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(54) Title: BAIT COMPOSITIONS



FIG. 1A



FIG. 1B

(57) Abstract: Described herein are bait compositions. Also described herein are methods of making bait compositions. Also described herein are methods for controlling pests with the bait compositions.



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BAIT COMPOSITIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 63/523,509 filed June 27, 2023.

FIELD OF DISCLOSURE

[0001] This disclosure relates to the field of insect attractants, and in particular, to bait compositions and methods of using bait compositions for controlling pests.

BACKGROUND

[0002] Pests, and particularly agronomic pests, are capable of causing extensive crop damage and economic losses. Examples of such agronomic pests include fruit flies in the family Tephritidae, with the genera *Anastrepha*, *Bactrocera*, and *Ceratitis* posing the greatest risk to U.S. agriculture. The extensive damage and wide host range of pests such as tephritid fruit flies become obstacles to agricultural diversification and trade when pests become established.

[0003] Insecticides have been used as a primary method for pest control for the last 100 years and are still widely employed today. Yet despite large numbers of available agrochemical products, heavy pest populations are still present on crop fields. For example, Tephritid fruit flies spend their larval stages feeding and growing in over 400 host plants. Many pest control failures can be attributed to insecticide resistance. Therefore, there exists a need to provide further, improved compositions and methods to combat pests such as fruit flies.

[0004] The present disclosure provides bait compositions useful for controlling pests such as fruit flies. The bait compositions exhibit improved efficacy and do not leave a readily visible residue on a surface after application of the bait composition to the surface. This feature of the bait composition is especially important when the bait is applied close to fruit harvest and may touch the fruit.

BRIEF DESCRIPTION

[0005] In one aspect, provided herein is a bait composition comprising: (i) at least one pesticidal active ingredient; (ii) at least one bait; (iii) at least one dispersant; and (iv) at least one thickener in an amount no more than about 0.80 wt%; wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants.

[0006] In another aspect, provided herein is a method of preparing a bait composition, the method comprising: (A) forming a mixture comprising: (i) at least one pesticidal active ingredient; (ii) at least one bait; (iii) at least one dispersant; and (iv) at least one thickener in an amount no more than about 0.80 wt%; wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants; and (B) optionally diluting the mixture with water.

[0007] In another aspect, provided herein is a method for controlling a pest comprising contacting the pest or its environment with a biologically effective amount of a composition comprising: (i) at least one pesticidal active ingredient; (ii) at least one bait; (iii) at least one dispersant; and (iv) at least one thickener in an amount no more than about 0.80 wt%; wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Figure 1A is a photograph of a citrus fruit after application of a composition according to the present disclosure.

[0009] Figure 1B is a photograph of leaves after application of a composition according to the present disclosure.

[0010] Figure 2A is a photograph of a citrus fruit after application of a comparative composition.

[0011] Figure 2B is a photograph of leaves after application of a comparative composition.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0012] This written description uses examples to illustrate the present disclosure, including the best mode, and also to enable any person skilled in the art to practice the disclosure, including making and using any compositions or systems and performing any incorporated methods. The patentable scope of the disclosure is defined by the claims, and may include other examples that

occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have elements that do not differ from the literal language of the claims, or if they include equivalent elements with insubstantial differences from the literal language of the claims.

[0013] As used herein, the terms “comprises,” “comprising,” “includes,” “including,” “has,” “having,” “contains,” “containing,” “characterized by” or any other variation thereof, are intended to cover a non-exclusive inclusion, subject to any limitation explicitly indicated. For example, a composition, mixture, process or method that comprises a list of elements is not necessarily limited to only those elements but may include other elements not expressly listed or inherent to such composition, mixture, process or method.

[0014] The transitional phrase “consisting of” excludes any element, step, or ingredient not specified. If in the claim, such would close the claim to the inclusion of materials other than those recited except for impurities ordinarily associated therewith. When the phrase “consisting of” appears in a clause of the body of a claim, rather than immediately following the preamble, it limits only the element set forth in that clause; other elements are not excluded from the claim as a whole.

[0015] The transitional phrase “consisting essentially of” is used to define a composition or method that includes materials, steps, features, components, or elements, in addition to those literally disclosed, provided that these additional materials, steps, features, components, or elements do not materially affect the basic and novel characteristic(s) of the claimed invention. The term “consisting essentially of” occupies a middle ground between “comprising” and “consisting of”. The use of “consisting essentially of” herein allows the applicant, as lexicographer, to define the invention being claimed by excluding any material, step, feature . . . that is considered by the applicant to be non-critical to the claimed invention, but which may be known in the prior art and otherwise can be included in the invention being claimed, whether or not such inclusion or exclusion is specifically described in the specification. Exclusion of any material, step, feature . . . by the applicant may be for the sole purpose of excluding elements of the prior art that affect the novelty and, therefore, the patentability of the invention being claimed. As such, the use of “consisting essentially of” herein does not require explicit support from the

specification to exclude any element of the prior art from the invention being claimed if inclusion of said element is detrimental to patentability of the invention claimed.

[0016] Where an invention or a portion thereof is defined with an open-ended term such as “comprising,” it should be readily understood that (unless otherwise stated) the description should be interpreted to also describe such an invention using the terms “consisting essentially of” or “consisting of.”

[0017] Further, unless expressly stated to the contrary, “or” refers to an inclusive or and not to an exclusive or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

[0018] Also, the indefinite articles “a” and “an” preceding an element or component of the invention are intended to be nonrestrictive regarding the number of instances (i.e. occurrences) of the element or component. Therefore “a” or “an” should be read to include one or at least one, and the singular word form of the element or component also includes the plural unless the number is obviously meant to be singular.

[0019] As used herein, depending on the context in which it is used, the term “about” provides an estimate of a value associated with the claimed invention, where the estimated value is reasonable when taken in context with the description of the invention and in view of what is known from information available to the public, as such information would be understood or interpreted by a person of ordinary skill in the art. Generally, the term “about” as used herein means that the estimated value will fall within plus or minus 10% of the associated value. The term “about” may be further defined by context, and it is within the applicant’s rights as lexicographer to define how “about” should be interpreted within the specific context in which it is used in describing the invention.

[0020] As used herein, “wt%” refers to the weight percent of the recited component relative to the total weight of the recited composition.

[0021] As used herein, “substantially free” generally refers to no more than 2 wt%. In some embodiments, “substantially free” refers to no more than 1.5 wt%, no more than 1.0 wt%, no more than 0.5 wt%, or no more than 0.1 wt%.

[0022] In the context of this disclosure “invertebrate pest control” means inhibition of invertebrate pest development (including mortality, feeding reduction, and/or mating disruption), and related expressions are defined analogously.

[0023] As referred to in this disclosure, the term “invertebrate pest” includes arthropods, gastropods, nematodes and helminths of economic importance as pests. The term “arthropod” includes insects, mites, spiders, scorpions, centipedes, millipedes, pill bugs and symphylans. The term “gastropod” includes snails, slugs and other Stylommatophora. The term “nematode” includes members of the phylum Nematoda, such as phytophagous nematodes and helminth nematodes parasitizing animals. The term “helminth” includes all of the parasitic worms, such as roundworms (phylum Nematoda), heartworms (phylum Nematoda, class Secernentea), flukes (phylum Platyhelminthes, class Tematoda), acanthocephalans (phylum Acanthocephala), and tapeworms (phylum Platyhelminthes, class Cestoda).

[0024] The term “agronomic” refers to the production of field crops such as for food and fiber and includes the growth of maize or corn, soybeans and other legumes, rice, cereal (e.g., wheat, oats, barley, rye and rice), leafy vegetables (e.g., lettuce, cabbage, and other cole crops), fruiting vegetables (e.g., tomatoes, pepper, eggplant, crucifers and cucurbits), potatoes, sweet potatoes, grapes, cotton, tree fruits (e.g., pome, stone and citrus), small fruit (e.g., berries and cherries) and other specialty crops (e.g., canola, sunflower and olives).

[0025] The term “nonagronomic” refers to other than field crops, such as horticultural crops (e.g., greenhouse, nursery or ornamental plants not grown in a field), residential, agricultural, commercial and industrial structures, turf (e.g., sod farm, pasture, golf course, lawn, sports field, etc.), wood products, stored product, agro-forestry and vegetation management, public health (i.e. human) and animal health (e.g., domesticated animals such as pets, livestock and poultry, undomesticated animals such as wildlife) applications.

[0026] The term “crop vigor” refers to rate of growth or biomass accumulation of a crop plant. An “increase in vigor” refers to an increase in growth or biomass accumulation in a crop plant relative to an untreated control crop plant. The term “crop yield” refers to the return on crop material, in terms of both quantity and quality, obtained after harvesting a crop plant. An “increase in crop yield” refers to an increase in crop yield relative to an untreated control crop plant.

[0027] The term “biologically effective amount” refers to the amount of a biologically active compound sufficient to produce the desired biological effect when applied to (i.e. contacted with) an invertebrate pest to be controlled or its environment, or to a plant, the seed from which the plant is grown, or the locus of the plant (e.g., growth medium) to protect the plant from injury by the invertebrate pest or for other desired effect (e.g., increasing plant vigor).

[0028] Nonagronomic applications include protecting an animal from an invertebrate parasitic pest by administering a parasitically effective (i.e. biologically effective) amount of a biologically active compound of the disclosure, typically in the form of a composition formulated for veterinary use, to the animal to be protected. As referred to in the present disclosure and claims, the terms “parasitidal” and “parasitically” refers to observable effects on an invertebrate parasite pest to provide protection of an animal from the pest. Parasitidal effects typically relate to diminishing the occurrence or activity of the target invertebrate parasitic pest. Such effects on the pest include necrosis, death, retarded growth, diminished mobility or lessened ability to remain on or in the host animal, reduced feeding and inhibition of reproduction. These effects on invertebrate parasite pests provide control (including prevention, reduction or elimination) of parasitic infestation or infection of the animal.

[0029] It was discovered herein that bait compositions according to the present disclosure exhibit improved efficacy and do not leave a readily visible residue on a surface after application of the bait composition to the surface.

[0030] There are numerous advantages to bait compositions according to the present disclosure. First, the bait compositions are efficacious and applicable to a wide variety of crops and pests. Second, the bait compositions may be premix formulations that do not require further mixing. As such, there is no requirement to mix a protein source with an AI formulation as conventionally required for a tank mix. Third, where the bait compositions include a protein, they

can be directly applied without reformulation of the bait compositions because they do not require an animal protein. This is particularly advantageous in countries with regulations relating to Halal and/or Kosher laws. Fourth, the bait compositions do not leave readily visible residue on fruit. As such, minimum processing is required to remove residue after harvesting.

[0031] Described herein is a bait composition comprising: (i) at least one pesticidal active ingredient; (ii) at least one bait; (iii) at least one dispersant; and (iv) at least one thickener in an amount no more than about 0.80 wt%; wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants.

[0032] In many embodiments, the bait composition does not leave a readily visible residue on a surface after application of the bait composition to the surface. As used herein, a “readily visible residue” refers to a residue that is observed with the human eye in the absence of instrumentation. Residues may be colored or colorless. Residues may also be opaque or transparent.

[0033] Generally, the at least one thickener may be present in any suitable amount known in the art that facilitates the bait composition. In some embodiments, the at least one thickener is present in an amount of at least about 0.05 wt%, at least about 0.10 wt%, at least about 0.15 wt%, at least about 0.20 wt%, 0.25 wt%, at least about 0.30 wt%, 0.35 wt%, at least about 0.40 wt%, or at least about 0.45 wt%, at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, at least about 0.85 wt%, at least about 0.90 wt%, or at least about 0.95 wt%. In some embodiments, the at least one thickener is present in an amount of at most about 0.10 wt%, at most about 0.15 wt%, at most about 0.20 wt%, 0.25 wt%, at most about 0.30 wt%, 0.35 wt%, at most about 0.40 wt%, at most about 0.45 wt%, at most about 0.50 wt%, at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, at most about 0.90 wt%, at most about 0.95 wt%, or at most about 1.0 wt%.

[0034] In some embodiments, the at least one thickener is present in an amount in a range of from about 0.30 wt% to about 0.80 wt%.

[0035] Generally, the at least one thickener may include any suitable thickener known in the art that facilitates the bait composition. In some embodiments, the thickener is selected from hydrated magnesium aluminosilicate, xanthan gum, amorphous silica, and combinations thereof. In some embodiments, suitable commercially available thickeners include, for example, Van Gel B, Veegum K, Veegum HS, Veegum R, Veegum T, Veegum Pure, Acti-gel 208, Rhodopol 23, Kelzan S, Kelzan S plus, Aerosil, AEROSIL® R 202, AEROSIL® R 805, AEROSIL® R 812 S, AEROSIL® R 816, AEROSIL® R 972, AEROSIL® R 974, AEROSIL® 200, AEROSIL® 300, AEROSIL® 380, and Bentonite (e.g. Vanatural). In some embodiments, suitable thickeners are sodium carboxymethylcellulose, hydroxyethyl cellulose, hydroxypropyl cellulose and hydroxypropylmethyl cellulose.

