc caatttaatt ctgtggtaaa acaaggagat 1080
ttactgctga atagagtcca aaaattatct agggtgatca atatctaaaa aatgtattct 1140
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<210> 772
<211> 617
<212> DNA
<213> Diabrotica virgifera

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ttctgtatga tgaacacagt gtccataaag tagaaatgat cacaaaacac attggtatgg 180
tttattctgg tatgggtcct gactatcgcc ttcttgtgag acaagcacgc aagatggctc 240
agcagtatta cctagtatac catgaaccca ttcctacagt acagttggtg caaagagtag 300
cgactgtaat gcaagaatac acccaatcag gaggagttag accatttgga gtgtcgctac 360
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aaaaaaggta cagtgaagag ctagaactcg acgatgctgt gcacactgct atccttaccc 540
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ctaatggatt cagaagg 617

<210> 773
<211> 736
<212> DNA
<213> Diabrotica virgifera

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agttcaaagg aaatttaaga cacgagaagc tgaagaaaaa gaaaaagagg atttggttaa 180
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tatcatgttc ggaaaaaaga aacatgttga cgttcaattc tgtacggaag tcggagaaat 480
taccacagat ttgggcaaac atcaacacat gcacgatcga gatgatctgg ctgctgagca 540
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tgaatctatg acaaaacaag aaattgaatt tgatacacca ttccgggagt tgggatttcc 660
aggagccccc ttccgctcta cagtccttct ccagcctaca tctggttgtt tggttaacct 720
gactgaatgg gcctcc 736

<210> 774
<211> 718
<212> DNA
<213> Diabrotica virgifera

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gttaaccgta cccaaggaac caaaattgcc tctgaaggtt tgaaattcag agtttttgaa 120
gtgtctttag ccgatttaca aaatgataat gacgccgaaa ggtctttcag aaagttccgt 180
ttgatagctg aagatgttca aggtagaaat gttttaacaa atttccacgg tatggattta 240
accactgaca agctgaggtc catggttaag aaatggcaaa ccttaattga agcatctgct 300
gatgtcaaga catcagatgg atatttactt agggtgttct gcataggctt taccaacaaa 360
gaccaacttt ctcaaaggaa aacatgctat gcacaacata cacaagttag agctatccgt 420
aaaaagatgg tagacattat taccagagac atccagggct cagacatcaa agaagtagtg 480
aataaactcc ttcctgacag catagccaag gatattgaaa aggcctgcca gggtatctac 540

cccctacatg atgtgtacat ccgtaaagtt aaagtattga aaaagcctcg ttttgaactc 600
tccaaattgt tggaattgca tggtgatgga ggcaaaggtg gtgctggtga ctccactggt 660
gaagctggtt ctaaagtcga caggcctgag ggatacgaac caccagtaca agaatccg 718

<210> 775
<211> 598
<212> DNA
<213> Diabrotica virgifera

<400> 775
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aacactaact caagacagaa catccgtaag ttgataaagg atggtcttat tattaagaag 180
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atgttggcag accaggccaa tgccagaagg atgaaggtaa aacaggctag agaaagacgt 540
gaggaacgta tcgccacaaa gaaacaagaa gttttgcaga actacatgag ggaggatg 598

<210> 776
<211> 683
<212> DNA
<213> Diabrotica virgifera

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aaatgaggtg cccaattttc tgtatggcct ggacacccga gggcagaaga ctggtaactg 180
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tacaggcaca tgacagtcca gtcaggacga tggtatggag tcacaatgac agctggatga 300
taacaggtga ccattctggt tatgtcaaat attggcagtc gaacatgaac aatgtgaaga 360
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ttctgaatag accatacaaa actaattccc ttaaagtaag atggtgaatg gacattgatt 660
ccgaaggcaa cagtccccaa aca 683

<210> 777
<211> 321
<212> DNA
<213> Diabrotica virgifera

<400> 777
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ccgctaggtt gaaggggatc caaaccaaac acaccaaatt tgtcagagac atcatccgtg 180
aagtcgtagg acatgctcca tatgaaaaga gagccatgga attgttaaag gtgtcaaagg 240
ataagagggc cctgaaattc ctgaagcgtc gtcttggcac acacatcaga gccaagagga 300
agcgtgaaga actatccaac a 321

<210> 778
<211> 311
<212> DNA
<213> Diabrotica virgifera

<400> 778
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ttggataaaa gacaagccgt actttgtgtg ctcgctgaaa actgtgacga gcctatgtat 180
aagaaactag tctcagcttt atgctcagaa catcaaattc ctcttattaa ggtagacaat 240
aacaaaaaat taggcgagtg gtcagggtta tgcaaaattg ataacactgg taaagcacga 300
aaggtcgttg g 311

<210> 779
<211> 501
<212> DNA
<213> Diabrotica virgifera

<400> 779
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tgtaactggc aaggaggata ctgaacttat ggcatatcaa attgcttttg atctctatga 120
gtcagctact caacagtttt tggaaagagt attagttgca ttaagagcca cagcaccagt 180
tccatctttg ctggaagaaa aagcaaagcc aaagccttct ggtgaaggag agggtgctat 240
gtcaaccgag actggagaac catctacaga aacaaaagaa gaaaaattaa aagaagaaaa 300
atctctggat agtttgtctg atcaggataa ggaacatcag aaaagaattg agaaacttca 360
tactatactc tcaggggagg tctctataga actgcacctt caattcctca tcaggtcaaa 420
tcatgctgat ctactgattc ttaaacaaac aaaagagact gtcagagtta gtatttgcca 480
cactgctact gtaatcgcaa a 501

<210> 780
<211> 370
<212> DNA
<213> Diabrotica virgifera

<400> 780
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gaccaaggcg tacaggaaaa cagtaggcaa agagttaaca atagatccat catttgaatt 120
tgaaaaacgt agaaacatac cacttaaata taacagagaa acctggtcaa aggctgtaga 180
agcaatgaaa acggtagaga aaataaaaca gaaaaggcaa ggagcctaca tcatgcaaag 240
attacgtaaa ggtagagaaa tcgaacaaga acgagacatc aaagaggtac aaagggatct 300
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gcaagatcac 370

<210> 781
<211> 673
<212> DNA
<213> Diabrotica virgifera

<400> 781
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ctatcccctc ccgtatgacg attggtcact tgatcgagtg catccaaggt aaggtatcat 180
ccaataaagg agaaatcggt gatgctacac ctttcaacga tgccgtcaac gtacagaaaa 240
tctccacttt gttacaagaa tatggttatc aactcagagg caacgaagta atgtacaacg 300

gccatactgg acgtaagata aatgctcaga ttttcttagg acctacctat tatcaaagat 360
tgaagcacat ggtggacgat aagattcatt caagagctag aggaccgttg cagattctcg 420
tcagacagcc tatggagggt cgtgcaagag acggcggtct acgtttcggt gagatggaac 480
gagattgtca aatttcacac ggtgcggcac aattcttaag agagaggctg tttgaagttt 540
ccgatcctta tagaatccat atttgcaact tctgtggttt gatagctatc gccaatttgc 600
gtaacaacac ctttgaatgt aagggttgca aaaataagac gcagatatcg caagttagac 660
tgccttatgc tgc 673

<210> 782
<211> 411
<212> DNA
<213> Diabrotica virgifera

<400> 782
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acattcgaat gatcaacccc aggttactga aagtagagaa atggttcggt accaagaagg 120
aattagctgc tgtcagaaca gtatgctctc atgttgaaaa catgttaaag ggtgttacaa 180
aaggatacca atacaagatg agagcagcat atgctcactt tcccattaac tgtgtcacca 240
ctgaaggaaa cacagttatc gaaattagaa atttcttggg agaaaaatac atcagaagag 300
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ttgaaggaaa ctcattggag gatgtttcaa agtcagctgc ccttattcaa c 411

<210> 783
<211> 553
<212> DNA
<213> Diabrotica virgifera

<400> 783
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aggaagttcg aattaggacg tccagccgca aataccaaac ttggagcacg tagaattcac 120
tatgtccgta cacgaggagg taacttgaag taccgtgcat tgaggattga aaaaggaaat 180
ttcgcatggg gcagcgaagg tactgctcgt aaaacacgta ttattgatgt cgtttacaat 240
gccagtaata acgaattggt acgtaccaaa acattggtaa agaatgccat cgttgttatt 300
gacgcaaccc ctttcagaca atggtacgaa agccactata ttttaccttt aggacgcaag 360
aaggggggcaa aattgacagc ggaagatgaa gaaatgttca ataagaaacg tagcaaaaaa 420
gtacagaaaa aatatgaaac taggcaaaaa acagctaaag tagaacctgc attagaagaa 480
caattctcaa ctggaaggtt attagcttgc ttagcgtcaa ggccaggaca atgtggtaga 540
gctgatggtt acg 553

<210> 784
<211> 902
<212> DNA
<213> Diabrotica virgifera

<400> 784
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aggtatcaat gaatttaaga ttgatcttct ccaaagcaat acgtttagtg tggactaaca 120
atgacttcct caatgtaata acacgtttct ttggtcccat acaacgtcct ttaatcataa 180
caaagtcatt gttaacttca ccataatgag gaaaaccacc cattggggta atagtttttt 240
cactaagatc gtaggcagtg gctgcattat ttttgacaac cttgccatct ttagtgtgga 300
ttccagcacc aattctgtag atctttttgt tcatctcagt tctgtgatgg taacccttt 360
gaccagcacg agcaactgtg aatgatactc ttgaaggatg ccatgctcca atacaggcaa 420
ctttacgaag acctttgtgt gtcttacggg gcaatttctt tgtgtgccaa cgagaagtaa 480
caccttttgta tccatgaccc ttagtaacac caatgcaatc aatcatttca tcttgagcaa 540

aaacgttggc aataggaata ggcttttcaa ggtgttcttt agcccaagct actttgtcag 600
ctacactacc accattcaat tgaatttcca taatgtgggc tttcttttga cgttgtttca 660
acaatttcat ctgagtatga gcaataactc tgacaacttt acagtattta acaatcttct 720
ttaagtcctt ttcgatggac ttctttccta aatcatcact ccatttcttg gaagctttgg 780
taaatgcctt cttcttgctc ttgtaccagt tcttgtagaa gcgcctgcgg caatcttcag 840
agagatgctc agcccaaact gtggctaaag ccctaagacc atgtggagtt tcgatgtaac 900
cg 902

<210> 785
<211> 1026
<212> DNA
<213> Diabrotica virgifera

<400> 785
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gttgtaaaga gttcattggg accagttggt ctagataaaa tgttggttga tgacattgga 120
gatgtgacag taactaatga cggagctacc attttacgtc ttttagaagt tgaacatcct 180
gccgccagag tattagtaga attggctcag ttacaggatg aagaagtagg agatggtaca 240
acttcagttg ttatcatagc tgcagaatta ctaaagaatg ctgatgaact cgtgaaacaa 300
aagatacatc caacttcaat tataagtgga tacagattag catgcaaaga ggcttgtagg 360
tacattcagg atcatttgac tattccagtc gaagaattgg gaaaggagtg catcataaat 420
gttgccaaaa cctcgatgag ctcaaaaatt attggagctg atgctgatct tttttcacaa 480
atcgttgtcg atgccgccaa tgctgttaaa gtgacagatt caagaggaaa tagcatgtat 540
cccataaagg ctgtcaatgt cttgaaagca catggtaaaa gcgccagaga gagcttcctt 600
gtaccaggtt atgcattaaa ctgcaccgtt gccagccaag cgatgcccaa aaaaattgtt 660
aacgccaaaa tcgcatgttt agatttttca ttgcagaagg ctaaaatgaa gatgggtgtt 720
caggttttga ttactgatcc aaatcaactg gaagcaatcc gcacaagaga gctcgacatc 780
accaaagaac gcatccagaa aatcctctct accggtgtta atgttattct tgcgagtggt 840
ggtatcgatg atctttgcct aaaatacttc gttgaaaatg gagcgatggg tgtaagaaga 900
gtaaagaaag ctgacttaaa acgcattgcc aaagcaactg gtgccacttt cctaacttct 960
cttagtaaca tggagggaga tgaaagtttt gattctagca tggtaggaga ggcagcggaa 1020
gttgtt 1026

<210> 786
<211> 469
<212> DNA
<213> Diabrotica virgifera

<400> 786
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gctgctaagg tattggaaca acttacagga caacaacctg tattctcaaa agccagatac 120
actgtcaggt cttttggtat ccgtcgtaat gaaaaaattg ctgtacactg tacagtaagg 180
ggagccaaag ctgaagaaat tttagaaaga ggcttaaaag ttagagaata tgaattgaga 240
cgtgataact tctctgcatc tggaaacttt ggatttggta ttcaggaaca catcgatctt 300
ggtatcaaat atgatccaag tataggtatt tacggtcttg acttttacgt agtattagga 360
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agattgacaa aagaggatgc catgaagtgg ttccaacaga aatacgacg 469

<210> 787
<211> 1159
<212> DNA
<213> Diabrotica virgifera

<400> 787

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ttttgtaatg gtacattgtt ttctgagcgt ataggtcgtg gtctggaatt atctattgtc 120
atcttcaact gtagtagaca ttatcaaatt tggaatttcg tgtgaatttg tttgttgccg 180
taccaaacaa tccggaaatt tctatacttt cagttggtgt aaagggttat cctaactatc 240
tttatctttg tgctttgtac attttactaa catagattaa tcaataaata aaattaatca 300
ataatactta ttaatttaat gatataatta aaacttttca tggaataaac tttcaagttt 360
gtgaaagcat aaatttggaa ataatattac aaaaaagcac atcatattat actcctttag 420
gataaattag tatattgcca tcatttactt tttacacgtg tttattacat aacgggccca 480
cattgtttta aatgaaaatt tctacaaatt tgtctctaca tttaataatc atctagatca 540
aattcttcgc cgttatccat atcgtctagt tgtaaacttt ggaagtctac tttgtaccgg 600
agcaaacctc caattccacc aaaccctcga acaaattggg agccctcttg agatttgtct 660
gtaataattt ctaaagtggc accgaagttc ttgtaattat tcgccaacca ttcaagaaga 720
ggttgacact cgaccaattc caattctaca ccagtctctt tatccgaaaa atgtgattta 780
tctttttctt gttcaggagt taaatgcagt atagtttccg aacctgtagc atggtttttc 840
aatacatatc gctgaatatc taaattctcc caacagatta gtgtttctac agcacctaat 900
tccaagcccc taagagtatc ttcaactcca aaacagtatt tccccgtatc ttggctaatt 960
tcatcgaaat atctgcctat cagtttcttt tcttgaataa actttacatt ttgaagtgat 1020
tcagctgcta attcgatggc ttgattaaat ccattctcac caccatacga gacatctact 1080
agtttgatta ctttagcttg taaccctgga tcaaacatat cagattgact aagttcagtc 1140
ttaaaatcgg cactacccg 1159

<210> 788
<211> 1261
<212> DNA
<213> Diabrotica virgifera

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ctgatgagtt tgatcatcaa cacattctac tctaataaag aaatcttcct tagagagttg 120
atctcaaact cctcagatgc cttggataag atccgttacc aatcactcac aaatccatcc 180
tgtctcgact ctggaaaaga tttgcacatt aaaattgttc caaacaagag tgaaggaacc 240
ttaaccatca ttgatactgg tattggtatg acgaaagcag atttagttaa caaccttggt 300
acaatcgcaa aatcaggaac aaaggcattc atggaggccc tccaagctgg agctgatatt 360
agtatgattg gtcaatttgg tgtaggtttc tactcagcct acttagttgc tgatcgagta 420
gtggttgtat caaaaaataa cgatgatgaa cagtacattt gggaatcatc tgcaggaggt 480
agcttcacaa taagaccaga tgttggagaa ccattgggac gtggtacaaa aattgttctg 540
tacatcaaag aggatcaaac tgaattttta gaagagaata aaattaagga gattgtaaag 600
aaacactccc agttcattgg ttaccccatt aaattgcttg tagaaaaaga aagggaaaag 660
gaactaagtg atgatgaagc agaagaagaa aagaaggaag aagaggaaga caaagataaa 720
cctaaaattg aagatgtagg agaggatgaa gatgaagata aaaaagatga gaaaaagaaa 780
aagaaaaaaa ctattaaaga aaagtacact gaagatgagg aactaaacaa aaccaaacca 840
atctggacaa gaaatgctga tgatataacc caagaagaat atggtgaatt ttacaaatca 900
ttgacaaatg attgggaaga ccatttagca gtaaaacatt ttagtgttga gggtcaactt 960
gagtttagag ctttattgtt tgttcctcgt cgtgtacctt ttgatttgtt tgaaaacaag 1020
aagaagaaga acaacatcaa attatatgta cgcagagttt tcattatgga caactgtgaa 1080
gaccttatcc cagaatatct taactttatt aagggagtag tagactctga agatttacct 1140
ctaaacattt caagagaaat gttgcaacaa aataagattc ttaaggtcat ccgcaaaaat 1200
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a 1261

<210> 789
<211> 905
<212> DNA
<213> Diabrotica virgifera

<400> 789
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ttttgctggg gatgatgcac ctcgtgctgt attcccttca attgttggac gcccaagaca 120
tcagggtgtg atggtaggaa tgggacaaaa agattcctat gtaggtgatg aagctcaaag 180
taaaagaggt atccttacct taaaataccc catcgagcac ggaatagtca caaactggga 240
tgatatggag aaaatttggc atcatacatt ctacaatgaa ctcagagtag ccccagaaga 300
acaccctgtt ctgttgacag aagctcctct caaccccaag gccaacaggg aaaagatgac 360
acaaataatg tttgaaactt tcaacacccc agccatgtat gttgccatcc aggctgtact 420
ctccttgtat gcatctggtc gtacaactgg tattgtgttg gattctggtg atggtgtatc 480
ccacactgtc ccaatctatg aaggttatgc tcttcctcat gcaatccttc gtttggactt 540
agctggtaga gacttgactg attacctcat gaaaattttg actgaacgtg gctactcttt 600
caccaccaca gcagaaagag aaattgttag agatattaaa gaaaaactct gctatgtagc 660
tttggacttc gaacaagaaa tggcaacagc tgctagttcc agttcccttg aaaagagtta 720
tgaacttcct gatggacaag tcatcaccat tggtaatgaa agattccgtt gcccagaagc 780
tctcttccaa ccatccttct tgggtatgga agctgctggt attcatgaaa caacctacaa 840
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tggag 905

<210> 790
<211> 873
<212> DNA
<213> Diabrotica virgifera

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gaaagatgtg aaaggtttct tgattaacct tattgactct cctggacacg ttgatttctc 180
atcagaagta acagctgccc ttcgtgtcac tgatggtgcc cttgtagtag tagattgtgt 240
atctggtgta tgtgtacaga ctgaaactgt actccgtcaa gctattgcag aacgtattaa 300
gccaatttta ttcatgaaca agatggaccg tgccctctta gaattacagt tggaatctga 360
agaactttac cagactttcc aacgtattgt tgaaaacgtc aacgtcatta ttgccaccta 420
caacgatgat tcaggtccaa tgggtgaagt cagagttgac cccagcaaag gttcagttgg 480
ttttggatca ggtctccacg gatgggcttt cactctcaaa caattctctg aaatgtatgc 540
cgagaaattc aagattgatg tagttaaact aatgaaccgt ttgtggggtg agaacttctt 600
caaccccaaa accaagaaat ggtccaaaca aaaggatgat gataacaaac gttcattctg 660
tatgtacatc ttagatccaa tctacaagat ttttgactcc atcatgaact acaagaaaga 720
agaatatgaa gcactccttc caaaattggg tattgcctta aaacatgaag ataaagacaa 780
agatggtaaa caattattga aagtagttat gcgtacctgg ttgccagctg gagaagcttt 840
acttcagatg atagccattc acttaccatc acc 873

<210> 791
<211> 877
<212> DNA
<213> Diabrotica virgifera

<400> 791
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tcactttgtt ggagaattca agaggaaata caagaaggac cttaccacaa acaaacgtgc 120
cctccgtcgt ttgagaacaa gctgtgaaag agctaagcgt acccttcct catcaaccca 180
agccagcatt gaaatcgatt ctctatttga gggtattgac ttctacacct caatcaccag 240
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atctacccgt attccaaagg tacaaaaact gttgcaagat ttcttcaatg gtaaagaatt 420
gaacaagtcg atcaaccccg atgaagctgt tgcttatggt gcagccgtcc aagccgccat 480
cttgcacgga gataagtctg aggaagtaca ggacttgctc ttgctcgatg tcactccact 540

ttcattgggt attgaaactg ccggaggtgt tatgactgcc ctcatcaaac gtaacactac 600
cattcccacc aagcaaaccc agaccttcac tacttactct gacaaccaac ccggagtact 660
tattcaggta tatgaaggtg aacgtgccat gaccaaggac aacaacctct tgggaaaatt 720
cgaacttacc ggcattcctc ctgcgccccg tgttgtccct cagattgaag taaccttcga 780
cattgatgcc aacggtatct tgaacgtcac agctattgaa aaatccacca acaaagaaaa 840
caagatcacc atcaccaatg ataaaggtcg tctcagc 877

<210> 792
<211> 375
<212> DNA
<213> Diabrotica virgifera

<400> 792
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aaagattaca aaaaggcaca tttaggaact agatggaagg ctaatccttt tggaggtgct 120
tctcatgcta aaggaattgt attggaaaaa gtgggagttg aagcaaaaca acctaactct 180
gctattcgca agtgcgttag ggtacagtta attaaaaatg gtaaaaaaat cacagccttc 240
gtacctagag atggttgctt aaaccatata gaagaaaacg atgaagttct agttgcaggt 300
tttggacgta aaggtcatgc tgtaggagat attcccggag ttagatttaa ggttgttaag 360
gtcgctaatg tgtcc 375