[0036] In some embodiments, the at least one thickener is selected from hydrated magnesium aluminosilicate, xanthan gum, amorphous silica, sodium carboxymethylcellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxypropylmethyl cellulose, gum arabic, and combinations thereof.

[0037] Generally, the at least one dispersant may be present in any suitable amount known in the art that facilitates the bait composition. In some embodiments, the at least one dispersant is present in an amount of at least about 0.05 wt%, at least about 0.10 wt%, at least about 0.15 wt%, at least about 0.20 wt%, 0.25 wt%, at least about 0.30 wt%, 0.35 wt%, at least about 0.40 wt%, at least about 0.45 wt%, at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, at least about 0.85 wt%, at least about 0.90 wt%, at least about 0.95 wt%, at least about 1.0 wt%, at least about 1.05 wt%, at least about 1.1 wt%, at least about 1.15 wt%, at least about 1.2 wt%, at least about 1.25 wt%, at least about 1.3 wt%, at least about 1.35 wt%, at least about 1.4 wt%, at least about 1.45 wt%, at least about 1.5 wt%, at least about 1.55 wt%, at least about 1.6 wt%, at least about 1.65 wt%, at least about 1.7 wt%, at least about 1.75 wt%, at least about 1.8 wt%, at least about 1.85 wt%, at least about 1.9 wt%, or at least about 1.95 wt%. In some embodiments, the at least one dispersant is present in an amount of at most about 0.10 wt%, at most about 0.15 wt%, at most about 0.20 wt%, 0.25 wt%, at most about 0.30 wt%, 0.35 wt%, at most about 0.40 wt%, at most about 0.45 wt%, at most about 0.50 wt%, at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80

wt%, at most about 0.85 wt%, at most about 0.90 wt%, at most about 0.95 wt%, at most about 1.0 wt%, at most about 1.05 wt%, at most about 1.1 wt%, at most about 1.15 wt%, at most about 1.2 wt%, at most about 1.25 wt%, at most about 1.3 wt%, at most about 1.35 wt%, at most about 1.4 wt%, at most about 1.45 wt%, at most about 1.5 wt%, at most about 1.55 wt%, at most about 1.6 wt%, at most about 1.65 wt%, at most about 1.7 wt%, at most about 1.75 wt%, at most about 1.8 wt%, at most about 1.85 wt%, at most about 1.9 wt%, at most about 1.95 wt%, or at most about 2.0 wt%.

[0038] Generally, the at least one dispersant may include any suitable dispersant known in the art that facilitates the bait composition. In some embodiments, the at least one dispersant comprises an ionic dispersant, an anionic dispersant, a cationic dispersant, a zwitterionic dispersant, a non-ionic dispersant, or a combination thereof.

[0039] Generally, the bait composition may include anionic dispersants in any suitable amount known in the art that facilitates the bait composition. In some embodiments, the bait composition includes anionic dispersants in an amount of at least about 0 wt%, at least about 0.05 wt%, at least about 0.10 wt%, at least about 0.15 wt%, at least about 0.20 wt%, 0.25 wt%, at least about 0.30 wt%, 0.35 wt%, at least about 0.40 wt%, at least about 0.45 wt%, at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, at least about 0.85 wt%, at least about 0.90 wt%, at least about 0.95 wt%, at least about 1.0 wt%, at least about 1.05 wt%, at least about 1.1 wt%, at least about 1.15 wt%, at least about 1.2 wt%, at least about 1.25 wt%, at least about 1.3 wt%, at least about 1.35 wt%, at least about 1.4 wt%, at least about 1.45 wt%, at least about 1.5 wt%, at least about 1.55 wt%, at least about 1.6 wt%, at least about 1.65 wt%, at least about 1.7 wt%, at least about 1.75 wt%, at least about 1.8 wt%, at least about 1.85 wt%, at least about 1.9 wt%, at least about 1.95 wt%, at least about 2.0 wt%, at least about 2.1 wt%, at least about 2.2 wt%, at least about 2.3 wt%, at least about 2.4 wt%, at least about 2.5 wt%, at least about 2.6 wt%, at least about 2.7 wt%, at least about 2.8 wt%, at least about 2.9 wt%, at least about 3.0 wt%, at least about 3.1 wt%, at least about 3.2 wt%, at least about 3.3 wt%, at least about 3.4 wt%, at least about 3.5 wt%, at least about 3.6 wt%, at least about 3.7 wt%, at least about 3.8 wt%, at least about 3.9 wt%, at least about 4.1 wt%, at least about 4.2 wt%, at least about 4.3 wt%, at least about 4.4 wt%, at least about 4.5 wt%, at least about 4.6 wt%, at least about 4.7 wt%, at least about 4.8 wt%,

at least about 4.9 wt%, at least about 5.1 wt%, at least about 5.2 wt%, at least about 5.3 wt%, at least about 5.4 wt%, at least about 5.5 wt%, at least about 5.6 wt%, at least about 5.7 wt%, at least about 5.8 wt%, or at least about 5.9 wt%. In some embodiments, the at least one dispersant is present in an amount of at most about 0.05 wt%, at most about 0.10 wt%, at most about 0.15 wt%, at most about 0.20 wt%, 0.25 wt%, at most about 0.30 wt%, 0.35 wt%, at most about 0.40 wt%, at most about 0.45 wt%, at most about 0.50 wt%, at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, at most about 0.90 wt%, at most about 0.95 wt%, at most about 1.0 wt%, at most about 1.05 wt%, at most about 1.1 wt%, at most about 1.15 wt%, at most about 1.2 wt%, at most about 1.25 wt%, at most about 1.3 wt%, at most about 1.35 wt%, at most about 1.4 wt%, at most about 1.45 wt%, at most about 1.5 wt%, at most about 1.55 wt%, at most about 1.6 wt%, at most about 1.65 wt%, at most about 1.7 wt%, at most about 1.75 wt%, at most about 1.8 wt%, at most about 1.85 wt%, at most about 1.9 wt%, at most about 1.95 wt%, at most about 2.0 wt%, at most about 2.1 wt%, at most about 2.2 wt%, at most about 2.3 wt%, at most about 2.4 wt%, at most about 2.5 wt%, at most about 2.6 wt%, at most about 2.7 wt%, at most about 2.8 wt%, at most about 2.9 wt%, at most about 3.1 wt%, at most about 3.2 wt%, at most about 3.3 wt%, at most about 3.4 wt%, at most about 3.5 wt%, at most about 3.6 wt%, at most about 3.7 wt%, at most about 3.8 wt%, at most about 3.9 wt%, at most about 4.1 wt%, at most about 4.2 wt%, at most about 4.3 wt%, at most about 4.4 wt%, at most about 4.5 wt%, at most about 4.6 wt%, at most about 4.7 wt%, at most about 4.8 wt%, at most about 4.9 wt%, at most about 5.1 wt%, at most about 5.2 wt%, at most about 5.3 wt%, at most about 5.4 wt%, at most about 5.5 wt%, at most about 5.6 wt%, at most about 5.7 wt%, at most about 5.8 wt%, at most about 5.9 wt%, or most about 6.0 wt%.

[0040] Non-limiting examples of anionic dispersants include: alkylaryl sulfonic acids and their salts; carboxylated alcohols; diphenyl sulfonate derivatives; olefin sulfonates; phosphate esters such as phosphate esters of alcohol alkoxylates, phosphate esters of alkylphenol alkoxylates and phosphate esters of styryl phenol ethoxylates; protein-based surfactants; sarcosine derivatives; styryl phenol ether sulfate; sulfates and sulfonates of oils and fatty acids; sulfates and sulfonates of ethoxylated alkylphenols; sulfates of alcohols; salts of sulfates of alkoxylated alcohols; sulfonates of amines and amides such as *N,N*-alkyltaurates; sulfonates of benzene, cumene, toluene, xylene, and dodecyl and tridecylbenzenes; sulfonates of naphthalene

and alkyl naphthalene; sulfonates of fractionated petroleum; sulfosuccinamates; sulfosuccinates and their derivatives such as dialkyl sulfosuccinate salts; and combinations thereof. Non-limiting examples of cationic counterions of the anionic dispersants in salt form may include, but are not limited to, alkali metal, alkaline-earth metal, ammonium, or (C₁₋₆) alkyl ammonium cation.

[0041] Non-limiting examples of anionic dispersants within the scope of the present disclosure include: ammonium lauryl sulfate; magnesium lauryl sulfate; sodium 2-ethyl-hexyl sulfate; sodium octyl sulfate; sodium oleyl sulfate; sodium tridecyl sulfate; triethanolamine lauryl sulfate; ammonium nonylphenol ether sulfate; ammonium monoxynol-4-sulfate sulfosuccinamates; tetrasodium N-(1,2-dicarboxyethyl)-N-octadecylsulfo-succinamate; diamyl ester of sodium sulfosuccinic acid; dihexyl ester of sodium sulfosuccinic acid; dioctyl esters of sodium sulfosuccinic acid; dihexyl ester of sodium sulfosuccinic acid; dioctyl esters of sodium sulfosuccinic acid (Aerosol OT 75 PG); calcium naphthalene sulfonates (DAXAD[®] 19LCAD); sodium methyl oleyl taurate (Geropon[®] T-77); sodium dodecylbenzene sulfonate; sodium dodecyl sulfate (Polystep[®] B-25Uvee); N-oleyl N-methyl taurate; 1,4-dioctoxy-1,4-dioxo-butane-2-sulfonic acid; sodium lauryl sulphate; sodium lauryl ether sulfate (Steol CS-370); calcium dodecylbenzenesulfonate (Rhodacal[®] 60 BE and 70 B); isopropyl amine dodecylbenzenesulfonate (Bio-Soft[®] N-411); and sodium diisopropyl naphthalenesulfonate (Morwet[®] IP).

[0042] Non-limiting examples of cationic dispersants include: amides and ethoxylated amides; amines (such as *N*-alkyl propanediamines, tripropylenetriamines and dipropylenetetramines); ethoxylated amines, ethoxylated diamines and propoxylated amines (prepared from the amines and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); amine salts such as amine acetates and diamine salts; quaternary ammonium salts such as quaternary salts, ethoxylated quaternary salts and diquaternary salts; amine oxides such as alkyldimethylamine oxides and bis-(2-hydroxyethyl)-alkylamine oxides; and combinations thereof.

[0043] Non-limiting examples of zwitterionic (amphoteric) dispersants include betaines, *N*-alkyl glycines, *N*-alkyl propionic acids, *N*-alkylaminobutyric acids, *N*-alkyliminodipropionic

acids, N-hydroxyethyl-N-alkylamidopropyl glycines, N-alkyl taurines, N-alkyl sarcosines, 2-alkylaminopropionic acids, alkylaminoacetic acids containing a C₈₋₁₈ alkyl group, and combinations thereof.

[0044] In some embodiments, the at least one dispersant is selected from sulfosuccinates, sodium dioctyl sulfosuccinate (e.g., STEPWET DOS 70-PG), lignosulfonates (e.g., REAX 88B or POLYFON F, Borresperse NA), naphthalene sulfonate condensates (e.g., Morwet D425, Morwet D400, Supragil MNS88), alkyl ethoxyl phosphate esters (e.g., Dextrol OC180, Stepfac 1818K), alkyl sulfates (e.g., Sodium Lauryl sulfate, Sodium Dodecyl sulfate), and combinations thereof.

[0045] In some embodiments, the bait composition comprises at least one non-ionic dispersant. Non-limiting examples of nonionic surfactants include alkoxyates, fatty alcohol alkoxyates, siloxanes/silicones, alkylphenol alkoxyates, fatty acid alkoxyates, alkoxyated amines, alkoxyated fatty acid amides, terminally blocked alkoxyates, fatty acid esters of polyhydroxy compounds, fatty acid esters of glycerol, fatty acid esters of sorbitol, fatty acid esters of sucrose, alkylpolyglucosides, amine oxide, and combinations thereof. Alkoxy groups may suitably be ethoxy, propoxy, or a combination of ethoxy and propoxy groups in random or block configuration.

[0046] Non-limiting examples of nonionic dispersants also include: alcohol alkoxyates (such as alcohol alkoxyates based on natural and synthetic alcohols (which may be branched or linear) and prepared from the alcohols and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); amine ethoxyates, alkanolamides and ethoxyated alkanolamides; alkoxyated triglycerides (such as ethoxyated soybean, castor and rapeseed oils); alkylphenol alkoxyates (e.g., octyl- (such as the Triton[®] X series), nonyl- (such as the Tergitol[®] HP series), dinonyl-, or dodecyl-)); ethoxyated fatty acids; ethoxyated fatty esters and oils (such as Break Thru[®] SP 133); ethoxyated methyl esters; ethoxyated tristyrylphenol (including those prepared from ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); fatty acid esters, glycerol esters, lanolin-based derivatives, polyethoxyate esters such as polyethoxyated sorbitan fatty acid esters, polyethoxyated sorbitol fatty acid esters and polyethoxyated glycerol fatty acid esters; other sorbitan derivatives such as sorbitan esters; polymeric surfactants such as random copolymers, block copolymers (such as block polymers prepared from ethylene oxide or

propylene oxide and reverse block polymers where the terminal blocks are prepared from propylene oxide; ethoxylated fatty acids), alkyd PEG (polyethylene glycol) resins, alkyd type copolyesters, graft or comb polymers, and star polymers; polyethylene glycols (PEG); polyethylene glycol fatty acid esters; silicone-based surfactants; sugar-derivatives such as sucrose esters, alkyl polyglycosides and alkyl polysaccharides; and combinations thereof.