<210> 793
<211> 547
<212> DNA
<213> Diabrotica virgifera

<400> 793
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taacaattct tgtttttctt ctggtgtcat taccacatgt tctggtacca attcatgttc 120
agtaatattg atcaacaact cggattccaa aaattgttct aatatgtatt ttggagccat 180
atcaactagt gactgtttgg cagatggtgt catacctgct tgaacaacaa taatagctct 240
atgaatattt tcttcctgca tacgggaaca ataggtttta atggttttta ttccaatttt 300
tggttcgtct gggaaaaata caaacaactg gtctgtagga tcatcattgt gagctaccaa 360
cacgatcaaa tcacttcttg acggtctttt ctcgctaggt ttgtctccaa actgttcctt 420
aaattgttct aatgtttgat ccaattcatc ttgagttact aggtagcctc tatcgtgaca 480
taactgcatg acagtttttc tgattctcca tagtttgtac gtttcagctt cgtcatccat 540
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<210> 794
<211> 334
<212> DNA
<213> Diabrotica virgifera

<400> 794
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atgcccttgg cttgaaacgt tactgctgca gaaggatgct tttgggacat gtggacctca 180
tcgaaaagtt gttgaattat gctcctttag aaaagtgaaa ctgtagcttt aaggtttatg 240
tatataattt aaaaataatg accttatcca tagttaattt gtatatttta gttctacaaa 300
ataatgcatt gactttcata ggcttataat ttgg 334

<210> 795
<211> 630

<212> DNA
<213> Diabrotica virgifera

<400> 795
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gtagatctca taaatataac actctatttt gaaaatggca aacacaaaca cagacttaac 120
ggaagaagac gcagcagacc tacagtttcc aaaagaattt gaaaatgcag aaactttatt 180
aatatcggag gttcacatgt tattagaaca tagaaaggat caaaatgaat ctgcgaagga 240
cgagcaagaa ttttcggatg tatttatgaa aacattaacg tatacagatc gatttaggaa 300
atttaaaaac aaagaaacca tatcagctgt aagaaattta ctaatgcaga ccaaaaagct 360
tcataaattt gagttggctg ctatcgcaaa cttgtgtcca gaaaccacag aggaggcgaa 420
atctctaatc ccttccctgg aagggcgatt tgaagacgag gaacttcagg caatcctgga 480
tgatattcaa actaaaagaa gtatccagta ctagagaaaa aagtcaatag tcatatttaa 540
tttcagattt tttcttttta tattttggaa caatttaatt atttatatta tttgaaaatg 600
caacaacttt ttcacgatgt aatgttagtg 630

<210> 796
<211> 1152
<212> DNA
<213> Diabrotica virgifera

<400> 796
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catctctctc aaatgagcaa gcattttgat gattctccct ccaggcgtcc aatttaaatg 180
caacatataa aaacaattgt gccgtcaaaa acacgctata aattgccaaa actatataag 240
agaatcaaca aaatcctcga agttgtatgt ttatccctat ttactgtaaa aaagatataa 300
aaaatccaaa attaattatc ttctgtgttt gttagttgat gagacccttg gccttgaaga 360
gatcacgcat gagcccctta aggtacttaa tttcgcgatt tagatcagct atttgacttc 420
ccaaatcaac gttcttgtcc agaagaccct tttcttcact aagaattacc tcaatctcgg 480
ccttcttctt ttggcgatac ctggtagcag cgttcttgtt ttgctccttc ttgcgaacct 540
tcttgtcctc ggtaccgctt ttagagtaag gtctggtcct tttgcgggat gacttaacag 600
gaagttcgtc gttgtactgt tcaattggct ctggcatcca ttccggatca gaagagcagt 660
cgccaaagtt gctgctactg ctactactgc tcggggatcc aggactgctg cttccgctac 720
tgctccattg catgtcttcc acacgagttc tgactagctc gtccacgacg gccagctcca 780
tagcaatatc gggctgagga gtattaacgg gcaaggaata gttgatctcg tagttctctg 840
gcagaaattg cttctccggt tggacgtaaa cacgcttggt ttccactgga tactgtagaa 900
gtggctcgag attggtgagc attggttggc tcgggggaga ctgaggtgga gtgagcgtgc 960
catgggagaa ttccacgact tcgtacacgt tctggaattc cttgaggaaa tattgggtgt 1020
cattggagtt gacaaactca ttcttcaagt tttgaacagg tactggaatg gcacgcggag 1080
gttccacttc gtccaggatt ggtagtattt tttcatcgag aaggaagggt tcgtaacaga 1140
tagacatcat tc 1152

<210> 797
<211> 988
<212> DNA
<213> Diabrotica virgifera

<400> 797
ctcttggatt gatgcgtgag tttagatctt cgattctaac atgtcgacgt tcagcttgta 60
gtaaacgtat gggtaatact ctgattggcc gaatccgagg cctggaatgt caacgctatc 120
aacgttaggt cctgaaaggg cagcactact atcgaggtgg ccgtaaagtt ggttcaagac 180
atctcttaaa cgttttaatt gtttcttatt ggggtggatt aaaatagctt ggaaattgac 240
ggggaggcca tatcttaaaa cagattcaac aaatacctc aacgctttaa cgtgaatcca 300
ggcgcagaaa cactcgctga agttgacttt aagccatcta actaatggac caaattgctt 360

cttttatcg gtgacgagtt tggttatctc gttctttcca gctgccagtt cctcttcgtt 420
atatatgaaa tcacgaacga tgaacttctt ttctctagcg tgtaacttga attcttcgac 480
gacctttttg aatagggata cagtatatag accgtgttcg ttatcctgtt taatcagttg 540
tgaagaacga gggactatca tgtcggtaat cttttcgtat gtcgcattcc attcgttgaa 600
ttgggctttt ggaactataa ccaacaatgt ctgcaaatat tcagaatcca aaataaaatg 660
ttcctttttc accaaatctg ccaagtttct tgttagtaaa cttcctgtct gtttcttctc 720
caaattctga agacttcctt tcaagttatt gtacgcagac gatttggtct tcagatcagc 780
gtcaatttgg ccaacttgtt tgctgattat atcggcgatg ttacggagcg attgcttgat 840
gggatatttg gcgatgtccc aagtaaatcg ggttaaataa gtgggcaaat cgctgttatt 900
ggcctgcagg ttttctgacc acttgtctct ctgttcttca agtacttctc caaggtactg 960
agctaccttt ctggtgacct gctccacg 988

<210> 798
<211> 208
<212> DNA
<213> Diabrotica virgifera

<400> 798
gagtgcctgg agagctgctg gattaaacta cattaactat tccaacattg ctgccaaact 60
tctgaggcag gcacttaaac ctgaacttag aacagaagca atgagaagaa atgaaaccca 120
tattaaagta accaaatggc aagatggaaa gccaataagg gagtccacat tttaaatcca 180
taatttaagt ccaagtctat gtagtgtt 208

<210> 799
<211> 1326
<212> DNA
<213> Diabrotica virgifera

<400> 799
ctgtatctgg tgtcaacggt ccactagtaa tcctcgaaga tgtcaaattt cctaagttca 60
acgaaattgt ccaactcaga ttatctgacg gaagtttaag atcaggtcaa gtacttgaag 120
tcagcggttc caaggctgta gtacaagtat tcgaaggtac atcaggtatc gatgccaaac 180
acactgtctg tgagttcaca ggagatattc tcagaactcc agtctctgag gatatgttgg 240
gaagagtatt caacggctct ggaaaaccta ttgacaaagg tcccccaatt ctggctgaag 300
actacctaga tattcaagga caacccatca acccatggtc ccgtatctac ccagaggaaa 360
tgatccaaac tggtatcact gccatcgatg tgatgaactc gattgcccgt ggtcagaaga 420
ttcccatttt ctcagctgct ggtctgccac ataacgatat tgctgcccaa atttgtaggc 480
aagccggtct tgtcaaaatc ccaggcaaat cagttttgga tgaccacgaa gacaactttg 540
ccatcgtgtt cgctgctatg ggtgttaaca tggagactgc tagattcttc aaacaagatt 600
tcgaagaaaa tggttctatg gaaaacgtat gtttgttctt gaacttggct aacgatccaa 660
ccatcgaaag aatcatcacc ccacgtcttg ctctaacagc cgctgaattc ttggcttacc 720
agtgcgaaaa acacgtgtta gtcattttaa ctgacatgtc ttcatacgct gaagctttgc 780
gtgaggtatc tgccgccaga gaggaagtac ccggtcgtcg tggtttcccc ggttacatgt 840
acaccgattt ggccaccatc tacgaacgtg ccggtcgtgt cgaaggccgt aacggttcca 900
tcactcaaat ccccatcttg actatgccta acgacgatat tactcaccct attcccgatt 960
tgacaggtta tattaccgaa ggacagatct acgtcgaccg tcaattgcac aacaggcaga 1020
tctacccacc aattaacgta ctgccatctc tctcacgttt gatgaagtct gctatcggcg 1080
aaggtatgac caggaaggac cactctgacg tttctaacca attgtatgct tgttatgcta 1140
tcggtaagga cgtccaggcc atgaaagccg tagtaggtga agaagctcta acacccgacg 1200
atcttctcta cctcgagttc ctaacgaaat tcgaaaagaa cttcatcacc caaggaaact 1260
acgaaaaccg caccgtcttc gagtctttgg acatcggctg gcaactactc cgtatcttcc 1320
ctaagg 1326

<210> 800

<211> 1034
<212> DNA
<213> Diabrotica virgifera

<400> 800
ccgggattta gtaggggcgg tccttccgga aagcgtttct tcacttcctt aatagctttg 60
tgcattcctt ttcgactatc tttcgacctt agatcgttgg gacagaacag ccgcacggac 120
gataaatgag ttatcagcgt cgaatctaca gtcactacct cgatttcgcc tttctggtct 180
tccaaacacg gtttcggtat catcgtttca tcgctatttt ctggtaatac gtgtaacaaa 240
atatccactt tgactttagt ttgggttttg ctttgtcctt gtttattttt gcgccccgga 300
ataatctctt ggacctttt gaagttaacc acagcgcccc aatcgtattc atcttcagtc 360
gattttatct ttaaaagtct accaggttga agaaacggca acaaatattg cgagcttgtg 420
agatatgtcc taaacttgac acccaacagg tctaactctg ttctaattac gtgataagac 480
tgtattcgct cttcatcttt gatttcaagc gaattgaaaa gttctaattt ttcgttataa 540
tcatcataat atccgggtat tgcagcttga ttctgaaact ggaagaacga tcgctccaac 600
atatactcag gattgatttc ttcgaccctt agcaagttca gtaccatatt gtaagtcaaa 660
tggaaggcgg agttgatggg gtccggcaaa cctttaacta tgttcctacc ggctgccgga 720
ggcactttct cgtccaccat caatattacg atacctttat cgtccaggcc tcttcttcct 780
gcccttccag acatttggat gtattctcca gaagtaatcc atctgtactc actgccatca 840
aatttcctca ttccagtaaa caacacagtt cttgcaggca tatttaaacc catagcgaac 900
gtttctgtgg caaatagcgc ttttatgagc ccctcgccga ataaaatctc gatggtttcc 960
ttcaaaatcg gcaacaaacc accgtgatgg atgcctattc ctcttcttaa caacggcaga 1020
aggttctcga cttg 1034