[0047] Non-limiting examples of nonionic dispersants also include sorbitan fatty acid esters, polyethoxylated sorbitan fatty acid esters, sorbitol ethoxylate esters and combinations thereof. Non-limiting examples of sorbitan fatty acid esters include sorbitan monolaurates (*e.g.*, SpanTM 20), sorbitan monopalmitates (*e.g.*, SpanTM 40), sorbitan monostearates (*e.g.*, SpanTM 60), sorbitan tristearates (*e.g.*, SpanTM 65), sorbitan monooleates (*e.g.*, SpanTM 80), sorbitan trioleates (*e.g.*, SpanTM 85), and combinations thereof. Non-limiting examples of polyethoxylated sorbitan fatty acid esters include Tween[®] 20, Tween[®] 21, Tween[®] 40, Tween[®] 60, Tween[®] 80, and Surfonic[®] L24-4. Non-limiting examples of sorbitol ethoxylate esters that may be suitable for the biopesticides described herein include polyoxyethylene sorbitol oleates (*e.g.*, Arlatone[®] TV), polyoxyethylene sorbitol hexaoleates (*e.g.*, Cirrasol[®] G-1086), polyoxyethylene sorbitol hexaoleates (*e.g.*, Cirrasol[®] G-1096), polyoxyethylene oleate-laurates (*e.g.*, Atlox 1045AR[®]), and combinations thereof. Polyethoxylated sorbitan fatty acid esters and sorbitol ethoxylate esters having a degree of ethoxylation of 20, 30, 40, 50, 60, 70 or 80 are generally suitable.

[0048] Non-limiting examples of nonionic dispersants also include organosilicone dispersants. Non-limiting examples of organosilicone dispersants within the scope of the present disclosure include: polyether siloxanes (*e.g.*, Break Thru[®] OE441); polyether trisiloxanes (*e.g.*, Break Thru[®] S240, Break Thru[®] S233); polyoxyethylene dimethylsiloxanes (*e.g.*, Dyne-Amic[®] (a mixture with methylated seed oil)); polyoxyethylene methylpolysiloxanes (*e.g.*, KF-640 manufactured by Shin-Etsu Chemical Co., Ltd.); polyalkylene oxide-modified polymethylsiloxane (*e.g.*, Kineti[®] manufactured by Helena Chemical); polyoxyethylene propylheptamethyltrisiloxanes (*e.g.*, Masil[®] SF19); polyether-modified polysiloxanes (*e.g.*, Quark (a mixture with an alkyl phenol ethoxylate)); hydroxypropyl heptamethyltrisiloxanes (*e.g.*, Silflow[®] (a mixture with ethoxylated acetate, polyethylene glycol monoallyl ether acetate and polyethylene glycol diacetate); polyalkylene oxide-modified heptamethyltrisiloxanes (*e.g.*, Silwet[®] L77);

polyether/polymethylsiloxane copolymers (*e.g.*, Syl-Coat[®]); polyoxyethylene-modified polydimethylsiloxanes (*e.g.*, Xiameter[®]); polyoxyalkylene oxypropylheptamethyltrisiloxanes; siloxane/polyalkylene oxide copolymers (*e.g.*, Vestis[™] (a mixture with polyalkylene oxide)). In some aspects, the organosilicone dispersant is a polyether trisiloxane such as, for instance, Break Thru[®] S240 (a mixture of a polyether trisiloxane and an alcohol ethoxylate (CAS 9043-30-5)), Break Thru[®] S321, Break Thru[®] S200, Break Thru[®] OE 441, Break Thru[®] S278, Break Thru[®] S243, Break Thru[®] S233, Silwet[®] L-77, Silwet[®] 408, Silwet[®] HS 429, Silwet[®] HS 312, Silwet[®] Y-12808, Silwet[®] L-7607, Silwet[®] L-7602, Silwet[®] L-7210, Silwet[®] L-7002, Silwet[®] L-720, and Silwet[®] L-7200, Sylgard[®] 309, and Silibase[®] 2848, and combinations thereof.

[0049] In some embodiments, the nonionic dispersant may comprise at least one alcohol alkoxyate surfactant, at least one alkylphenol alkoxyate surfactant, at least seed oil alkoxyate surfactant (*e.g.*, Ecosurf[®] SA-4, Ecosurf[®] SA-7, Ecosurf[®] SA-9, and Ecosurf[®] SA-15), at least one alkylamine alkoxyate surfactant, at least one tallow amine alkoxyate surfactant, at last one fatty acid alkoxyate surfactant, and combinations thereof. In some aspects, the alkoxyates may be end capped. Alcohol alkoxyates generally comprise a hydrophobic alkyl chain attached by an ether linkage to a hydrophilic alkoxy chain and have the general formula $R-(OC_{2-4})_n-OH$. R may be C₆₋₁₈ straight or branched chain alkyl. The alkoxy moiety (OC₂₋₄) may be ethoxy, *n*-propyl, *i*-propyl, *n*-butyl, *i*-butyl or *tert*-butyl. In some aspects, the alkoxy moiety may be a block co-polymer of a polymeric ethoxy and polymeric propoxy or polymeric butoxy, and n may suitably be an integer of from 2 to 100. Suitable alcohol alkoxyates include linear alcohol alkoxyates, branched alcohol alkoxyates, secondary alcohol alkoxyates, and mixtures thereof. Non-limiting examples of alcohol alkoxyates include: Plurafac[®] SL-42 (C₆₋₁₀-(PO)₃(EO)₆); Plurafac[®] SL-62 (C₆₋₁₀-(PO)₃(EO)₈); Lutensol[®] XL series of the general structure Guerbet C₁₀-(PO)_a(EO)_b including without limitation Lutensol[®] XL-40, Lutensol[®] XL-50, Lutensol[®] XL-60, Lutensol[®] XL-70, Lutensol[®] XL-79, Lutensol[®] XL-80, Lutensol[®] XL-89, Lutensol[®] XL-90, Lutensol[®] XL-99, Lutensol[®] XL-100, and Lutensol[®] XL-140; Lutensol[®] XP series of the general structure Guerbet C₁₀-(EO)_a, including without limitation Lutensol[®] XP-40, Lutensol[®] XP-50, Lutensol[®] XP-60, Lutensol[®] XP-70, Lutensol[®] XP-79, Lutensol[®] XP-80, Lutensol[®] XP-89, Lutensol[®] XP-90, Lutensol[®] XP-99, Lutensol[®] XP-100; Lutensol[®] ON series of the general structure oxo C₁₀-(EO)_a, including without limitation Lutensol[®] ON-30, Lutensol[®] ON-50, Lutensol[®] ON-60, Lutensol[®] ON-70, Lutensol[®] ON-80, Lutensol[®] ON-110; Lutensol[®] AO series

of the general structure $\text{oxo C}_{13/15}-(\text{EO})_a$, including without limitation Lutensol[®] AO-3, Lutensol[®] AO-5, Lutensol[®] AO-7, Lutensol[®] AO-79, Lutensol[®] AO-8, Lutensol[®] AO-11; Lutensol[®] TO series of the general structure $\text{oxo C}_{13}-(\text{EO})_a$, including without limitation Lutensol[®] TO-6, Lutensol[®] TO-65, Lutensol[®] TO-7, Lutensol[®] TO-79, Lutensol[®] TO-8, Lutensol[®] TO-89, Lutensol[®] TO-10, Lutensol[®] TO-109, Lutensol[®] TO-12, Lutensol[®] TO-129, Lutensol[®] TO-15, Lutensol[®] TO-20; Lutensol[®] TDA series of the general structure $\text{oxo C}_{11}\text{-C}_{14}\text{-C}_{13}\text{ rich }(\text{EO})_a$, including without limitation Lutensol[®] TDA-6, Lutensol[®] TDA 8, Lutensol[®] TDA-9, Lutensol[®] TDA-10; Ecosurf[®] EH series of the general structure 2-ethyl hexyl $(\text{PO})_m(\text{EO})_n$ including Ecosurf[®] EH-3, Ecosurf[®] EH-6, and Ecosurf[®] EH-9; Ecosurf[®] SA series including Ecosurf[®] SA-4 ($\text{C}_{6-12}-(\text{PO})_{3-4}(\text{EO})_4$), Ecosurf[®] SA-7 ($\text{C}_{6-12}-(\text{PO})_{3-4}(\text{EO})_7$), and Ecosurf[®] SA-9 ($\text{C}_{6-12}-(\text{PO})_{3-4}(\text{EO})_9$); Tergitol[®] 15-S-3, Tergitol[®] 15-S-5, Tergitol[®] 15-S-7, Tergitol[®] 15-S-9, Tergitol[®] 15-S-12, Tergitol[®] 15-S-15, Tergitol[®] 15-S-20, Tergitol[®] 15-S-30, and Tergitol[®] 15-S-40; Tergitol[®] L-61, Tergitol[®] L-62, Tergitol[®] L-64, Tergitol[®] L-81, and Tergitol[®] L-101; Tergitol[®] TMN-3, Tergitol[®] TMN-6, and Tergitol[®] TMN-10), and combinations thereof.

[0050] In some embodiments, the nonionic dispersant may comprise at least one polymeric surfactant. Polymeric surfactants fall into several categories including, but not limited to, block copolymers, random copolymers, graft copolymer and star polymers. Non-limiting examples of polymer monomeric units include ethylene oxide, propylene oxide, acrylic, styrene, methacrylic, hydroxystearate, and ester (*e.g.*, alkyd). Examples include, without limitation, EO/PO block copolymers, acrylic/styrene copolymers, methacrylic copolymers, poly hydroxystearate derivatives, alkyd PEG resin derivatives, and combinations thereof. Non-limiting examples of block copolymers include Atlas[™] G-5000 and Atlas[™] G-5002L (butyl block copolymers). A non-limiting example of a graft copolymer is Atlox[®] 4913 (a methyl methacrylate graft copolymer backbone having PEG extending therefrom). In some aspects, the nonionic surfactant component comprises Atlox[®] 4913. In some aspects, the nonionic surfactant component comprises Atlas[™] G-5000. In some aspects, the nonionic surfactant component comprises Atlox[®] 4913, Atlas[™] G-5000 and Lutensol[®] TDA 6.

[0051] In some embodiments, the bait composition comprises at least one non-ionic dispersant selected from graft polymers, acrylic graft copolymers (*e.g.*, ATLOX 4913), polymethyl methacrylate-polyethylene glycol graft copolymers (*e.g.*, STEP-FLOW 4000), alkyl

polyglycosides, C₉₋₁₁ alkyl polyglucosides (e.g., AGNIQUE PG 9116), C₈₋₁₀ alkyl polyglucosides (e.g., AGNIQUE PG 8107), polyvinylpyrrolidones (e.g., PVP K-30, PVP 60, PVP 90), polyalkylene oxide block copolymers, polyalkylene glycol ethers (e.g., Atlas G5000), butyl polyalkylene oxide block copolymers (e.g., TOXIMUL 8330, Emulsogen EP4910), alkyl ethoxylates, tristyrylphenol ethoxylates (e.g., Sorprophor BSU, Markon TSP), and combinations thereof.

[0052] Generally, the at least one pesticidal active ingredient may include any suitable pesticidal active ingredient known in the art that facilitates the bait composition. In some embodiments, the bait composition includes one or more pest control agents selected from insecticides, herbicides, biopesticides, nematocides, bactericides, and fungicides. General references for these pest control agents (*i.e.*, insecticides, fungicides, nematocides, acaricides, herbicides and biological agents) include *The Pesticide Manual, 13th Edition*, C. D. S. Tomlin, Ed., British Crop Protection Council, Farnham, Surrey, U.K., 2003 and *The BioPesticide Manual, 2nd Edition*, L. G. Copping, Ed., British Crop Protection Council, Farnham, Surrey, U.K., 2001.

[0053] In some embodiments, the pesticidal active ingredient is selected from insecticides, nematocides, biopesticides, and combinations thereof.

[0054] In some embodiments, the pesticidal active ingredient comprises an insecticide. In some embodiments, the insecticide is a diamide selected from chlorantraniliprole, cyantraniliprole, tetrachlorantraniliprole, bromoantraniliprole, dichlorantraniliprole, tetraniliprole, cyclaniliprole, cyhalodiamide, flubendiamide, and combinations thereof. In some embodiments, the insecticide is cyantraniliprole.