<210> 801
<211> 721
<212> DNA
<213> Diabrotica virgifera

<400> 801
ggagaaacca tcccctatac aggaagcctc tatccctata gcactgtctg gaaaagatgt 60
acttgctaga gcaaaaaatg gaacaggtaa gactggtgct tacagtattc ctgtgttaga 120
gcaaatcgac cctaaaaaag actgtattca agcactaatt atagtaccaa cgagagaatt 180
agcattacaa acttcacaaa tatgcataga actagccaaa tacctagagg tacgtgttat 240
ggtgacaaca ggtggaacaa acttacgaga tgacattatg cgtatatacc aaaaagtgca 300
agttatcata gcaactccag ggcgtatact tgacttaatg gaaaaaggag tagcagttat 360
ggaccaatgt aaaattcttg tattagatga agctgacaaa ttactgtctc aagattttaa 420
gggaatgctt gacactgtga ttaaaaattt accacaagag aggcaaattt tactattttc 480
tgcaactttc cctttgacag ttgaacaatt tatgagaaag catttacgag atccgtacga 540
gataaatctc atggaagaac ttacattaaa aggtgttaca cagtattatg catttgtcca 600
ggaaagacag aaagtgcact gtttaaatac tctattttcc aagttacaaa ttaatcaaag 660
tattattttt tgcaattcta cacaacgagt agaattgctg gcgaagaaat aacagaactg 720
g 721

<210> 802
<211> 361
<212> DNA
<213> Diabrotica virgifera

<400> 802
gctttagggc agtgtgtaga aactcctcgt ctttacgatc tttcagtaca aggcctttgg 60
cagtcacatt agtaaataga tgcagtgata ttttacaaaa tagctcacaa agtaaacctg 120
gttctttgat cgatatacag acaagattct attcaccaga ggtaataaaa cctaaacctt 180
ctgaagaaga aatcaaacaa agggtgctga aagtgtgttc ttcatatgat aaagtaactg 240
cagaaaagct gactttgaac tcccacttca tcaatgatct tggattagat tccctagacc 300

atgtcgaagt catcatggcg atggaagatg aattcggctt tgaaatccca gatgctgatg 360
c 361

<210> 803
<211> 183
<212> DNA
<213> Diabrotica virgifera

<400> 803
ggtctttcta gcacaattta caattccatt tttaaaagaa cctcaacaat ggctttagct 60
gttgttgttt ctgcattttt cttcgagaga actttcgatt tagcaacaga caccttttt 120
gaaagatata atgaagggaa attatggaaa cacatcaagg acaaatatga gcaggaataa 180
gtg 183

<210> 804
<211> 372
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
C4_Dv49_CG8055 concatemer; putative binding,
carrier activity: CG8055 ortholog

<400> 804
cccgggttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 60
gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 120
gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 180
gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 240
gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 300
gccctcttta ccatggtagc aaagaaaaat gcgtcgaaaa ataaaagagt tgcactccaa 360
gccctctcta ga 372

<210> 805
<211> 372
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
Primer

<400> 805
cccgggcaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 60
gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 120
gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 180
gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 240
gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 300
gctagccaaa tagatggaac ccttacaact attgaaatgc agagggaagc cctcgaagga 360
gctagctcta ga 372

<210> 806
<211> 490

<212> DNA
<213> Artificial

<220>
<223> Description of Artificial Sequence: C6 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26, Dv49, Dv23, Dv20, Dv13, Dv22, Dv18

<220>
<221> misc_feature
<222> (1)..(70)
<223> Concatemer C6 Dv26 Segment

<220>
<221> misc_feature
<222> (71)..(140)
<223> Concatemer C6 Dv49 Segment

<220>
<221> misc_feature
<222> (141)..(210)
<223> Concatemer C6 Dv423 Segment

<220>
<221> misc_feature
<222> (211)..(280)
<223> Concatemer C6 Dv20 Segment

<220>
<221> misc_feature
<222> (281)..(350)
<223> Concatemer C6 Dv13 Segment

<220>
<221> misc_feature
<222> (351)..(420)
<223> Concatemer C6 Dv22 Segment

<220>
<221> misc_feature
<222> (421)..(490)
<223> Concatemer C6 Dv18 Segment

<400> 806
catcacgact atcctactag tggagaagta tgcgaagtcg atgtcagaga ttgggaagaa 60
tgcaacaggg ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt 120
tgctactaaa ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa 180
ctacagaggt acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca 240
cacggtgctg cacaattctt aagagagagg ctgtttgaag tctcttcagc aatagacaat 300
ttgactccct ttcctcttgg gagggaaacg aaggccttag ctcccttacc tcatcgtccg 360
tttggattca caaaaacaca tcgacttctc tctgaaatca cctttgggag gcggtcgtcc 420
gatccttttc gatttgttgc tgccattggg gatccatctg gacttctgga ggaagcaagg 480
caggtgcagc 490

<210> 807

<211> 560
<212> DNA
<213> Artificial

<220>
<223> Concatemer consisting of segments in order 5'-3' from Dv6, Dv1, Dv88, Dv93, Dv4, Dv113, Dv127, and Dv99

<220>
<221> misc_feature
<222> (1)..(70)
<223> Concatemer C7 Dv6 segment

<220>
<221> misc_feature
<222> (71)..(140)
<223> Concatemer C7 Dv1 segment

<220>
<221> misc_feature
<222> (141)..(210)
<223> Concatemer C7 Dv88 segment

<220>
<221> misc_feature
<222> (211)..(280)
<223> Concatemer C7 Dv93 segment

<220>
<221> misc_feature
<222> (281)..(350)
<223> Concatemer C7 Dv4 segment

<220>
<221> misc_feature
<222> (351)..(420)
<223> Concatemer C7 Dv113 segment

<220>
<221> misc_feature
<222> (421)..(490)
<223> Concatemer C7 Dv127 segment

<220>
<221> misc_feature
<222> (491)..(550)
<223> Concatemer C7 Dv99 segment

<400> 807
ggcgcaagcg cttcagtgtt atcatatgcc cacttccagg catttaaatt ccctgactcc 60
atggaagttc tccatcaggg gccaaaaggg gataccaagc cattaccggc cactcatcca 120
cagctttagc atggtacata tagtgatccc aaccgtgcac ctgactgtga cccaactcaa 180
tgtgtaattc cggactgttt ctgctcagcg cccgccacca gttagcgccg aagtacaaaa 240
gggattggac cttatttttg ctggtatcag agctcaacag gcaccacgtg ctcaacgata 300
aaagactggt caggaaggca cattcctttt tgccttactt attcaaggca gggtgcatac 360
agagtagcca cgtaacaaat agcacatagc gaagtgttgt accagcataa tgtataagct 420

cctgtactta ccaaaggctc gttggcagat ctagaccagt tggacgaatt ggttattgag 480
tactgtggtg cagcgccccc tttatggcag atgaatgtct gatggccata ccagacatcg 540
aaggtattga ttacaccacc 560

<210> 808
<211> 372
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C8
concatemer; putative sodium/potassium-exchanging
ATPase: CG9261 ortholog

<400> 808
cccggggcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 60
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 120
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 180
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 240
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 300
ggagaagcta aaggaaatgg ccaaattaaa acatgctctc atcacgacta tcctactagt 360
ggagaatcta ga 372

<210> 809
<211> 372
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C9
concatemer; putative sodium/potassium-exchanging
ATPase: CG9261 ortholog

<400> 809
cccgggctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 60
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 120
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 180
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 240
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 300
acgatgctcc atgtattttt attaaattga acaaaatata taactgggag ccaatgtatt 360
acgatgtcta ga 372

<210> 810
<211> 1000
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C10
concatemer of genes with putative same/different
mode of action, ~50% GC criterion

<400> 810
caagcccgcc aaaatgcgcg aacatctgga actcttctgg tctcgagtga atatccccaa 60

agttcttagg aatgcaatgc ttcctagacg tcgtcgagct ggctctgaaa ctgagcccca 120
agttatagta ggtaacgata attattggac gtggcattag gttataggga aagtgtcaat 180
ctgtctcaaa ttcgcacatt tgtggaaatg gactcgcacg cgcggcccaa cgacggcttc 240
aacaaacaca ggcgcaagtc gacgaagtcg tggatatcat gaaaacgaat gtagaaaaag 300
gtatggcagg aaagaaatgc tgaatccgcc attgaagctc ttaaagaata tgaaccagaa 360
atgggcaaag ttgtccgaca agacaaatcc ggtattcaga aaatccgggc atagcaaaca 420
tgccaaacac acacacgcag aaaggaaata tcagtcagac tcagaatcag atagtgatct 480
ggaatggatt ggacacagag gtgaatcaga ccagaggacg ttcgggggta tattaaaaat 540
aacgttgtgt gcgcacttgg aaccgaaaca agcagaccat catccgcagc tcagtgcgta 600
gccgaatgtg gccgtgcaca ctgtgcattt gtaggacagg tgtgcgggtt tcaacgtcat 660
gttatgatcc cttgcatata ttgatggaaa aacacgccaa agaagagagc agagtattaa 720
aaggagtatt gccaggtaca tagaccagca aggaactgta atcaaaatgg gcgatgaaaa 780
gaaggccagc gatagcgaac acattaatct caaagtactt ggtcaggata atgcagtggt 840
gcagaaggtc agacctctcc tcaacgtcac ccgtatcgag gatgagattg ccaaacttga 900
agagaaagcc caaaaagccc aacgaacacg gcgtagacga aacatcttgt gtagttattg 960
tagaaggaca aaccagcaca ccagaacaac aagaactagc 1000

<210> 811
<211> 478
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12
concatemer of highly effective WCR targets, ~50%
GC criterion, consisting of segments in order
5'-3' from Dv23-Dv13-Dv26-Dv18-Dv49-Dv22-Dv20.