[0055] In some embodiments, the composition comprises a pesticidal active ingredient selected from abamectin, acephate, acequinocyl, acetamiprid, acrinathrin, acynonapyr, afidopyropen ([[(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-6,12-dihydroxy-4,6a,12b-trimethyl-11-oxo-9-(3-pyridinyl)-2H,11H-naphtho[2,1-b]pyrano[3,4-e]pyran-4-yl]methyl cyclopropanecarboxylate), amidoflumet, amitraz, avermectin, azadirachtin, azinphos methyl, benfuracarb, bensultap, benzpyrimoxan, bifenthrin, kappa-bifenthrin, bifenazate, bistrifluron, borate, broflanilide, buprofezin, cadusafos, carbaryl, carbofuran, cartap, carzol, chlorantraniliprole, chlorfenapyr,

chlorfluazuron, chloroprallethrin, chlorpyrifos, chlorpyrifos-e, chlorpyrifos-methyl, chromafenozide, clofentezin, chloroprallethrin, clothianidin, cyantraniliprole, (3-bromo-1-(3-chloro-2-pyridinyl)-N-[4-cyano-2-methyl-6-[(methylamino)carbonyl]phenyl]-1H-pyrazole-5-carboxamide), cyclaniliprole (3-bromo-N-[2-bromo-4-chloro-6-[[1-(cyclopropylethyl)amino]carbonyl]phenyl]-1-(3-chloro-2-pyridinyl)-1H-pyrazole-5-carboxamide), cycloprothrin, cycloxaprid ((5S,8R)-1-[(6-chloro-3-pyridinyl)methyl]-2,3,5,6,7,8-hexahydro-9-nitro-5,8-Epoxy-1H-imidazo[1,2-a]azepine), cyenopyrafen, cyflumetofen, cyfluthrin, beta cyfluthrin, cyhalodiamide, cyhalothrin, gamma-cyhalothrin, lambda-cyhalothrin, cypermethrin, alpha-cypermethrin, zeta-cypermethrin, cyromazine, deltamethrin, diafenthiuron, diazinon, dicloromezotiaz, dieldrin, diflubenzuron, dimefluthrin, dimehypo, dimethoate, dimpropyridaz, dinotefuran, diofenolan, emamectin, emamectin benzoate, endosulfan, esfenvalerate, ethiprole, etofenprox, epsilon-metofluthrin, etoxazole, fenbutatin oxide, fenitrothion, fenothiocarb, fenoxycarb, fenpropathrin, fenvalerate, fipronil, flometoquin (2-ethyl-3,7-dimethyl-6-[4-(trifluoromethoxy)phenoxy]-4-quinolinyl methyl carbonate), flonicamid, fluazaindolizine, flubendiamide, flucythrinate, flufenerim, flufenoxuron, flufenoxystrobin (methyl (αE)-2-[[2-chloro-4-(trifluoromethyl)phenoxy]methyl]-α-(methoxymethylene)benzeneacetate), fluensulfone (5-chloro-2-[(3,4,4-trifluoro-3-buten-1-yl)sulfonyl]thiazole), fluhexafon, fluopyram, flupiprole (1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-5-[(2-methyl-2-propen-1-yl)amino]-4-[(trifluoromethyl)sulfinyl]-1H-pyrazole-3-carbonitrile), flupyradifurone (4-[[[(6-chloro-3-pyridinyl)methyl](2,2-difluoroethyl)amino]-2(5H)-furanone]), flupyrimin, fluvalinate, tau fluvalinate, fluxametamide, fonophos, formetanate, fosthiazate, gamma-cyhalothrin, halofenozide, heptafluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 2,2-dimethyl-3-[(1Z)-3,3,3-trifluoro-1-propen-1-yl]cyclopropanecarboxylate), hexaflumuron, hexythiazox, hydramethylnon, imidacloprid, indoxacarb, insecticidal soaps, isofenphos, isocycloseram, kappa-tefluthrin, lambda-cyhalothrin, lufenuron, malathion, meperfluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl (1R,3S)-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate), metaflumizone, metaldehyde, methamidophos, methidathion, methiocarb, methomyl, methoprene, methoxychlor, metofluthrin, methoxyfenozide, epsilon-metofluthrin, epsilon-momfluorothrin, monocrotophos, monofluorothrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 3-(2-cyano-1-propen-1-yl)-2,2-dimethylcyclopropanecarboxylate), nicotine, nitenpyram, nithiazine, novaluron, noviflumuron, N-

[1,1-dimethyl-2-(methylthio)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-[1,1-dimethyl-2-(methylsulfinyl)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-[1,1-dimethyl-2-(methylsulfonyl)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-(1-methylcyclopropyl)-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, and *N*-[1-(difluoromethyl)cyclopropyl]-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, oxamyl, oxazosulfonyl, parathion, parathion methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb, profenofos, profluthrin, propargite, protrifenbute, pyflubumide (1,3,5-trimethyl-*N*-(2-methyl-1-oxopropyl)-*N*-[3-(2-methylpropyl)-4-[2,2,2-trifluoro-1-methoxy-1-(trifluoromethyl)ethyl]phenyl]-1*H*-pyrazole-4-carboxamide), pymetrozine, pyrafluprole, pyrethrin, pyridaben, pyridalyl, pyrifluquinazon, pyriminostrobin (methyl (α*E*)-2-[[[2-[(2,4-dichlorophenyl)amino]-6-(trifluoromethyl)-4-pyrimidinyl]oxy]methyl]-α-(methoxymethylene)benzeneacetate), pydiflumetofen, pyriprole, pyriproxyfen, rotenone, ryanodine, silafluofen, spinetoram, spinosad, spiroidiclofen, spiromesifen, spiropidion, spirotetramat, sulprofos, sulfoxaflor (*N*-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-λ4-sulfanylidene]cyanamide), tebufenozide, tebufenpyrad, teflubenzuron, tefluthrin, kappa-tefluthrin, terbufos, tetrachlorantraniliprole, tetrachlorvinphos, tetramethrin, tetramethylfluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 2,2,3,3-tetramethylcyclopropanecarboxylate), tetraniliprole, thiacloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tioxazafen (3-phenyl-5-(2-thienyl)-1,2,4-oxadiazole), tolfenpyrad, tralomethrin, triazamate, trichlorfon, triflumezopyrim (2,4-dioxo-1-(5-pyrimidinylmethyl)-3-[3-(trifluoromethyl)phenyl]-2*H*-pyrido[1,2-*a*]pyrimidinium inner salt), triflumuron, tyclopyrazoflor, zeta-cypermethrin, *Bacillus thuringiensis* delta-endotoxins, entomopathogenic bacteria, entomopathogenic viruses, entomopathogenic fungi, and combinations thereof.

[0056] In some embodiments, the composition comprises a pesticidal active ingredient selected from fungicides such as acibenzolar-*S*-methyl, aldimorph, ametoctradin, aminopyrifin, amisulbrom, anilazine, azaconazole, azoxystrobin, benalaxyl (including benalaxyl-*M*), benodanil, benomyl, bentiavalicarb (including bentiavalicarb-isopropyl), benzovindiflupyr, bethoxazin, binapacryl, biphenyl, bitertanol, bixafen, blasticidin-*S*, boscalid, bromuconazole, bupirimate, buthiobate, carboxin, carpropamid, captafol, captan, carbendazim, chloroneb, chlorothalonil, chlozolate, copper hydroxide, copper oxychloride, copper sulfate, coumoxystrobin, cyazofamid, cyflufenamid, cymoxanil, cyproconazole, cyprodinil,

dichlobentiazox, dichlofluanid, diclocymet, diclomezine, dicloran, diethofencarb, difenoconazole, diflumetorim, dimethirimol, dimethomorph, dimoxystrobin, diniconazole (including diniconazole-M), dinocap, dipymetitrone, dithianon, dithiolanes, dodemorph, dodine, econazole, etaconazole, edifenphos, enoxastrobin (also known as enestroburin), epoxiconazole, ethaboxam, ethirimol, etridiazole, famoxadone, fenamidone, fenaminstrobin, fenarimol, fenbuconazole, fenfuram, fenhexamide, fenoxanil, fempiclonil, fempicoxamid, fenpropidin, fenpropimorph, fenpyrazamine, fentin acetate, fentin hydroxide, ferbam, ferimzone, flometoquin, florylpicoxamid, fluopimomide, fluazinam, fludioxonil, flufenoxystrobin, fluindapyr, flumorph, fluopicolide, fluopyram, fluoxapiprolin, fluoxastrobin, fluquinconazole, flusilazole, flusulfamide, flutianil, flutolanil, flutriafol, fluxapyroxad, folpet, fthalide (also known as phthalide), fuberidazole, furalaxyl, furametpyr, hexaconazole, hymexazole, guazatine, imazalil, imibenconazole, iminoctadine albesilate, iminoctadine triacetate, inpyrfluxam, iodcarb, ipconazole, ipfentrifluconazole, ipflufenquin, isofetamid, iprobenfos, iprodione, iprovalicarb, isoflucypram, isoprothiolane, isopyrazam, isotianil, kasugamycin, kresoxim-methyl, lancotrione, mancozeb, mandipropamid, mandestrobin, maneb, mapanipyrin, mefentrifluconazole, mepronil, meptyldinocap, metalaxyl (including metalaxyl-M/mefenoxam), metconazole, methasulfocarb, metiram, metominostrobin, metyltetraprole, metrafenone, myclobutanil, naftitine, neo-asozin (ferric methanearsonate), nuarimol, octhilinone, ofurace, orysastrobin, oxadixyl, oxathiapiprolin, oxolinic acid, oxpoconazole, oxycarboxin, oxytetracycline, penconazole, pencycuron, penflufen, penthiopyrad, perfurazoate, phosphorous acid (including salts thereof, e.g., fosetyl-aluminum), picoxystrobin, piperalin, polyoxin, probenazole, prochloraz, procymidone, propamocarb, propiconazole, propineb, proquinazid, prothiocarb, prothioconazole, pydiflumetofen (Adepidyn®), pyraclostrobin, pyrametostrobin, pyrapropoyne, pyraoxystrobin, pyraziflumid, pyrazophos, pyribencarb, pyributacarb, pyridachlometyl, pyrifenox, pyriofenone, perisoxazole, pyrimethanil, pyrifenox, pyrrolnitrin, pyroquilon, quinconazole, quinmethionate, quinofumelin, quinoxifen, quintozone, silthiofam, sedaxane, simeconazole, spiroxamine, streptomycin, sulfur, tebuconazole, tebufloquin, teclofthalam, tecloftalam, tecnazene, terbinafine, tetraconazole, thiabendazole, thifluzamide, thiophanate, thiophanate-methyl, thiram, tiadinil, tolclofos-methyl, tolprocarb, tolyfluanid, triadimefon, triadimenol, triarimol, triazoxide, tribasic copper sulfate, triclopyricarb, tridemorph, trifloxystrobin, triflumizole, trimoprhamide tricyclazole, trifloxystrobin, triforine, triticonazole, uniconazole, validamycin, valifenalate (also known as

valifenal), vinclozolin, zineb, ziram, zoxamide, 1-[4-[4-[5-(2,6-difluorophenyl)-4,5-dihydro-3-isoxazolyl]-2-thiazolyl]-1-piperidiny]-2-[5-methyl-3-(trifluoromethyl)-1*H*-pyrazol-1-yl]ethanone, and combinations thereof.

[0057] In some embodiments, the composition comprises a pesticidal active ingredient selected from herbicides including: cyclohexenone oxime ethers, such as alloxymid, clethodim, cloproxydim, cycloxydim, sethoxydim, tralkoxydim, butroxydim, clefoxydim or tepraloxym; phenoxyphenoxypropionic esters, such as clodinafop-propargyl, cyhalofop-butyl, diclofop-methyl, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenthiapropethyl, fluazifop-butyl, fluazifop-P-butyl, haloxyfop-ethoxyethyl, haloxyfop-methyl, haloxyfop-P-methyl, isoxapyrifop, propaquizafop, quizalofop-ethyl, quizalofop-P-ethyl or quizalofop-tefuryl; arylaminopropionic acids, such as flamprop-methyl or flamprop-isopropyl; acetolactate synthase inhibitors (ALS), such as imazapyr, imazaquin, imazamethabenz-methyl (imazame), imazamox, imazapic or imazethapyr; pyrimidyl ethers, such as pyriithiobac-acid, pyriithiobac-sodium, bispyribac-sodium. KIH-6127 or pyribenzoxym; sulfonamides, such as florasulam, flumetsulam or metosulam; sulfonylureas, such as amidosulfuron, azimsulfuron, bensulfuron-methyl, chlorimuron-ethyl, chlorsulfuron, cinosulfuron, cyclosulfamuron, ethametsulfuron-methyl, ethoxysulfuron, flazasulfuron, halosulfuron-methyl, imazosulfuron, metsulfuron-methyl, nicosulfuron, primisulfuron-methyl, prosulfuron, pyrazosulfuron-ethyl, rimsulfuron, sulfometuron-methyl, thifensulfuron-methyl, triasulfuron, tribenuron-methyl, triflusulfuron-methyl, tritosulfuron, sulfosulfuron, foramsulfuron or iodosulfuron; amides, such as allidochlor (CDAA), benzoylprop-ethyl, bromobutide, chiorthiamid, diphenamid, etobenzanidibenzchlomet), fluthiamide, fosamin or monalide; auxin herbicides, such as pyridinecarboxylic acids, such as clopyralid or picloram; 2,4-D or benazolin; auxin transport inhibitors, such as naptalame or diflufenopyr; carotenoid biosynthesis inhibitors, such as benzofenap, clomazone (dimethazone), diflufenican, fluoro-chloridone, fluridone, pyrazolynate, pyrazoxyfen, isoxaflutole, isoxachlortole, mesotrione, sulcotrione (chlormesulone), ketospiradox, flurtamone, norflurazon or amitrol; enolpyruvylshikimate-3-phosphate synthase inhibitors (EPSPS), such as glyphosate or sulfosate; glutamine synthetase inhibitors, such as bilanafos (bialaphos) or glufosinate-ammonium; lipid biosynthesis inhibitors, such as anilides, such as anilofos or mefenacet; chloroacetanilides, such as dimethenamid, S-dimethenamid, acetochlor, alachlor, butachlor, butenachlor, diethatyl-ethyl, dimethachlor, metazachlor, metolachlor, S-metolachlor, pretilachlor, propachlor, prynachlor,