<220>
<221> misc_feature
<222> (1)..(70)
<223> Concatemer C12 Dv24 Segment

<220>
<221> misc_feature
<222> (71)..(145)
<223> Concatemer C12 Dv13 Segment

<220>
<221> misc_feature
<222> (146)..(222)
<223> Concatemer C12 Dv26 Segment

<220>
<221> misc_feature
<222> (223)..(275)
<223> Concatemer C12 Dv18 Segment

<220>
<221> misc_feature
<222> (276)..(338)
<223> Concatemer C12 Dv49 Segment

<220>
<221> misc_feature
<222> (339)..(418)

<223> Concatemer C12 Dv22 Segment

<220>
<221> misc_feature
<222> (419)..(478)
<223> Concatemer C12 Dv20 Segment

<400> 811
cctcaagctg tcattggcat ggatattctg tgccaagcta aatccggtat gggaaaaacg 60
gctgtttttg caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc 120
aaatttcttc ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct 180
gaagcaacat ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca 240
cattgtcctt ggatgtagta tccatcacgc agaccgccga acaacacgac atagccaacg 300
aaatcacaaa cgctattagc aatcctgtcg gattcaccgt aatgcactcc tacgtcgttt 360
ggttcgtatt ggagtactag acgagaacag aatgaagctc gattacgtat tgggtctccg 420
aagtaatgta caacggccac actggacgta agataaatgc tcagattttc ttaggacc 478

<210> 812
<211> 869
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C14
concatemer of gene targets active in several
different organisms, ~50% GC criterion

<400> 812
ccgaagtgag atcggagcca aaaagcattg gttgcttgac ggtccaatgg aaaacgaacg 60
agaagtggat ggcttcagca atgctcggcc aggctgattg ctctttattt tgacactgga 120
atgtacagcg aagcgctaca actggaatcg accttactga ctactcgtct acgatatcgc 180
caaacatctg acatacgaaa acgttgaacg ttggttgcgc gaattgcgcc attcttttct 240
caggtaccaa tgttgctgct ggtaaagcac gtggtattgt tattggaact ggtcttaaca 300
ccgccattgg taaaatcaga actgaaatgt ccaacgaaat tgccaacact aactcaagac 360
agaacatccg taagttgata aaggatggtc ttattattaa gaagcccgta gctgtacatt 420
cccgtgccga tacctacaca gaaagctata ttagtaccat tggcgtagat tttaaaatca 480
ggacaatcga tttagatggg ttacaaaagg ataccaatac aagatgagag cagcatatgc 540
tcactttccc attaactgtg tcaccactga aggaaacaca gttatccagt ttgcaagctc 600
tctggcagat ttcagtcaaa tcggcaccag aaaatccatg agttacttta gcaatgtata 660
caagatctac gtctttagct acaggcgatt tccgatgaaa tagtggcatt aggttatagg 720
gaaagtgtca atctgtctca aattcgcaca tttgtggaaa tggactcgca cgaagaaaaa 780
gtttatcagg ccgtgagaga attaaaagtt caaggaggta tcggttcgtg tgtatcactt 840
aacgtgaaga gcccccttggt ttccgacac 869

<210> 813
<211> 2694
<212> DNA
<213> Diabrotica virgifera

<400> 813
ggtcgaccca cgcgtccggc ttgagtaaaa actgaaatca tataaaagag ataatttcta 60
ttgtgaacta atttttcaaa agtttctaca ttaagtacat attcattact aaataatggc 120
cgaaaacaaa aatccagagg atttggccac cgcaattctc cgtaagaaag atcgtccaaa 180
tagacttttg gtagaagaag cagttaacga tgataactcc gtggttgctt tgtcacaagc 240
aaaaatggat gaactacaac ttttcagagg agacacagtc ctactgaagg gcaagcgaag 300

gaaagaaact gtttgtatag tattatctga tgatacatgt agcgatgaaa aaattcgtat 360
gaatagaaat aatttaagag ttaggctttc agatgtagtt tctatccaag cttgccctga 420
tgtaaagtat ggcaagagaa tacatgtact tcccatagat gatacagtgg aaggactcac 480
aggaaatctc ttcgaagtat acctgaaacc ctacttcctg gaggcctatc gaccaataca 540
caaagatgac gtattcgttg tacgtggagg aatgagagct gttgaattca aagtcgtcga 600
gaccgatccc gctccgtact gtatcgtggc tccagacacc gtcattcatt gtgatggaga 660
tccaatcaag cgcgaagagg aagaggaagc tcttaacgca gttggatacg acgacatcgg 720
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Dv49 Concatemer C1 dsRNA Expression Cassette

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<210> 822
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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<210> 823
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 823
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<210> 824
<211> 46
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 824
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<210> 825
<211> 113
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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<210> 826
<211> 153
<212> DNA

<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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ttctgtaaaa gatatgggtg cttgcgagat ata 153

<210> 827
<211> 183
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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atc 183

<210> 828
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 828
ccaagccctc aaaaagaaga aacgattgga aaagacccaa ctacaacgac atagccaacg 60
aaatcacaaa cgctattagc aatcctgtcg gattc 95

<210> 829
<211> 96
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 829
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gatgcagttg ctactaaacc aatcaaacca gcagct 96

<210> 830

<211> 266
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

<400> 830
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atggatgcca gtggaggcaa aattatttgg gccagacact ctgaacttca acaggcaaat 180
ctcaaggcgt tagctgaagg tgcggaaata agagatggag aacgccttcc agtttctgta 240
aaagatatgg gtgcttgcga gatata 266

<210> 831
<211> 336
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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ttctgtaaaa gatatgggtg cttgcgagat atagttgctt cttgctacga gctccggtga 180
tgaaaattta gtccgtactc taggagaaac gacacaagct gaaagcaaac ataacttagc 240
atttttgtca cacttgttag taggtgattt aaacaaatgt ctagacattc ttattaatac 300
cggtagattg ccagaagctg catttttcgc cagatc 336

<210> 832
<211> 141
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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aaaccaatca aaccagcagc t 141

<210> 833
<211> 449
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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atggatgcca gtggaggcaa aattatttgg gccagacact ctgaacttca acaggcaaat 180
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tcacacttgt tagtaggtga tttaaacaaa tgtctagaca ttcttattaa taccggtaga 420
ttgccagaag ctgcattttt cgccagatc 449

<210> 834
<211> 590
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic Primer

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attcttatta ataccggtag attgccagaa gctgcatttt tcgccagatc 590

<210> 835
<211> 657
<212> DNA
<213> Diabrotica virgifera

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<210> 836
<211> 1251
<212> DNA
<213> Diabrotica virgifera

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<210> 837
<211> 669
<212> DNA
<213> Diabrotica virgifera

<400> 837
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aagagagaag tacgataatt tagcagattt gtatgctgta ataaacactt tgcaacaatt 120
agagaaggca tatattcgag attgtgtagt ggcaaaggaa tatacaggag cttgtagtaa 180
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ctctgatgaa ttatccgaag ctcaagtgag gcaactgttg tttgatcttg aaagtgcgta 600
tgcgtccttt aataaagtcc ttcataattc tgcctaaatg tacgagatag ttgttatgat 660
tgttacacg 669

<210> 838
<211> 793
<212> DNA
<213> Diabrotica virgifera

<400> 838
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gttttgctgg ttattattat tatattattt aaaaatggag tggttatttg gaaaaaaagt 120
aacccccgaa gaaatgcttc gtaaaaacca acgagcatta aataaagcca tgagagattt 180
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cgatgcggat ttg 793

<210> 839
<211> 767
<212> DNA
<213> Diabrotica virgifera

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ggcacggaag gcatctcttg ctcaatcata ccagccaatt cttcttctac agctgcttca 120
tcttcatctg tcaattgacc actaagaagt tcgttaatct cattctgttt gtcaacccct 180
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tattatcaca cgttttatgc tgttttctta tatcttttag gactaatttt taatcagggt 720
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<210> 840
<211> 588
<212> DNA
<213> Diabrotica virgifera

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taagttctct gatcatttcc tccaacttat tagcattttc accttcttgt tgttctgcct 180
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ctttgtcaaa gaaacattct tctgcatgtg catctactgt gataaaatag gccaaacttt 480
gatttatgcc caaacaaacc agtgaaataa ggaagccgaa aagatacatg tttactttaa 540
attaaaatta gaaaacttcg gccacgtaac ctctcacact tgacgttc 588

<210> 841
<211> 1098
<212> DNA
<213> Diabrotica virgifera

<400> 841
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cttcttgcgg acttctaagt caggagcaga gagtactctc agtatgtcca taactaaatc 180
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gagttttaca ttgttgtcac tttctttgat aattaactca atgtaacagc tagcagcagc 300
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taggaatcca ttcggcaacc tttctcctgc cagaatcatg tgaattattt tttctaatgc 1020
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gggctccgaa tctgttgg 1098

<210> 842
<211> 718
<212> DNA
<213> Diabrotica virgifera

<400> 842
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cccattcggt tcccggttct agttcgtcat cttcggctac gaactgcttt tcagcgttcc 180
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tttcaaaact gctcgcagaa ttggttgggt catcaccatt aagaactgga gcaataactg 540
cggccggttt cacttcatct tcaaggcctg ctagttcgtc ttgctcgcgt gccaagaatt 600
ctgccgctgg gtcttcgtcg gcaactccaa aattgtctcc aaatccagac attcttgatt 660
ttgttaatct taaggataag aaaagctgct attttcccac tgacactgac agcaaagc 718

<210> 843
<211> 842
<212> DNA
<213> Diabrotica virgifera

<400> 843
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agacagatat ctattagcaa tctcaggtgc tttggccata tgtctctgaa gagtgatcat 180
gttaacaagt gtatcaggat agttggcatc cttatcaagt gcttcttgaa gagctgcttc 240
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agtggatcca tatttgtcta caagttcttg gtaaatatag taggcgtcct ggagtttatc 360
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agcatcaaga ttgccttcgt taacataaat agtagctgct accaaaatta gagtatcatt 600
gttagcattt gcttggactt gttgctccac ttgagccacc acagaatcct tcttgatttt 660
gcctgctaag tagtcagcga ggtatttcag gggttggatt tctgggggag atgccccgtg 720

gatttcgtct aatactacta ggaatttatt ttgggccata taggaccggt aggtgtagaa 780
gtctctttgg actgctactt cgggcgttga cggctttctg agtttttgtg cctcgtttat 840
gc 842

<210> 844
<211> 679
<212> DNA
<213> Diabrotica virgifera

<400> 844
cttctgcaaa agatttggca tacgagatca tgtgcaggta tatcaggaaa aagtcagatc 60
ctctttgcta tagtctacac tacaagatac cttgacttag tgacgtcata tgtatctatg 120
tacaatactg ttatgaaatt tgtatttttg gccacatcgt atgcaactat ttatttaatc 180
tacatgaaat ttaaagccac ttatgaccat aaccatgaca cgttcagaat agagtttctc 240
attttaccat cgtttggttt ggctatgctt atcaatcacg agttttcatt tatggaggtc 300
ttgtggactt tcagtattta tttggaatca gtggctatat tgccgcaatt gttcatggtc 360
agtaaaacag gagaagcaga aagtattact tcgcactact tattcgcatt gggatcttat 420
agggccctat acattttgaa ctggatctac cgctatgcaa ctgaaactca ttacgatctc 480
atcgctatag tagctggtgt tgtgcagact atattatatt gtgacttctt ttatctttac 540
attactaaag tactcaaggg aaagaaacta caattgcccg cttaaacccc tcttatataa 600
gacttaactg tacaaacatt ttactttcag ctaaacggta ttaacacaat gatgcctaat 660
gatcatgtgt ttggatagc 679