terbuchlor, thenylchlor or xylachlor; thioureas, such as butylate, cycloate, di-allate, dimepiperate, EPTC, esprocarb, molinate, pebulate, prosulfocarb, thiobencarb (benthiocarb), tri-allate or vemolate; or benfuresate or perfluidone; mitosis inhibitors, such as asulam, carbetamid, chlorpropham, orbencarb, pronamid (propyzamid), propham or tiocarbazil; dinitroanilines, such as benefin, butralin, dinitramin, ethalfluralin, fluchloralin, oryzalin, pendimethalin, prodiamine or trifluralin; pyridines, such as dithiopyr or thiazopyr; butamifos, chlorthal-dimethyl (DCPA) maleic hydrazide; protoporphyrinogen IX oxidase inhibitors, such as acifluorfen, acifluorfen-sodium, aclonifen, bifenox, chlomitrofen (CNP), ethoxyfen, fluorodifen, fluoroglycofen-ethyl, fomesafen, furyloxyfen, lactofen, nitrofen, nitrofluorfen or oxyfluorfen; oxadiazoles, such as oxadiargyl or oxadiazon; cyclic imides, such as azafenidin, butafenacil, carfentrazone-ethyl, cinidon-ethyl, flumiclorac-pentyl, flumioxazin, flumipropyn, flupropacil, fluthiacet-methyl, sulfentrazone or thidiazimin; pyrazoles, such as ET-751, JV 485 or nipyraclufen; photosynthesis inhibitors, such as propanil, pyridate or pyridafol; benzothiadiazinones, such as bentazone; dinitrophenols, such as bromofenoxim, dinoseb, dinoseb-acetate, dinoterb or DNOC; dipyridylenes, such as cyperquat-chloride, difenzoquat-methylsulfate, diquat or paraquat-dichloride; ureas, such as chlorbromuron, chlorotoluron, difenoxuron, dimefuron, diuron, ethidimuron, fenuron, fluometuron, isoproturon, isouron, linuron, methabenzthiazuron, methazole, metobenzuron, metoxuron, monolinuron, neburon, siduron or tebuthiuron; phenols, such as bromoxynil or ioxynil; chloridazon; triazines, such as ametryn, atrazine, cyanazine, desmein, dimethamethryn, hexazinone, prometon, prometryn, propazine, simazine, simetryn, terbumeton, terbutryn, terbutylazine or trietazine; triazinones, such as metamitron or metribuzin; uracils, such as bromacil, lenacil or terbacil; or biscarbamates, such as desmedipham or phenmedipham; synergists, such as tridiphane; CIS cell wall synthesis inhibitors, such as isoxaben or dichlobenil; dichloropropionic acids, such as dalapon; dihydrobenzofurans, such as ethofumesate; phenylacetic acids, such as chlorfenac (fenac); or aziprotryn, barban, beflubutamid, s-beflubutamid, bensulide, benzthiazuron, benzofluor, bixlozone, buminafos, buthidazole, buturon, cafenstrole, chlorbufam, chlorfenprop-methyl, chloroxuron, cinmethylin, cumyluron, cycluron, cyprazine, cyprazole, dibenzyluron, dipropetryn, dymron, eglinazin-ethyl, endothall, ethiozin, flucabazone, fluorbentrail, flupoxam, isocarbamid, isopropalin, isoflex, karbutilate, mefluidide, monuron, napropamide, napropamide-M, napropanilide, nitralin, oxaciclomefone, phenisopham, piperophos, procyazine, profluralin, pyributicarb, rimisoxamid,

sebumeton, sulfallate (CDEC), terbucarb, triaziflam, triazofenamid or trimeturon; their environmentally compatible salts; and combinations thereof. In some embodiments, the herbicide is selected from the group consisting of: beflubutamid, s-beflubutamid, rimisoxamid, bixlozone, isoflex, napropamide, aclonifen, and combinations thereof.

[0058] In some embodiments, the composition comprises a pesticidal active ingredient selected from nematocides including fluopyram, spirotetramat, thiodicarb, fosthiazate, abamectin, iprodione, fluensulfone, dimethyl disulfide, tioxazafen, 1,3-dichloropropene (1,3-D), metam (sodium and potassium), dazomet, chloropicrin, fenamiphos, ethoprophos, cadusaphos, terbufos, imicyafos, oxamyl, carbofuran, tioxazafen, *Bacillus firmus*, *Pasteuria nishizawae*, and combinations thereof. A non-limiting example of a bactericide is streptomycin. Non-limiting examples of additional acaricides include amitraz, chinomethionat, chlorobenzilate, cyhexatin, dicofol, dienochlor, etoxazole, fenazaquin, fenbutatin oxide, fenpropathrin, fenpyroximate, hexythiazox, propargite, pyridaben, tebufenpyrad, and combinations thereof.

[0059] Generally, the at least one pesticidal active ingredient may be present in any suitable amount known in the art that facilitates the bait composition. In some embodiments, the at least one pesticidal active ingredient is present in an amount of at least about 0.05 wt%, at least about 0.10 wt%, at least about 0.15 wt%, at least about 0.20 wt%, 0.25 wt%, at least about 0.30 wt%, 0.35 wt%, at least about 0.40 wt%, at least about 0.45 wt%, at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, at least about 0.85 wt%, at least about 0.90 wt%, at least about 0.95 wt%, at least about 1.0 wt%, at least about 1.05 wt%, at least about 1.1 wt%, at least about 1.15 wt%, at least about 1.2 wt%, at least about 1.25 wt%, at least about 1.3 wt%, at least about 1.35 wt%, at least about 1.4 wt%, at least about 1.45 wt%, at least about 1.5 wt%, at least about 1.55 wt%, at least about 1.6 wt%, at least about 1.65 wt%, at least about 1.7 wt%, at least about 1.75 wt%, at least about 1.8 wt%, at least about 1.85 wt%, at least about 1.9 wt%, or at least about 1.95 wt%. In some embodiments, the at least one pesticidal active ingredient is present in an amount of at most about 0.10 wt%, at most about 0.15 wt%, at most about 0.20 wt%, 0.25 wt%, at most about 0.30 wt%, 0.35 wt%, at most about 0.40 wt%, at most about 0.45 wt%, at most about 0.50 wt%, at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, at most about

0.90 wt%, at most about 0.95 wt%, at most about 1.0 wt%, at most about 1.05 wt%, at most about 1.1 wt%, at most about 1.15 wt%, at most about 1.2 wt%, at most about 1.25 wt%, at most about 1.3 wt%, at most about 1.35 wt%, at most about 1.4 wt%, at most about 1.45 wt%, at most about 1.5 wt%, at most about 1.55 wt%, at most about 1.6 wt%, at most about 1.65 wt%, at most about 1.7 wt%, at most about 1.75 wt%, at most about 1.8 wt%, at most about 1.85 wt%, at most about 1.9 wt%, at most about 1.95 wt%, or at most about 2.0 wt%.

[0060] In some embodiments, the at least one pesticidal active ingredient is present in an amount in a range of from about 0.10 wt% to about 0.70 wt%.

[0061] One or more additional additives may optionally be combined with aqueous spray mixtures produced according to the present disclosure. Examples of such additives include, for instance and without limitation, safeners (as described elsewhere herein), dispersants (as described elsewhere herein), surfactants (as described elsewhere herein), oils (*e.g.*, crop oil concentrate and/or methylated seed oil), nitrogen-based fertilizers (*e.g.*, ammonium sulfate and/or urea ammonium nitrate), defoamers, suspension agents, buffers, conditioning or water-softening agents, deposition agents (stickers), drift control agents, and colorants.

[0062] In some embodiments, the bait composition comprises at least one auxiliary selected from antifoams, antifreeze, biocides, and combinations thereof.

[0063] In some embodiments, the at least one bait comprises a component selected from feedants, attractants, sugary attractants, ammonia, ammonium salts, hydrolyzed proteins, vegetable proteins, hydrolyzed vegetable proteins, yeast proteins, hydrolyzed yeast proteins, animal proteins, hydrolyzed animal proteins, and combinations thereof.

[0064] In some embodiments, the at least one bait does not comprise an animal protein or a hydrolyzed animal protein. In some embodiments, the at least one bait is substantially free of an animal protein or a hydrolyzed animal protein.

[0065] In some embodiments, the at least one bait comprises a vegetable protein. Suitable vegetable proteins are those that have attractive and feeding stimulant properties. In some embodiments, the at least one bait comprises corn steep liquor. In some embodiments, the

at least one bait comprises corn protein in an amount in a range of from about 2 wt% to about 80 wt%.

[0066] Generally, the at least one feedant may include any suitable feedant known in the art that facilitates the bait composition. In some embodiments, the at least one feedant comprises corn steep liquor. In some embodiments, the at least one feedant comprises hydrolyzed proteins. In some embodiments, the at least one feedant comprises sugar.

[0067] Generally, the at least one feedant may be present in any suitable amount known in the art that facilitates the bait composition. In some embodiments, the at least one feedant is present in an amount of at least about 50 wt%, at least about 55 wt%, at least about 60 wt%, at least about 65 wt%, at least about 70 wt%, or at least about 75 wt%. In some embodiments, the at least one feedant is present in an amount of at most about 55 wt%, at most about 60 wt%, at most about 65 wt%, at most about 70 wt%, at most about 75 wt%, or at most about 80 wt%.

[0068] In some embodiments, the at least one feedant is present in an amount in a range of from about 55 wt% to about 80 wt%.

[0069] Generally, the at least one attractant may include any suitable attractant known in the art that facilitates the bait composition. In some embodiments, the at least one attractant comprises corn syrup.

[0070] Generally, the at least one attractant may be present in any suitable amount known in the art that facilitates the bait composition. In some embodiments, the at least one attractant is present in an amount of at least about 0.10 wt%, at least about 0.15 wt%, at least about 0.20 wt%, at least about 0.25 wt%, at least about 0.30 wt%, at least about 0.35 wt%, at least about 0.40 wt%, at least about 0.45 wt%, at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, at least about 0.85 wt%, at least about 0.90 wt%, at least about 0.95 wt%, at least about 1.0 wt%, at least about 1.1 wt%, at least about 1.2 wt%, at least about 1.3 wt%, at least about 1.4 wt%, at least about 1.5 wt%, at least about 1.6 wt%, at least about 1.7 wt%, at least about 1.8 wt%, at least about 1.9 wt%, at least about 2.0 wt%, at least about 2.1 wt%, at least about 2.2 wt%, at least about 2.3 wt%, at least about 2.4 wt%, at least about 2.5 wt%, at least about 2.6 wt%, at least about 2.7

wt%, at least about 2.8 wt%, at least about 2.9 wt%, at least about 3.0 wt%, at least about 3.1 wt%, at least about 3.2 wt%, at least about 3.3 wt%, at least about 3.4 wt%, at least about 3.5 wt%, at least about 3.6 wt%, at least about 3.7 wt%, at least about 3.8 wt%, or at least about 3.9 wt%. In some embodiments, the at least one attractant is present in an amount of at most about 0.15 wt%, at most about 0.20 wt%, at most about 0.25 wt%, at most about 0.30 wt%, at most about 0.35 wt%, at most about 0.40 wt%, at most about 0.45 wt%, at most about 0.50 wt%, at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, at most about 0.90 wt%, at most about 0.95 wt%, at most about 1.0 wt%, at most about 1.1 wt%, at most about 1.2 wt%, at most about 1.3 wt%, at most about 1.4 wt%, at most about 1.5 wt%, at most about 1.6 wt%, at most about 1.7 wt%, at most about 1.8 wt%, at most about 1.9 wt%, at most about 2.0 wt%, at most about 2.1 wt%, at most about 2.2 wt%, at most about 2.3 wt%, at most about 2.4 wt%, at most about 2.5 wt%, at most about 2.6 wt%, at most about 2.7 wt%, at most about 2.8 wt%, at most about 2.9 wt%, at most about 3.0 wt%, at most about 3.1 wt%, at most about 3.2 wt%, at most about 3.3 wt%, at most about 3.4 wt%, at most about 3.5 wt%, at most about 3.6 wt%, at most about 3.7 wt%, at most about 3.8 wt%, at most about 3.9 wt%, or at most about 4.0 wt%.