<210> 845
<211> 725
<212> DNA
<213> Diabrotica virgifera

<400> 845
atgtataaga gggatcgggc cagaaagctg cagataatgc ggcagcggca gttggcggcg 60
caaacgttga ggggcggatt agggcccgat atgtattccg gacaaccggg cacttcgcct 120
ttcgccaaca tccacatcaa acaagaaata caaatacctc aagtgtcctc ccttacctca 180
tcgccagatt cgtcgcccag tcccatagca gtagctttag gccaggtgaa ctcctcgttg 240
gtgcagccca cgtccaatca gcagcccgct ctccagatcg tcggcgttcc tggaggtcac 300
tcgtcgatgg tcatgggccc ggataacaaa ctctgggccc aagcgaactc caccaccaca 360
tcacccctta gtcccaaagt gttccaattc gagactgtcg taccgggcag cagtgtaccg 420
ccttcgagta aagtgtcgcc gctcattagg gatttcgttg ccgccgttga cgatcgcgaa 480
tggcaaaact ctttgtacac tcttttacaa aaccagacgt acaatcagtg tgaagtggac 540
ttatttgaac taatgtgtaa agttttggac caaaatctct tttctcaagt cgattgggcg 600
aggaattcga tattctttaa agatctcaag gtggacgatc aaatgaaact tctgcagcat 660
tcatggtcgg atatgttggt gctggatcac atacaccagc gcacgcacaa taacctaccc 720
gacga 725

<210> 846
<211> 864
<212> DNA
<213> Diabrotica virgifera

<400> 846
gcgtgggcgt ggcttataat gctagtatag gaggtgtacg tatgttagat ggtgtagtaa 60
acgacgcagt tgaagccaga gccctaggtc taaacccgga acacatcgac atctacagcg 120
cttcctgggg acctgaagac gacgggaaaa ccgtagacgg tcccggacca ttagcaagac 180
gagcttttat atacggagta actagtggga gaaaaggaaa aggatctatt ttcgtttggg 240
cttcgggaaa tggaggccga catacggatt cctgcaattg tgatggatac accaacagta 300

tctttacctt gagtatatct agtgctacac aaggaggtta caaaccttgg tatttggaag 360
agtgttcttc aacattagca acaacttaca gctcaggaac acctggacat gacaaaagcg 420
tcgcgactgt tgatatggac gctagattac gaccagatca tatctgtact gtagaacata 480
ctggaacttc agcttcagca cctttagctg ctggaatatg cgccctagct cttgaagcca 540
accccacgtt gacgtggcgt gacatgcaat atttagtagt actaacttca agagctcctc 600
cactggaaaa agaggctgga tggatagtaa acggcgttgg gcgaaaagct tctcataaat 660
ttggttatgg tctcatggac gctggtgctt tggttacttt agctgaaaaa tggactacgg 720
taccacctca acacatctgt aaaagtcagg aaattgtaga agatcgacca attaatcctg 780
cctatggttc cagtttgaat ttcaatatgg aagtagacgc atgtagtggt accttgaacg 840
aagtcaggta cctggagcac gtgc 864

<210> 847
<211> 140
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.1 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv49

<400> 847
catcacgact atcctactag tggagaagta tgcgaagtcg atgtcagaga ttgggaagaa 60
tgcaacaggg ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt 120
tgctactaaa ccaatcaaac 140

<210> 848
<211> 210
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.2 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv49-Dv23

<400> 848
catcacgact atcctactag tggagaagta tgcgaagtcg atgtcagaga ttgggaagaa 60
tgcaacaggg ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt 120
tgctactaaa ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa 180
ctacagaggt acagaaaaag ggtgtcaagg 210

<210> 849
<211> 280
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.3 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv49-Dv23-Dv20

<400> 849
catcacgact atcctactag tggagaagta tgcgaagtcg atgtcagaga ttgggaagaa 60

tgcaacaggg ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt 120
tgctactaaa ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa 180
ctacagaggt acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca 240
cacggtgctg cacaattctt aagagagagg ctgtttgaag 280

<210> 850
<211> 350
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.4 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv49-Dv23-Dv20-Dv13

<400> 850
catcacgact atcctactag tggagaagta tgcgaagtcg atgtcagaga ttgggaagaa 60
tgcaacaggg ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt 120
tgctactaaa ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa 180
ctacagaggt acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca 240
cacggtgctg cacaattctt aagagagagg ctgtttgaag tctcttcagc aatagacaat 300
ttgactccct ttcctcttgg gagggaaacg aaggccttag ctcccttacc 350

<210> 851
<211> 420
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.5 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv49-Dv23-Dv20-Dv13-Dv22

<400> 851
catcacgact atcctactag tggagaagta tgcgaagtcg atgtcagaga ttgggaagaa 60
tgcaacaggg ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt 120
tgctactaaa ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa 180
ctacagaggt acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca 240
cacggtgctg cacaattctt aagagagagg ctgtttgaag tctcttcagc aatagacaat 300
ttgactccct ttcctcttgg gagggaaacg aaggccttag ctcccttacc tcatcgtccg 360
tttggattca caaaaacaca tcgacttctc tctgaaatca cctttgggag gcggtcgtcc 420

<210> 852
<211> 140
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.6 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv49-Dv23

<400> 852
ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt tgctactaaa 60

ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt 120
acagaaaaag ggtgtcaagg 140

<210> 853
<211> 210
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.7 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
Dv49-Dv23-Dv20

<400> 853
ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt tgctactaaa 60
ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt 120
acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg 180
cacaattctt aagagagagg ctgtttgaag 210

<210> 854
<211> 280
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.8 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv49-Dv23-Dv20-Dv13

<400> 854
ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt tgctactaaa 60
ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt 120
acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg 180
cacaattctt aagagagagg ctgtttgaag tctcttcagc aatagacaat ttgactccct 240
ttcctcttgg gagggaaacg aaggccttag ctcccttacc 280

<210> 855
<211> 350
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.9 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv49-Dv23-Dv20-Dv13-Dv22

<400> 855
ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt tgctactaaa 60
ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt 120
acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg 180
cacaattctt aagagagagg ctgtttgaag tctcttcagc aatagacaat ttgactccct 240
ttcctcttgg gagggaaacg aaggccttag ctcccttacc tcatcgtccg tttggattca 300
caaaaacaca tcgacttctc tctgaaatca cctttgggag gcggtcgtcc 350

<210> 856
<211> 420
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.10 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv49-Dv23-Dv20-Dv13-Dv22-Dv18

<400> 856
ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt tgctactaaa 60
ccaatcaaac gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt 120
acagaaaaag ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg 180
cacaattctt aagagagagg ctgtttgaag tctcttcagc aatagacaat ttgactccct 240
ttcctcttgg gagggaaacg aaggccttag ctcccttacc tcatcgtccg tttggattca 300
caaaaacaca tcgacttctc tctgaaatca cctttgggag gcggtcgtcc gatccttttc 360
gatttgttgc tgccattggg gatccatctg gacttctgga ggaagcaagg caggtgcagc 420

<210> 857
<211> 140
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.11 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv23-Dv20

<400> 857
gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt acagaaaaag 60
ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt 120
aagagagagg ctgtttgaag 140

<210> 858
<211> 210
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.12 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv23-Dv20-Dv13

<400> 858
gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt acagaaaaag 60
ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt 120
aagagagagg ctgtttgaag tctcttcagc aatagacaat ttgactccct ttcctcttgg 180
gagggaaacg aaggccttag ctcccttacc 210

<210> 859
<211> 280
<212> DNA

<213> Artificial

<220> Description of Artificial Sequence: C6.13 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv23-Dv20-Dv13-Dv22

<400> 859
gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt acagaaaaag 60
ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt 120
aagagagagg ctgtttgaag tctcttcagc aatagacaat ttgactccct ttcctcttgg 180
gagggaaacg aaggccttag ctcccttacc tcatcgtccg tttggattca caaaaacaca 240
tcgacttctc tctgaaatca cctttgggag gcggtcgtcc 280

<210> 860
<211> 350
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.14 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv23-Dv20-Dv13-Dv22-Dv18

<400> 860
gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt acagaaaaag 60
ggtgtcaagg ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt 120
aagagagagg ctgtttgaag tctcttcagc aatagacaat ttgactccct ttcctcttgg 180
gagggaaacg aaggccttag ctcccttacc tcatcgtccg tttggattca caaaaacaca 240
tcgacttctc tctgaaatca cctttgggag gcggtcgtcc gatccttttc gatttgttgc 300
tgccattggg gatccatctg gacttctgga ggaagcaagg caggtgcagc 350

<210> 861
<211> 140
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.15 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv20-Dv13

<400> 861
ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt aagagagagg 60
ctgtttgaag tctcttcagc aatagacaat ttgactccct ttcctcttgg gagggaaacg 120
aaggccttag ctcccttacc 140

<210> 862
<211> 210
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.16 concatemer

of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv20-Dv13-Dv22

<400> 862
ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt aagagagagg 60
ctgtttgaag tctcttcagc aatagacaat ttgactccct ttcctcttgg gagggaaacg 120
aaggccttag ctcccttacc tcatcgtccg tttggattca caaaaacaca tcgacttctc 180
tctgaaatca cctttgggag gcggtcgtcc 210

<210> 863
<211> 280
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.17 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv20-Dv13-Dv22-Dv18

<400> 863
ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt aagagagagg 60
ctgtttgaag tctcttcagc aatagacaat ttgactccct ttcctcttgg gagggaaacg 120
aaggccttag ctcccttacc tcatcgtccg tttggattca caaaaacaca tcgacttctc 180
tctgaaatca cctttgggag gcggtcgtcc gatccttttc gatttgttgc tgccattggg 240
gatccatctg gacttctgga ggaagcaagg caggtgcagc 280

<210> 864
<211> 140
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.18 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv13-Dv22

<400> 864
tctcttcagc aatagacaat ttgactccct ttcctcttgg gagggaaacg aaggccttag 60
ctcccttacc tcatcgtccg tttggattca caaaaacaca tcgacttctc tctgaaatca 120
cctttgggag gcggtcgtcc 140

<210> 865
<211> 210
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.19 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv13-Dv22-Dv18

<400> 865

tctcttcagc aatagacaat ttgactccct ttcctcttgg gagggaaacg aaggccttag 60
ctcccttacc tcatcgtccg tttggattca caaaaacaca tcgacttctc tctgaaatca 120
cctttgggag gcggtcgtcc gatccttttc gatttgttgc tgccattggg gatccatctg 180
gacttctgga ggaagcaagg caggtgcagc 210

<210> 866
<211> 140
<212> DNA
<213> Artificial

<220> Description of Artificial Sequence: C6.20 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv22-Dv18

<400> 866
tcatcgtccg tttggattca caaaaacaca tcgacttctc tctgaaatca cctttgggag 60
gcggtcgtcc gatccttttc gatttgttgc tgccattggg gatccatctg gacttctgga 120
ggaagcaagg caggtgcagc 140

<210> 867
<211> 70
<212> DNA
<213> Diabrotica virgifera

<400> 867
catcacgact atcctactag tggagaagta tgcgaagtcg atgtcagaga ttgggaagaa 60
tgcaacaggg 70

<210> 868
<211> 70
<212> DNA
<213> Diabrotica virgifera

<400> 868
ctccaagtgc caggtccaac tcaactgccg gctgtgtctg ctgatgcagt tgctactaaa 60
ccaatcaaac 70