[0071] In some embodiments, the at least one attractant is present in an amount of at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, or at most about 0.90 wt%.

[0072] In some embodiments, the at least one sugary attractant is present in an amount in a range of from about 0.50 wt% to about 0.90 wt%.

[0073] Generally, the at least one ammonium salt may include any suitable ammonium salt known in the art that facilitates the bait composition. In some embodiments, the at least one ammonium salt is selected from ammonium acetate, ammonium citrate, ammonium tartrate, ammonium lactate, water-soluble ammonium salts of fatty acids, and combinations thereof.

[0074] Generally, the at least one ammonium salt may be present in any suitable amount known in the art that facilitates the bait composition.

[0075] In some embodiments, the at least one ammonium salt is present in an amount of at least about 0.10 wt%, at least about 0.15 wt%, at least about 0.20 wt%, at least about 0.25 wt%, at least about 0.30 wt%, at least about 0.35 wt%, at least about 0.40 wt%, at least about 0.45 wt%, at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, at least about 0.85 wt%, at least about 0.90 wt%, at least about 0.95 wt%, at least about 1.0 wt%, at least about 1.1 wt%, at least about 1.2 wt%, at least about 1.3 wt%, at least about 1.4 wt%, at least about 1.5 wt%, at least about 1.6 wt%, at least about 1.7 wt%, at least about 1.8 wt%, or at least about 1.9 wt%. In some embodiments, the at least one ammonium salt is present in an amount of at most about 0.15 wt%, at most about 0.20 wt%, at most about 0.25 wt%, at most about 0.30 wt%, at most about 0.35 wt%, at most about 0.40 wt%, at most about 0.45 wt%, at most about 0.50 wt%, at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, at most about 0.90 wt%, at most about 0.95 wt%, at most about 1.0 wt%, at most about 1.1 wt%, at most about 1.2 wt%, at most about 1.3 wt%, at most about 1.4 wt%, at most about 1.5 wt%, at most about 1.6 wt%, at most about 1.7 wt%, at most about 1.8 wt%, at most about 1.9 wt%, or at most about 2.0 wt%.

[0076] In some embodiments, the at least one ammonium salt is present in an amount of at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, or at least about 0.85 wt%. In some embodiments, the at least one ammonium salt is present in an amount of at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, or at most about 0.90 wt%.

[0077] In some embodiments, the at least one ammonium salt is present in an amount in a range of from about 0.50 wt% to about 0.90 wt%.

[0078] In some embodiments, ammonia is present in an amount of at least about 0.10 wt%, at least about 0.15 wt%, at least about 0.20 wt%, at least about 0.25 wt%, at least about 0.30 wt%, at least about 0.35 wt%, at least about 0.40 wt%, at least about 0.45 wt%, at least about 0.50 wt%, at least about 0.55 wt%, at least about 0.60 wt%, at least about 0.65 wt%, at least about 0.70 wt%, at least about 0.75 wt%, at least about 0.80 wt%, at least about 0.85 wt%, at least about 0.90 wt%,

at least about 0.95 wt%, at least about 1.0 wt%, at least about 1.1 wt%, at least about 1.2 wt%, at least about 1.3 wt%, at least about 1.4 wt%, at least about 1.5 wt%, at least about 1.6 wt%, at least about 1.7 wt%, at least about 1.8 wt%, or at least about 1.9 wt%. In some embodiments, ammonia is present in an amount of at most about 0.15 wt%, at most about 0.20 wt%, at most about 0.25 wt%, at most about 0.30 wt%, at most about 0.35 wt%, at most about 0.40 wt%, at most about 0.45 wt%, at most about 0.50 wt%, at most about 0.55 wt%, at most about 0.60 wt%, at most about 0.65 wt%, at most about 0.70 wt%, at most about 0.75 wt%, at most about 0.80 wt%, at most about 0.85 wt%, at most about 0.90 wt%, at most about 0.95 wt%, at most about 1.0 wt%, at most about 1.1 wt%, at most about 1.2 wt%, at most about 1.3 wt%, at most about 1.4 wt%, at most about 1.5 wt%, at most about 1.6 wt%, at most about 1.7 wt%, at most about 1.8 wt%, at most about 1.9 wt%, or at most about 2.0 wt%.

[0079] In some embodiments, the bait composition is an agrochemical composition. In some embodiments, the bait composition is in a form selected from a premix and a tank mix. In some embodiments, the bait composition is in a form of a premix. In some embodiments, the bait composition is a sprayable composition.

[0080] In some embodiments, the bait composition is capable of controlling phytophagous insects. Phytophagous insects refers to invertebrate pests causing injury to plants by feeding upon them, such as by eating foliage, stem, leaf, fruit or seed tissue or by sucking the vascular juices of plants. Leaf feeders may be external (exophytic) or they may mine the tissues, sometimes even specializing on a particular cell type. There are phytophagous insect species in the majority of insect orders, including *Hemiptera*, *Thysanoptera*, *Orthoptera*, *Lepidoptera*, *Coleoptera*, *Heteroptera*, *Hymenoptera*, and *Diptera*.

[0081] Examples of agronomic or nonagronomic invertebrate pests include eggs, larvae and adults of the order Lepidoptera, such as armyworms, cutworms, loopers, and heliothines in the family Noctuidae (e.g., pink stem borer (*Sesamia inferens* Walker), corn stalk borer (*Sesamia nonagrioides* Lefebvre), southern armyworm (*Spodoptera eridania* Cramer), fall armyworm (*Spodoptera frugiperda* J. E. Smith), beet armyworm (*Spodoptera exigua* Hübner), cotton leafworm (*Spodoptera littoralis* Boisduval), yellowstriped armyworm (*Spodoptera ornithogalli* Guenée), black cutworm (*Agrotis ipsilon* Hufnagel), velvetbean caterpillar (*Anticarsia*

gemmatalis Hübner), green fruitworm (*Lithophane antennata* Walker), cabbage armyworm (*Barathra brassicae* Linnaeus), soybean looper (*Pseudoplusia includens* Walker), cabbage looper (*Trichoplusia ni* Hübner), tobacco budworm (*Heliothis virescens* Fabricius)); borers, casebearers, webworms, coneworms, cabbageworms and skeletonizers from the family Pyralidae (e.g., European corn borer (*Ostrinia nubilalis* Hübner), navel orangeworm (*Amyelois transitella* Walker), corn root webworm (*Crambus caliginosellus* Clemens), sod webworms (Pyralidae: *Crambinae*) such as sod worm (*Herpetogramma licarsisalis* Walker), sugarcane stem borer (*Chilo infuscatellus* Snellen), tomato small borer (*Neoleucinodes elegantalis* Guenée), green leafroller (*Cnaphalocrocis medinalis*), grape leafroller (*Desmia funeralis* Hübner), melon worm (*Diaphania nitidalis* Stoll), cabbage center grub (*Helluala hydralis* Guenée), yellow stem borer (*Scirpophaga incertulas* Walker), early shoot borer (*Scirpophaga infuscatellus* Snellen), white stem borer (*Scirpophaga innotata* Walker), top shoot borer (*Scirpophaga nivella* Fabricius), dark-headed rice borer (*Chilo polychrysus* Meyrick), striped riceborer (*Chilo suppressalis* Walker), cabbage cluster caterpillar (*Crocidolomia binotalis* English)); leafrollers, budworms, seed worms, and fruit worms in the family Tortricidae (e.g., codling moth (*Cydia pomonella* Linnaeus), grape berry moth (*Endopiza viteana* Clemens), oriental fruit moth (*Grapholita molesta* Busck), citrus false codling moth (*Cryptophlebia leucotreta* Meyrick), citrus borer (*Ecdytolopha aurantiana* Lima), redbanded leafroller (*Argyrotaenia velutinana* Walker), obliquebanded leafroller (*Choristoneura rosaceana* Harris), light brown apple moth (*Epiphyas postvittana* Walker), European grape berry moth (*Eupoecilia ambiguella* Hübner), apple bud moth (*Pandemis pyrusana* Kearfott), omnivorous leafroller (*Platynota stultana* Walsingham), barred fruit-tree tortrix (*Pandemis cerasana* Hübner), apple brown tortrix (*Pandemis heparana* Denis & Schifferrmüller)); and many other economically important lepidoptera (e.g., diamond back moth (*Plutella xylostella* Linnaeus), pink bollworm (*Pectinophora gossypiella* Saunders), gypsy moth (*Lymantria dispar* Linnaeus), peach fruit borer (*Carposina niponensis* Walsingham), peach twig borer (*Anarsia lineatella* Zeller), potato tuberworm (*Phthorimaea operculella* Zeller), spotted teniform leafminer (*Lithocolletis blancardella* Fabricius), Asiatic apple leafminer (*Lithocolletis ringoniella* Matsumura), rice leafroller (*Lerodea eufala* Edwards), apple leafminer (*Leucoptera scitella* Zeller)); eggs, nymphs and adults of the order Blattodea including cockroaches from the families Blattellidae and Blattidae (e.g., oriental cockroach (*Blatta orientalis* Linnaeus), Asian cockroach (*Blattella asahinai* Mizukubo), German cockroach

(*Blattella germanica* Linnaeus), brownbanded cockroach (*Supella longipalpa* Fabricius), American cockroach (*Periplaneta americana* Linnaeus), brown cockroach (*Periplaneta brunnea* Burmeister), Madeira cockroach (*Leucophaea maderae* Fabricius)), smoky brown cockroach (*Periplaneta fuliginosa* Service), Australian Cockroach (*Periplaneta australasiae* Fabr.), lobster cockroach (*Nauphoeta cinerea* Olivier) and smooth cockroach (*Symploce pallens* Stephens)); eggs, foliar feeding, fruit feeding, root feeding, seed feeding and vesicular tissue feeding larvae and adults of the order Coleoptera including weevils from the families Anthribidae, Bruchidae, and Curculionidae (e.g., boll weevil (*Anthonomus grandis* Boheman), rice water weevil (*Lissorhoptrus oryzophilus* Kuschel), granary weevil (*Sitophilus granarius* Linnaeus), rice weevil (*Sitophilus oryzae* Linnaeus)), annual bluegrass weevil (*Listronotus maculicollis* Dietz), bluegrass billbug (*Sphenophorus parvulus* Gyllenhal), hunting billbug (*Sphenophorus venatus vestitus*), Denver billbug (*Sphenophorus cicatristriatus* Fahraeus)); flea beetles, cucumber beetles, rootworms, leaf beetles, potato beetles, and leafminers in the family Chrysomelidae (e.g., Colorado potato beetle (*Leptinotarsa decemlineata* Say), western corn rootworm (*Diabrotica virgifera* LeConte)); chafers and other beetles from the family Scarabaeidae (e.g., Japanese beetle (*Popillia japonica* Newman), oriental beetle (*Anomala orientalis* Waterhouse, *Exomala orientalis* (Waterhouse) Baraud), northern masked chafer (*Cyclocephala borealis* Arrow), southern masked chafer (*Cyclocephala immaculata* Olivier or *C. lurida* Bland), dung beetle and white grub (*Aphodius* spp.), black turfgrass ataenius (*Ataenius spretulus* Haldeman), green June beetle (*Cotinis nitida* Linnaeus), Asiatic garden beetle (*Maladera castanea* Arrow), May/June beetles (*Phyllophaga* spp.) and European chafer (*Rhizotrogus majalis* Razoumowsky)); carpet beetles from the family Dermestidae; wireworms from the family Elateridae; bark beetles from the family Scolytidae and flour beetles from the family Tenebrionidae.

[0082] In addition, agronomic and nonagronomic pests include: eggs, adults and larvae of the order Dermaptera including earwigs from the family Forficulidae (e.g., European earwig (*Forficula auricularia* Linnaeus), black earwig (*Chelisoches morio* Fabricius)); eggs, immatures, adults and nymphs of the orders Hemiptera and Homoptera such as, plant bugs from the family Miridae, cicadas from the family Cicadidae, leafhoppers (e.g. *Empoasca* spp.) from the family Cicadellidae, potato leafhoppers, bed bugs (e.g., *Cimex lectularius* Linnaeus) from the family Cimicidae, planthoppers from the families Fulgoroidae and Delphacidae, treehoppers from the

family Membracidae, psyllids from the family Psyllidae, whiteflies from the family Aleyrodidae, aphids from the family Aphididae, phylloxera from the family Phylloxeridae, mealybugs from the family Pseudococcidae, scales from the families Coccidae, Diaspididae and Margarodidae, lace bugs from the family Tingidae, stink bugs from the family Pentatomidae, chinch bugs (e.g., hairy chinch bug (*Blissus leucopterus hirtus* Montandon) and southern chinch bug (*Blissus insularis* Barber)) and other seed bugs from the family Lygaeidae, spittlebugs from the family Cercopidae squash bugs from the family Coreidae, and red bugs and cotton stainers from the family Pyrrhocoridae.

[0083] Agronomic and nonagronomic pests also include: eggs, larvae, nymphs and adults of the order Acari (mites) such as spider mites and red mites in the family Tetranychidae (e.g., European red mite (*Panonychus ulmi* Koch), two spotted spider mite (*Tetranychus urticae* Koch), McDaniel mite (*Tetranychus mcdanieli* McGregor)); flat mites in the family Tenuipalpidae (e.g., citrus flat mite (*Brevipalpus lewisi* McGregor)); rust and bud mites in the family Eriophyidae and other foliar feeding mites and mites important in human and animal health, *i.e.*, dust mites in the family Epidermoptidae, follicle mites in the family Demodicidae, grain mites in the family Glycyphagidae; ticks in the family Ixodidae, commonly known as hard ticks (e.g., deer tick (*Ixodes scapularis* Say), Australian paralysis tick (*Ixodes holocyclus* Neumann), American dog tick (*Dermacentor variabilis* Say), lone star tick (*Amblyomma americanum* Linnaeus)) and ticks in the family Argasidae, commonly known as soft ticks (e.g., relapsing fever tick (*Ornithodoros turicata*), common fowl tick (*Argas radiatus*)); scab and itch mites in the families Psoroptidae, Pyemotidae, and Sarcoptidae; eggs, adults and immatures of the order Orthoptera including grasshoppers, locusts and crickets (e.g., migratory grasshoppers (e.g., *Melanoplus sanguinipes* Fabricius, *M. differentialis* Thomas), American grasshoppers (e.g., *Schistocerca americana* Drury), desert locust (*Schistocerca gregaria* Forskal), migratory locust (*Locusta migratoria* Linnaeus), bush locust (*Zonocerus* spp.), house cricket (*Acheta domesticus* Linnaeus), mole crickets (e.g., tawny mole cricket (*Scapteriscus vicinus* Scudder) and southern mole cricket (*Scapteriscus borellii* Giglio-Tos)); eggs, adults and immatures of the order Diptera including leafminers (e.g., *Liriomyza* spp. such as serpentine vegetable leafminer (*Liriomyza sativae* Blanchard)), midges, fruit flies (Tephritidae), frit flies (e.g., *Oscinella frit* Linnaeus), soil maggots, house flies (e.g., *Musca domestica* Linnaeus), lesser house flies (e.g., *Fannia canicularis* Linnaeus, *F. femoralis* Stein), stable flies (e.g., *Stomoxys calcitrans* Linnaeus), face

flies, horn flies, blow flies (e.g., *Chrysomya* spp., *Phormia* spp.), and other muscoid fly pests, horse flies (e.g., *Tabanus* spp.), bot flies (e.g., *Gastrophilus* spp., *Oestrus* spp.), cattle grubs (e.g., *Hypoderma* spp.), deer flies (e.g., *Chrysops* spp.), keds (e.g., *Melophagus ovinus* Linnaeus) and other Brachycera, mosquitoes (e.g., *Aedes* spp., *Anopheles* spp., *Culex* spp.), black flies (e.g., *Prosimulium* spp., *Simulium* spp.), biting midges, sand flies, sciarids, and other Nematocera; eggs, adults and immatures of the order Thysanoptera including onion thrips (*Thrips tabaci* Lindeman), flower thrips (*Frankliniella* spp.), and other foliar feeding thrips; insect pests of the order Hymenoptera including ants of the Family Formicidae including the Florida carpenter ant (*Camponotus floridanus* Buckley), red carpenter ant (*Camponotus ferrugineus* Fabricius), black carpenter ant (*Camponotus pennsylvanicus* De Geer), white-footed ant (*Technomyrmex albipes* fr. Smith), big headed ants (*Pheidole* sp.), ghost ant (*Tapinoma melanocephalum* Fabricius), Pharaoh ant (*Monomorium pharaonis* Linnaeus), little fire ant (*Wasmannia auropunctata* Roger), fire ant (*Solenopsis geminata* Fabricius), red imported fire ant (*Solenopsis invicta* Buren), Argentine ant (*Iridomyrmex humilis* Mayr), crazy ant (*Paratrechina longicornis* Latreille), pavement ant (*Tetramorium caespitum* Linnaeus), cornfield ant (*Lasius alienus* Förster) and odorous house ant (*Tapinoma sessile* Say). Other Hymenoptera including bees (including carpenter bees), hornets, yellow jackets, wasps, and sawflies (*Neodiprion* spp.; *Cephus* spp.); insect pests of the order Isoptera including termites in the Termitidae (e.g., *Macrotermes* sp., *Odontotermes obesus* Rambur), Kalotermitidae (e.g., *Cryptotermes* sp.), and Rhinotermitidae (e.g., *Reticulitermes* sp., *Coptotermes* sp., *Heterotermes tenuis* Hagen) families, the eastern subterranean termite (*Reticulitermes flavipes* Kollar), western subterranean termite (*Reticulitermes hesperus* Banks), Formosan subterranean termite (*Coptotermes formosanus* Shiraki), West Indian drywood termite (*Incisitermes immigrans* Snyder), powder post termite (*Cryptotermes brevis* Walker), drywood termite (*Incisitermes snyderi* Light), southeastern subterranean termite (*Reticulitermes virginicus* Banks), western drywood termite (*Incisitermes minor* Hagen), arboreal termites such as *Nasutitermes* sp. and other termites of economic importance; insect pests of the order Thysanura such as silverfish (*Lepisma saccharina* Linnaeus) and firebrat (*Thermobia domestica* Packard); insect pests of the order Mallophaga and including the head louse (*Pediculus humanus capitis* De Geer), body louse (*Pediculus humanus* Linnaeus), chicken body louse (*Menacanthus stramineus* Nitsch), dog biting louse (*Trichodectes canis* De Geer), fluff louse (*Goniocotes gallinae* De Geer), sheep body louse

(*Bovicola ovis* Schrank), short-nosed cattle louse (*Haematopinus eurysternus* Nitzsch), long-nosed cattle louse (*Linognathus vituli* Linnaeus) and other sucking and chewing parasitic lice that attack man and animals; insect pests of the order Siphonoptera including the oriental rat flea (*Xenopsylla cheopis* Rothschild), cat flea (*Ctenocephalides felis* Bouche), dog flea (*Ctenocephalides canis* Curtis), hen flea (*Ceratophyllus gallinae* Schrank), sticktight flea (*Echidnophaga gallinacea* Westwood), human flea (*Pulex irritans* Linnaeus) and other fleas afflicting mammals and birds. Additional arthropod pests covered include: spiders in the order Araneae such as the brown recluse spider (*Loxosceles reclusa* Gertsch & Mulaik) and the black widow spider (*Latrodectus mactans* Fabricius), and centipedes in the order Scutigermorpha such as the house centipede (*Scutigera coleoptrata* Linnaeus).

[0084] Examples of invertebrate pests of stored grain include larger grain borer (*Prostephanus truncatus*), lesser grain borer (*Rhyzopertha dominica*), rice weevil (*Stiophilus oryzae*), maize weevil (*Stiophilus zeamais*), cowpea weevil (*Callosobruchus maculatus*), red flour beetle (*Tribolium castaneum*), granary weevil (*Stiophilus granarius*), Indian meal moth (*Plodia interpunctella*), Mediterranean flour beetle (*Ephestia kuhniella*) and flat or rusty grain beetle (*Cryptolestis ferrugineus*).

[0085] Compositions produced according to the present disclosure may have activity on members of the Classes Nematoda, Cestoda, Trematoda, and Acanthocephala including economically important members of the orders Strongylida, Ascaridida, Oxyurida, Rhabditida, Spirurida, and Enoplida such as but not limited to economically important agricultural pests (*i.e.*, root knot nematodes in the genus *Meloidogyne*, lesion nematodes in the genus *Pratylenchus*, stubby root nematodes in the genus *Trichodorus*, etc.) and animal and human health pests (*i.e.*, all economically important flukes, tapeworms, and roundworms, such as *Strongylus vulgaris* in horses, *Toxocara canis* in dogs, *Haemonchus contortus* in sheep, *Dirofilaria immitis* Leidy in dogs, *Anoplocephala perfoliata* in horses, *Fasciola hepatica* Linnaeus in ruminants, etc.).

[0086] Compositions produced according to the disclosure may have activity against pests in the order Lepidoptera (e.g., *Alabama argillacea* Hübner (cotton leaf worm), *Archips argyrospila* Walker (fruit tree leaf roller), *A. rosana* Linnaeus (European leaf roller) and other *Archips* species, *Chilo suppressalis* Walker (rice stem borer), *Cnaphalocrosis medinalis* Guenée

(rice leaf roller), *Crambus caliginosellus* Clemens (corn root webworm), *Crambus teterrellus* Zincken (bluegrass webworm), *Cydia pomonella* Linnaeus (codling moth), *Earias insulana* Boisduval (spiny bollworm), *Earias vittella* Fabricius (spotted bollworm), *Helicoverpa armigera* Hübner (American bollworm), *Helicoverpa zea* Boddie (corn earworm), *Heliothis virescens* Fabricius (tobacco budworm), *Herpetogramma licarsisalis* Walker (sod webworm), *Lobesia botrana* Denis & Schiffermüller (grape berry moth), *Pectinophora gossypiella* Saunders (pink bollworm), *Phyllocnistis citrella* Stainton (citrus leafminer), *Pieris brassicae* Linnaeus (large white butterfly), *Pieris rapae* Linnaeus (small white butterfly), *Plutella xylostella* Linnaeus (diamond back moth), *Spodoptera exigua* Hübner (beet armyworm), *Spodoptera litura* Fabricius (tobacco cutworm, cluster caterpillar), *Spodoptera frugiperda* J. E. Smith (fall armyworm), *Trichoplusia ni* Hübner (cabbage looper) and *Tuta absoluta* Meyrick (tomato leafminer)).

[0087] Compositions produced according to the disclosure may have significant activity on members from the order Homoptera including: *Acyrtosiphon pisum* Harris (pea aphid), *Aphis craccivora* Koch (cowpea aphid), *Aphis fabae* Scopoli (black bean aphid), *Aphis gossypii* Glover (cotton aphid, melon aphid), *Aphis pomi* De Geer (apple aphid), *Aphis spiraeicola* Patch (spirea aphid), *Aulacorthum solani* Kaltenbach (foxglove aphid), *Chaetosiphon fragaefolii* Cockerell (strawberry aphid), *Diuraphis noxia* Kurdjumov/Mordvilko (Russian wheat aphid), *Dysaphis plantaginea* Paaserini (rosy apple aphid), *Eriosoma lanigerum* Hausmann (woolly apple aphid), *Hyalopterus pruni* Geoffroy (mealy plum aphid), *Lipaphis erysimi* Kaltenbach (turnip aphid), *Metopolophium dirrhodum* Walker (cereal aphid), *Macrosiphum euphorbiae* Thomas (potato aphid), *Myzus persicae* Sulzer (peach-potato aphid, green peach aphid), *Nasonovia ribisnigri* Mosley (lettuce aphid), *Pemphigus* spp. (root aphids and gall aphids), *Rhopalosiphum maidis* Fitch (corn leaf aphid), *Rhopalosiphum padi* Linnaeus (bird cherry-oat aphid), *Schizaphis graminum* Rondani (greenbug), *Sitobion avenae* Fabricius (English grain aphid), *Therioaphis maculata* Buckton (spotted alfalfa aphid), *Toxoptera aurantii* Boyer de Fonscolombe (black citrus aphid), and *Toxoptera citricida* Kirkaldy (brown citrus aphid); *Adelges* spp. (adelgids); *Phylloxera devastatrix* Pergande (pecan phylloxera); *Bemisia tabaci* Gennadius (tobacco whitefly, sweetpotato whitefly), *Bemisia argentifolii* Bellows & Perring (silverleaf whitefly), *Dialeurodes citri* Ashmead (citrus whitefly) and *Trialeurodes vaporariorum* Westwood (greenhouse whitefly); *Empoasca fabae* Harris (potato leafhopper), *Laodelphax striatellus* Fallen (smaller brown planthopper), *Macrolestes quadrilineatus* Forbes

(aster leafhopper), *Nephotettix cincticeps* Uhler (green leafhopper), *Nephotettix nigropictus* Stål (rice leafhopper), *Nilaparvata lugens* Stål (brown planthopper), *Peregrinus maidis* Ashmead (corn planthopper), *Sogatella furcifera* Horvath (white-backed planthopper), *Sogatodes orizicola* Muir (rice delphacid), *Typhlocyba pomaria* McAtee white apple leafhopper, *Erythroneoura* spp. (grape leafhoppers); *Magicidada septendecim* Linnaeus (periodical cicada); *Icerya purchasi* Maskell (cottony cushion scale), *Quadraspidiotus perniciosus* Comstock (San Jose scale); *Planococcus citri* Risso (citrus mealybug); *Pseudococcus* spp. (other mealybug complex); *Cacopsylla pyricola* Foerster (pear psylla), *Trioza diospyri* Ashmead (persimmon psylla).