<210> 869
<211> 70
<212> DNA
<213> Diabrotica virgifera

<400> 869
gatgaggaac agacagaaca aaccgcaact gaaacggcaa ctacagaggt acagaaaaag 60
ggtgtcaagg 70

<210> 870
<211> 70
<212> DNA
<213> Diabrotica virgifera

<400> 870
ggtgagatgg aacgagattg tcaaatttca cacggtgctg cacaattctt aagagagagg 60
ctgtttgaag 70

<210> 871
<211> 70
<212> DNA
<213> Diabrotica virgifera

<400> 871
tctcttcagc aatagacaat ttgactccct ttcctcttgg gagggaaacg aaggccttag 60
ctcccttacc 70

<210> 872
<211> 70
<212> DNA
<213> Diabrotica virgifera

<400> 872
tcatcgtccg tttggattca caaaaacaca tcgacttctc tctgaaatca cctttgggag 60
gcggtcgtcc 70

<210> 873
<211> 70
<212> DNA
<213> Diabrotica virgifera

<400> 873
gatccttttc gatttgttgc tgccattggg gatccatctg gacttctgga ggaagcaagg 60
caggtgcagc 70

<210> 874
<211> 1358
<212> DNA
<213> Diabrotica virgifera

<400> 874
cttgttgaat tggaggaggt ggcttcaaaa attttgcatt tggatctaca tctggaaaac 60
ctttcttttc tccaatttgt tccttcagct gttcagcttc atctaccatt ccgtgagtag 120
cagctgtcaa gtaggccaaa gaaagttgat tggaagcctt caaaatttta acacgctctt 180
caagatcacc aagcaaaagt gcagcatgat attgagatga tttagctttt ctaatttccg 240
caattttcat catttttctc aatttgtcca ggttgccggt aatcagatat aggaatgata 300
atttttcgaa actcttggtc ctttgataac acatctcaac tacttgatgg tttccttgcc 360
atagagcagc atgtgctagt tgatcccaac aagctttgtc attcaaagat ttcgcagcat 420
ctagagcaat ctcaatattt ccacattcca gagccaaagt aaatcgagtt ttgtcgtctt 480
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gtcccaccaa ttttgaattt ctaaccatat acaaaacttc ttcatatttg tgattaatta 600
atgcaagttt gaatttgtat tccattgaat ccactgtcaa tacccgtggt ttgcattcac 660
gatcaaggca aaagatctgg tttcctctta ctctggtgat gtatattgga agatcgaggg 720
ttctaataat tccttggtca ccgtttttaa gtgtatattt caaaatggtt gcttgtagta 780
taaataaaaa ctcctgtatc atcccaagct ccagatttca ctctagtatt ttcgtgtaaa 840
caacataaaa catccaattt cctattacaa atagtcacgt tgtgtttgga aaggagagcc 900

aagtgggaca tatcagacga ccagacaacg tatctgcatt tgttaatttt cacttgtgct 960
aaagttctct tctgttgaac gtcaaacaga gtaacatgtt cagaatctct taataacagc 1020
attccagtac cagcataaaa tacttcatca catgtaggag tttgtacctt cttggtgact 1080
tcgtttttca agttcttgat aattagttga tgagtcctgt ccaaaacggc aaatctgttt 1140
cttgcaaccc ataatgccgt aagtccagaa gacctttgc tttcagcttc tggtacttga 1200
tcatctctct cctgctcttt tggaatcaca tataaatcgt atgtgctatt atccaagttt 1260
gaagttcttg tagaaagaag aacagcattt tcagctggat taaaggacat cttataaact 1320
ggtatttttc ctccaccacg aatctgaatg actggaac 1358

<210> 875
<211> 2714
<212> DNA
<213> Diabrotica barberi

<400> 875
atgccacttc gattagatat aaaaagaaag ctaacagctc gctcagaccg ggtaaaatgt 60
gtggatcttc accctacaga accttggatg ctatgttctc tttacagcgg aaatataaac 120
gtttggaaca ccgaaaatca gcaactggtt aagacttttg aagtatgtga tgtacccgtt 180
cggacagcta agtttttgcc caggaagaac tggatagtca gtgggtctga tgatatgcag 240
attcgagttt tcaattacaa taccttagat cgggtacatt cttttgaggc tcattcggat 300
tatgtgagat gtattgtcgt acaccctaca caaccttata tattaacaag tagtgatgat 360
atgcttatca agctttggaa ttgggaaaaa gcatgggcct gtcagcaagt tttcgaagga 420
cacactcact atattatgca aatcgccata aatccaaaag acaacaacac atttgccagt 480
gcatccctag acagaacatt gaaagtatgg caattgggag cgtccacagc caatttcaca 540
ctagaaggtc acgagaaagg cgttaactgt gtggactatt atcatggtgg agataagcct 600
tatttaatct caggtgctga tgatagatta gtaaaaatct gggattatca aaacaaaact 660
tgtgttcaaa ctttagaagg acatgctcaa aatgtaactg ctgcatgttt ccatccagaa 720
cttcctgtag ctcttactgg aagtgaagat ggtactgtca gagtgtggca tgccaacacc 780
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ggtttgtttc caccctgaac tacctgtggc tctcacaggc agcgaagatg gtaccgttag 180
agtttggcat acgaatacac acagattaga gaattgtttg aattatgggt tcgagagagt 240
gtggaccatt tgttgcttga agggttcgaa taatgtttct ctggggtatg acgagggcag 300
tatattagtg aaagttggaa gagaagaacc ggcagttagt atggatgcca gtggcggtaa 360
aataatttgg gcaaggcact cggaattaca acaagctaat ttgaaggcgc tgccagaagg 420
tggagaaata agagatgggg agcgtttacc tgtctctgta aaagatatgg gagcatgtga 480
aatataccct caaacaatcc aacataatcc gaatggaaga ttcgttgtag tatgcggaga 540
cggcgaatat atcatttaca cagcgatggc tctacggaac aaggcttttg gaagcgctca 600
agagtttgtc tgggctcagg actccagcga gtatgccatt cgcgagtctg gttccacaat 660
tcggatattc aaaaacttca aagaaaggaa gaacttcaag tcggatttca gcgcggaagg 720
aatctacggg ggttttctct tggggattaa atcggtgtcc ggtttaacgt tttacgattg 780
ggaaactttg gacttggtga gacggattga aatacaaccg agggcggttt attggtctga 840
cagtggaaaa ttagtctgtc tcgcaacgga ggacagctac ttcatccttt cttatgattc 900
ggagcaagtt cagaaggcca gggagaacaa tcaagtcgca gaggatggcg tagaggccgc 960
tttcgatgtg ttgggggaaa tgaacgagtc tgtccgaaca ggtctttggg tcggagactg 1020
tttcatctat acc 1033

<210> 882
<211> 601
<212> DNA
<213> Diabrotica balteata

<400> 882
gtcctgggga ggctattcaa aaactcagag agactgaaga aatgttaata aaaaaacagg 60
atttttaga aaagaagata gaagaatata ccttagtagc aaagaaaaat gcgtcgaaaa 120
ataaaagagt tgcactccaa gctctcaaaa agaagaaacg attggaaaag acccaactac 180
aaatagatgg aacccttaca actattgaaa tgcagaggga agccctcgaa ggagctagca 240
caaatactgc tgtattagat tctatgaaaa atgctgcaga tgcccttaag aaagctcata 300
agaacttgaa tgtggatgat gttcacgaca tcatggatga catagccgaa caacacgaca 360
tagccaacga aatcacaaac gctattagca accctgttgg attcaccgac gatctggacg 420
acgatgaatt agagaaagaa ttagaagagc tcgaacaaga aggattggaa gaagacctgc 480
ttcaagtgcc aggtcccact caactgccgg ctgtgcctac tgatgcagtt gctaataaac 540
caatcaaacc agcagctaga aaagttgaag atgatgacga tatgaaagaa ttggaagcct 600
g 601

<210> 883
<211> 601
<212> DNA
<213> Diabrotica barberi

<400> 883
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atttttaga aaagaagata gaagaattta ccatggtagc aaagaaaaat gcgtcgaaaa 120
ataaaagagt tgcactccaa gccctcaaaa agaagaaacg attggaaaag actcaactac 180
aaatagatgg aacccttaca actattgaaa tgcagaggga agccctcgaa ggagctagca 240
caaatactgc tgtattagat tctatgaaaa atgctgcaga tgcccttaag aaagctcata 300
agaatttgaa tgtagatgat gttcacgata tcatggatga catagccgaa caacacgaca 360
tagccaacga aattacaaat gctattagca accctgttgg attcaccgac gatctggacg 420
acgatgaatt agaaaaagaa ttagaagagc tcgaacaaga aggattggaa gaagacctgc 480
tccaagtgcc aggtccaact caactgccgg ctgtgcctgc tgatgcagtt actactaaac 540
caatcaaacc agcagctaaa aaagttgaag atgatgacga tatgaaagaa ttggaagcct 600
g 601

<210> 884
<211> 601
<212> DNA
<213> Diabrotica undecimpunctata howardii

<400> 884
gtcctgggga ggctattcaa aaactcagag agactgaaga aatgttaata aaaaaacagg 60
atttttaga aaagaagata gaagaattta ccttagtagc aaagaaaaat gcgtcgaaaa 120
ataaaagagt tgcactccaa gccctcaaaa agaagaaacg attggaaaag acccaactac 180
aaatagatgg aacccttaca actattgaaa tgcagaggga agccctcgaa ggagctagca 240
caaatactgc tgtattagat tctatgaaaa atgctgcaga tgcccttaag aaagctcata 300
agaacttgaa tgtggatgat gttcacgaca tcatggatga catagccgaa caacacgaca 360
tagccaacga aatcacaaac gctattagca atcctgttgg attcaccgac gatctggacg 420
atgatgaatt agagaaagaa ttagaagagc tcgaacaaga aggattggaa gaagacctgc 480
ttcaagtgcc aggtccaact caactgccgg ctgtgcctac tgatgcagtt gctaataaac 540
caattaaacc agcagctaga aaagttgaag atgatgacga tatgaaagaa ttggaagcct 600
g 601

<210> 885
<211> 601
<212> DNA
<213> Diabrotica virgifera zeae

<400> 885
gtcctgggga ggctattcaa aaactcagag agactgaaga aatgttaata aaaaaacagg 60
atttttaga aaagaagata gaagaattta ccatggtagc aaagaaaaat gcgtcgaaaa 120
ataaaagagt tgcactccaa gccctcaaaa agaagaaacg attggaaaag acccaactac 180
aaatagatgg aacccttaca actattgaaa tgcagaggga agccctcgaa ggagctagca 240
caaatactgc tgtattagat tctatgaaaa atgctgcaga tgcccttaag aaagctcata 300
agaatttgaa tgtagatgat gttcacgata tcatggatga catagccgaa caacacgaca 360
tagccaacga aatcacaaac gctattagca atcctgtcgg attcaccgac gatctggatg 420
acgatgaatt agaaaaagaa ttagaagagc tcgaacaaga aggattggaa gaagacctgc 480
tccaagtgcc aggtccaact caactgccgg ctgtgcctgc tgatgcagtt gctactaaac 540
caatcaaacc agcagctaaa aaagttgaag atgatgacga tatgaaagaa ttggaagcct 600
g 601

<210> 886
<211> 601
<212> DNA
<213> Diabrotica virgifera virgifera

<400> 886
gtcctgggga ggctattcaa aaactcagag agactgaaga aatgttaata aaaaaacagg 60
atttttaga aaagaagata gaagaattta ccatggtagc aaagaaaaat gcgtcgaaaa 120
ataaaagagt tgcactccaa gccctcaaaa agaagaaacg attggaaaag acccaactac 180
aaatagatgg aacccttaca actattgaaa tgcagaggga agccctcgaa ggagctagca 240
caaatactgc tgtattagat tctatgaaaa atgctgcaga tgcccttaag aaagctcata 300
agaatttgaa tgtagatgat gttcacgata tcatggatga catagccgaa caacacgaca 360
tagccaacga aatcacaaac gctattagca atcctgtcgg attcaccgac gatctggatg 420
acgatgaatt agaaaaagaa ttagaagagc tcgaacaaga aggattggaa gaagacctgc 480
tccaagtgcc aggtccaact caactgccgg ctgtgcctgc tgatgcagtt gctactaaac 540
caatcaaacc agcagctaaa aaagttgaag atgatgacga tatgaaagaa ttggaagcct 600
g 601

<210> 887
<211> 145
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.1
concatemer of highly effective WCR targets, ~50%
GC criterion, consisting of segments in order
5'-3' from Dv23-Dv13

<400> 887
cctcaagctg tcattggcat ggatattctg tgccaagcta aatccggtat gggaaaaacg 60
gctgtttttg caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc 120
aaatttcttc ctccagtgat catac 145

<210> 888
<211> 222
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.2
concatemer of highly effective WCR targets, ~50%
GC criterion, consisting of segments in order
5'-3' from 23-Dv13-Dv26

<400> 888
cctcaagctg tcattggcat ggatattctg tgccaagcta aatccggtat gggaaaaacg 60
gctgtttttg caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc 120
aaatttcttc ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct 180
gaagcaacat ataaggggta tcaacaatac tagagagttg ag 222

<210> 889

<211> 275
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.3
concatemer of highly effective WCR targets, ~50%
GC criterion, consisting of segments in order
5'-3' from Dv23-Dv13-Dv26-Dv18

<400> 889
cctcaagctg tcattggcat ggatattctg tgccaagcta aatccggtat gggaaaaacg 60
gctgtttttg caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc 120
aaatttcttc ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct 180
gaagcaacat ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca 240
cattgtcctt ggatgtagta tccatcacgc agacc 275

<210> 890
<211> 338
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.4
concatemer of highly effective WCR targets, ~50%
GC criterion, consisting of segments in order
5'-3' from Dv23-Dv13-Dv26-Dv18-Dv49

<400> 890
cctcaagctg tcattggcat ggatattctg tgccaagcta aatccggtat gggaaaaacg 60
gctgtttttg caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc 120
aaatttcttc ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct 180
gaagcaacat ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca 240
cattgtcctt ggatgtagta tccatcacgc agaccgccga acaacacgac atagccaacg 300
aaatcacaaa cgctattagc aatcctgtcg gattcacc 338

<210> 891
<211> 418
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.5
concatemer of highly effective WCR targets, ~50%
GC criterion, consisting of segments in order
5'-3' from Dv23-Dv13-Dv26-Dv18-Dv49-Dv22

<400> 891
cctcaagctg tcattggcat ggatattctg tgccaagcta aatccggtat gggaaaaacg 60
gctgtttttg caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc 120
aaatttcttc ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct 180
gaagcaacat ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca 240
cattgtcctt ggatgtagta tccatcacgc agaccgccga acaacacgac atagccaacg 300
aaatcacaaa cgctattagc aatcctgtcg gattcaccgt aatgcactcc tacgtcgttt 360
ggttcgtatt ggagtactag acgagaacag aatgaagctc gattacgtat tgggtctc 418

<210> 892
<211> 152
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.6 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv13-Dv26

<400> 892
caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc aaatttcttc 60
ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct gaagcaacat 120
ataaggggta tcaacaatac tagagagttg ag 152

<210> 893
<211> 205
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.7 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from
Dv13-Dv26-Dv18

<400> 893
caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc aaatttcttc 60
ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct gaagcaacat 120
ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca cattgtcctt 180
ggatgtagta tccatcacgc agacc 205

<210> 894
<211> 268
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.8 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv13-Dv26-Dv18-Dv49

<400> 894
caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc aaatttcttc 60
ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct gaagcaacat 120
ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca cattgtcctt 180
ggatgtagta tccatcacgc agaccgccga acaacacgac atagccaacg aaatcacaaa 240
cgctattagc aatcctgtcg gattcacc 268

<210> 895
<211> 348
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.9
concatemer of highly effective WCR targets, ~50%
GC criterion, consisting of segments in order
5'-3' from
Dv13-Dv26-Dv18-Dv49-Dv22

<400> 895
caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc aaatttcttc 60
ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct gaagcaacat 120
ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca cattgtcctt 180
ggatgtagta tccatcacgc agaccgccga acaacacgac atagccaacg aaatcacaaa 240
cgctattagc aatcctgtcg gattcaccgt aatgcactcc tacgtcgttt ggttcgtatt 300
ggagtactag acgagaacag aatgaagctc gattacgtat tgggtctc 348

<210> 896
<211> 408
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.10 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv13-Dv26-Dv18-Dv49-Dv22-Dv20

<400> 896
caaaggatcc aggatgacgt tccctattga taactgtacc tacacgaccc aaatttcttc 60
ctccagtgat catacccata cgatttacct gaggaaatgc cggataatct gaagcaacat 120
ataaggggta tcaacaatac tagagagttg agtcaaacat aattatggca cattgtcctt 180
ggatgtagta tccatcacgc agaccgccga acaacacgac atagccaacg aaatcacaaa 240
cgctattagc aatcctgtcg gattcaccgt aatgcactcc tacgtcgttt ggttcgtatt 300
ggagtactag acgagaacag aatgaagctc gattacgtat tgggtctccg aagtaatgta 360
caacggccac actggacgta agataaatgc tcagattttc ttaggacc 408

<210> 897
<211> 130
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.11 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from
Dv26-Dv18

<400> 897
ccatacgatt tacctgagga aatgccggat aatctgaagc aacatataag gggtatcaac 60
aatactagag agttgagtca aacataatta tggcacattg tccttggatg tagtatccat 120

cacgcagacc 130

<210> 898
<211> 193
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.12 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv18-Dv49

<400> 898
ccatacgatt tacctgagga aatgccggat aatctgaagc aacatataag gggtatcaac 60
aatactagag agttgagtca aacataatta tggcacattg tccttggatg tagtatccat 120
cacgcagacc gccgaacaac acgacatagc caacgaaatc acaaacgcta ttagcaatcc 180
tgtcggattc acc 193

<210> 899
<211> 273
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.13 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv18-Dv49-Dv22

<400> 899
ccatacgatt tacctgagga aatgccggat aatctgaagc aacatataag gggtatcaac 60
aatactagag agttgagtca aacataatta tggcacattg tccttggatg tagtatccat 120
cacgcagacc gccgaacaac acgacatagc caacgaaatc acaaacgcta ttagcaatcc 180
tgtcggattc accgtaatgc actcctacgt cgtttggttc gtattggagt actagacgag 240
aacagaatga agctcgatta cgtattgggt ctc 273

<210> 900
<211> 333
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.14 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv26-Dv18-Dv49-Dv22-Dv20

<400> 900
ccatacgatt tacctgagga aatgccggat aatctgaagc aacatataag gggtatcaac 60
aatactagag agttgagtca aacataatta tggcacattg tccttggatg tagtatccat 120
cacgcagacc gccgaacaac acgacatagc caacgaaatc acaaacgcta ttagcaatcc 180
tgtcggattc accgtaatgc actcctacgt cgtttggttc gtattggagt actagacgag 240

aacagaatga agctcgatta cgtattgggt ctccgaagta atgtacaacg gccacactgg 300
acgtaagata aatgctcaga ttttcttagg acc 333

<210> 901
<211> 116
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.15 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from
Dv18-Dv49

<400> 901
tcaaacataa ttatggcaca ttgtccttgg atgtagtatc catcacgcag accgccgaac 60
aacacgacat agccaacgaa atcacaaacg ctattagcaa tcctgtcgga ttcacc 116

<210> 902
<211> 196
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.16 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv18-Dv49-Dv22

<400> 902
tcaaacataa ttatggcaca ttgtccttgg atgtagtatc catcacgcag accgccgaac 60
aacacgacat agccaacgaa atcacaaacg ctattagcaa tcctgtcgga ttcaccgtaa 120
tgcactccta cgtcgtttgg ttcgtattgg agtactagac gagaacagaa tgaagctcga 180
ttacgtattg ggtctc 196

<210> 903
<211> 256
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.17 concatemer
of highly effective WCR targets, ~50% GC
criterion, consisting of segments in order 5'-3'
from Dv18-Dv49-Dv22-Dv20

<400> 903
tcaaacataa ttatggcaca ttgtccttgg atgtagtatc catcacgcag accgccgaac 60
aacacgacat agccaacgaa atcacaaacg ctattagcaa tcctgtcgga ttcaccgtaa 120
tgcactccta cgtcgtttgg ttcgtattgg agtactagac gagaacagaa tgaagctcga 180
ttacgtattg ggtctccgaa gtaatgtaca acggccacac tggacgtaag ataaatgctc 240
agattttctt aggacc 256

<210> 904
<211> 143
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.18 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv49-Dv22

<400> 904
gccgaacaac acgacatagc caacgaaatc acaaacgcta ttagcaatcc tgtcggattc 60
accgtaatgc actcctacgt cgtttggttc gtattggagt actagacgag aacagaatga 120
agctcgatta cgtattgggt ctc 143

<210> 905
<211> 203
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.19 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv49-Dv22-Dv20

<400> 905
gccgaacaac acgacatagc caacgaaatc acaaacgcta ttagcaatcc tgtcggattc 60
accgtaatgc actcctacgt cgtttggttc gtattggagt actagacgag aacagaatga 120
agctcgatta cgtattgggt ctccgaagta atgtacaacg gccacactgg acgtaagata 180
aatgctcaga ttttcttagg acc 203

<210> 906
<211> 140
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: C12.20 concatemer of highly effective WCR targets, ~50% GC criterion, consisting of segments in order 5'-3' from Dv22-Dv20

<400> 906
gtaatgcact cctacgtcgt ttggttcgta ttggagtact agacgagaac agaatgaagc 60
tcgattacgt attgggtctc cgaagtaatg tacaacggcc acactggacg taagataaat 120
gctcagattt tcttaggacc 140