[0088] Compositions produced according to this disclosure also may have activity on members from the order Hemiptera including: *Acrosternum hilare* Say (green stink bug), *Anasa tristis* De Geer (squash bug), *Blissus leucopterus* Say (chinch bug), *Cimex lectularius* Linnaeus (bed bug) *Corythuca gossypii* Fabricius (cotton lace bug), *Cyrtopeltis modesta* Distant (tomato bug), *Dysdercus suturellus* Herrich-Schäffer (cotton stainer), *Euchistus servus* Say (brown stink bug), *Euchistus variolarius* Palisot de Beauvois (one-spotted stink bug), *Graptostethus* spp. (complex of seed bugs), *Halymorpha halys* Stål (brown marmorated stink bug), *Leptoglossus corculus* Say (leaf-footed pine seed bug), *Lygus lineolaris* Palisot de Beauvois (tarnished plant bug), *Nezara viridula* Linnaeus (southern green stink bug), *Oebalus pugnax* Fabricius (rice stink bug), *Oncopeltus fasciatus* Dallas (large milkweed bug), *Pseudatomoscelis seriatus* Reuter (cotton fleahopper). Other insect orders controlled by compounds of the disclosure include Thysanoptera (e.g., *Frankliniella occidentalis* Pergande (western flower thrips), *Scirtothrips citri* Moulton (citrus thrips), *Sericothrips variabilis* Beach (soybean thrips), and *Thrips tabaci* Lindeman (onion thrips); and the order Coleoptera (e.g., *Leptinotarsa decemlineata* Say (Colorado potato beetle), *Epilachna varivestis* Mulsant (Mexican bean beetle) and wireworms of the genera *Agriotes*, *Athous* or *Limonius*).

[0089] In some aspects, the compositions produced according to the disclosure are useful for controlling Western Flower Thrips (*Frankliniella occidentalis*). In some aspects, the compositions produced according to the disclosure are useful for controlling potato leafhopper (*Empoasca fabae*). In some aspects, the compositions produced according to the disclosure are useful for controlling cotton melon aphid (*Aphis gossypii*). In some aspects, the compositions produced according to the disclosure are useful for controlling diamond backmoth (*Plutella*

xylostella L.). In some aspects, the compositions produced according to the disclosure are useful for controlling Silverleaf Whitefly (*Bemisia argentifolii* Bellows & Perring).

[0090] In cyantraniliprole aspects of the disclosure, the compositions produced according to the disclosure are effective against Coleoptera, Chrysomelidae, *Cerotoma trifurcata* bean leaf beetle, *Chaetocnema concinna* beet flea beetle, *Epilachna varivestis* Mexican bean beetle, *Epitrix cucumeris* potato flea beetle, *Leptinotarsa decemlineata* Colorado potato beetle, *Oulema melanopus* cereal leaf beetle, *Oulema oryzae* rice leaf beetle, *Phyllotreta cruciiferae* cabbage flea beetle, *Phyllotreta striolata* striped flea beetle, *Psylliodes* spp. flea beetles, Curculionidae, *Anthonomus eugeniei* pepper weevil, *Ceutorhynchus napi* cabbage stem weevil, *Ceutorhynchus quadridens* cabbage seed-stalk curculio, *Conotrachelus nenuphar* plum curculio, *Hypera bruneipennis* Egyptian alfalfa weevil, *Hypera postica* alfalfa weevil, *Lissorhoptrus oryzophilus* rice water weevil, Nitidulidae, *Meligethes aeneus* pollen beetle, blossom beetle, Scarabaeidae, *Cotinis nitida* green June beetle, *Phyllophaga* spp. June beetles, grubs, *Popillia japonica* Japanese beetle, Diptera, Agromyzidae, *Liomyza chinensis* stone leek leafminer, *Liomyza huidobrensis* pea leafminer, *Liriomyza sativae* serpentine/vegetable leafminer, *Liomyza trifolii* American serpentine leafminer, Anthomyiidae, *Delia antiqua* onion fly, *Delia platura* seedcorn maggot, Muscidae, *Atherigona oryzae* rice seedling fly, Psilidae, *Psila rosae* carrot fly, Tephritidae, *Anastrepha fraterculus* South American fruit fly, *Anastrepha ludens* Mexican fruit fly, *Anastrepha striata* guava fruit fly, *Bactrocera cucurbitae* melon fly, *Bactrocera dorsalis* oriental fruit fly, *Bactrocera oleae* olive fly, *Ceratitis capitata* Mediterranean fruit fly, *Chromatomyia horticola* garden pea leafminer, *Rhagoletis cerasi* cherry fruit fly, *Rhagoletis cingulata* cherry fruit fly, *Rhagoletis indifferens* western cherry fruit fly, *Rhagoletis pomonella* apple maggot, Hemiptera, Aleyrodidae, *Aleyrodes proletella* cabbage whitefly, *Bemisia tabaci* sweet potato whitefly, cotton whitefly, *Dialeurodes citri* citrus whitefly, *Trialeurodes vaporariorum*, greenhouse whitefly, Aphididae, *Acyrtosiphon pisum* pea aphid, *Aphis craccivora* cowpea aphid, *Aphis fabae* black bean aphid, *Aphis glycines* soybean aphid, *Aphis gossypii* cotton aphid, melon aphid, *Aphis nasturtii* buckthorn aphid, *Aphis pomi* green apple aphid, *Aphis spiraeola* spirea aphid, *Aulacorthum solani* foxglove aphid, *Brachycaudus persicae* black peach aphid, *Brevicoryne brassicae* cabbage aphid, *Chromaphis juglandicola* European walnut aphid, *Dysaphis plantaginea* rosy apple aphid, *Hyalopterus pruni* mealy plum aphid, *Lipaphis erysimi* mustard aphid, turnip aphid, *Macrosiphum euphorbiae* potato aphid, *Myzus persicae* green peach

aphid, peach potato aphid, *Rhopalosiphum padi* bird cherry oat aphid, *Rhopalosiphum*
nymphaeae plum aphid, *Schizaphis graminum* greenbug, *Sitobion avenae* English grain aphid,
Therioaphis maculata spotted alfalfa aphid, *Toxoptera citricida* brown citrus aphid, oriental citrus
 aphid, Cicadellidae, *Empoasca fabae* leafhopper/jassid complex, *Empoasca vitis* green frogfly,
Hortensia similis common green leafhopper, *Idioscopus* spp. mango leafhopper, *Jacobiasca*
lybica cotton jassid, *Nephotettix* spp. rice green leafhopper complex, *Typhlocyba rosae* rose
 leafhopper, *Typhlocyba pomaria* white apple leafhopper, Coreidae *Leptocoris* oratorius rice
 bug, rice ear bug, paddy bug, Delphacidae, *Nilaparvata lugens* rice brown planthopper,
 Diaspididae, *Aonidiella aurantii* citrus scale, Flatidae, *Metcalfa pruinosa* citrus flatid
 planthopper, Pentatomidae, *Euschistus* spp. brown stinkbugs, *Edessa* spp. stink bugs, Psyllidae,
Diaphorina citri Asian citrus psyllid, *Paratrioza cockerelli* potato psyllid, tomato psyllid, *Trioza*
eugeniae eugenia psyllid, lillypilly psyllid, Hymenoptera Tenthredinidae, *Hoplocampa testudinea*
 European apple sawfly, Lepidoptera, Crambidae, *Scirpophaga incertulas* yellow (rice) stemborer,
 Gelechiidae, *Anarsia lineatella* peach twig borer, *Keiferia lycopersicella* tomato pinworm,
Pectinophora gossypiella pink bollworm, *Tuta absoluta* tomato leafminer, Gracillariidae,
Gracillaria theivora tea leafroller, *Phyllonorycter blancardella* spotted tentiform leafminer,
Phyllonorycter coryfoliella nut leaf blister moth, *Phyllonorycter crataegella* apple blotch
 leafminer, *Phyllonorycter ringoniella* apple leafminer, *Phyllonorycter elmaella* western tentiform
 leafminer, Hesperidae, *Borbo cinara* rice leafroller, Lyonetiidae, *Leucoptera coffeella* white
 coffee leafminer, *Leucoptera scitella* pear leaf blister moth, *Lyonetia clerkella* peach, leaf miner,
 Noctuidae, *Agrotis segetum* common cutworm, *Alabama argillacea* cotton leafworm, *Autographa*
californica alfalfa looper, *Barathra brassicae* cabbage armyworm, *Chrysodeixis chalcites* green
 garden looper, *Chrysodeixis eriosoma* green semi-looper, *Earias insulana* Egyptian bollworm,
Earias vittella northern rough bollworm, *Feltia subterranea* granulate cutworm, *Helicoverpa*
armigera American bollworm, cotton bollworm, *Helicoverpa punctigera* climbing cutworm,
Heliothis virescens tobacco budworm, *Helicoverpa zea* corn earworm, *Prodenia ornithogalli*
 yellow-striped armyworm, *Pseudaletia unipuncta* true armyworm, *Pseudoplusia includens*
 soybean looper, *Sesamia inferens* pink (rice) stemborer, *Spodoptera eridania* southern
 armyworm, *Spodoptera exigua* beet armyworm, *Spodoptera frugiperda* fall armyworm,
Spodoptera littoralis cotton leafworm, *Spodoptera litura* cluster caterpillar, *Thermesia*
gemmatilis velvetbean caterpillar, *Trichoplusia ni* cabbage looper, Phyllocnistidae, *Phyllocnistis*

citrella citrus leafminer, Pieridae, Colias eurytheme alfalfa caterpillar, Leptophobia aripa green-eyed white, Pieris brassicae cabbage butterfly, large white, Pieris rapae imported cabbage worm, cabbage white, Plutellidae, Plutella xylostella diamondback moth, Pyralidae, Chilo suppressalis Asiatic rice stemborer, Cnaphalocerus medinalis rice leaffolder, Crocidolomia binotalis cabbage caterpillar, Desmia funeralis grape leaffolder, Diaphania indica cotton caterpillar, Diaphania nitidalis melonworm, Hellula hydralis cabbage center grub, Hellula undalis cabbage webworm, Lerodea eufala rice leaffolder, Leucinodes orbonalis brinjal fruit borer, Maruca testulalis bean pod borer, Neoleucinodes elegantalis small tomato borer, Nymphula depunctalis rice caseworm, Ostrinia furnicalis Asian corn borer, Ostrinia nubilalis European corn borer, Sphingidae, Manduca sexta tomato hornworm, tobacco hornworm, Smerinthus spp. sphinx moths, Tortricidae, Adoxophyes orana summer fruit tortrix, Argyrotaenia pulchellana grape tortrix, Argyrotaenia velutinana red-banded leafroller, Choristoneura rosaceana oblique-banded leafroller, Eupoecilia ambiguella grape berry moth, Cydia pomonella codling moth, Cydia prunivora lesser apple worm, Grapholita molesta oriental fruit moth, Lobesia botrana grape vine moth, Pandemis heparana apple brown tortrix, Pandemis limitata three-lined leaf roller, Paramyelois transitella navel orangeworm, Platynota idaeusalis tufted apple bud moth, Platynota stultana omnivorus leafroller, Thysanoptera, Thripidae, Enneothrips flavens, Frankliniella fusca tobacco thrips, Frankliniella intonsa European flower thrips, Frankliniella occidentalis western flower thrips, Frankliniella schultzei common blossom thrips, Frankliniella tritici eastern flower thrips, Megalurothrips sjostedti cowpea thrips, Megalurothrips usitatus bean blossom thrips, Scirtothrips citri citrus thrips, Scirtothrips dorsalis yellow tea thrips, chilli thrips, Sericothrips variabilis soybean thrips, Stenchaetothrips biformis oriental rice thrips, Thrips arizonensis cotton thrips, Thrips meridionalis peach thrips, Thrips palmi melon thrips, and Thrips tabaci onion thrips, common cotton thrips.

[0091] In some cyantraniliprole aspects of the disclosure, the compositions produced according to the disclosure are effective against Leptinotarsa decemlineata Colorado potato beetle, Oulema oryzae rice leaf beetle, Phyllotreta cruciiferae cabbage flea beetle, Phyllotreta striolata striped flea beetle, Psylliodes spp. flea beetles, Anthonomus eugenii pepper weevil, Conotrachelus nenuphar plum curculio, Lissorhoptrus oryzophilus rice water weevil, Meligethes aeneus pollen beetle, blossom beetle, Liomyza chinensis stone leek leafminer, Liomyza huidobrensis pea leafminer, Liriomyza sativae serpentine/vegetable leafminer, Liriomyza trifolii

American serpentine leafminer, *Delia antiqua* onion fly, *Delia platura* seedcorn maggot, *Psila rosae* carrot fly, *Bactrocera dorsalis* oriental fruit fly, *Bactrocera oleae* olive fly, *Ceratitis capitata* Mediterranean fruit fly, *Rhagoletis indifferens* western cherry fruit fly, *Rhagoletis pomonella* apple maggot, *Bemisia tabaci* sweet potato whitefly, cotton whitefly, *Trialeurodes vaporariorum*, greenhouse whitefly, *Acyrtosiphon pisum* pea aphid, *Aphis craccivora* cowpea aphid, *Aphis fabae* black bean aphid, *Aphis gossypii* cotton aphid, melon aphid, *Aphis pomi* green apple aphid, *Aphis spiraceola* spirea aphid, *Aulacorthum solani* foxglove aphid, *Brevicoryne brassicae* cabbage aphid, *Dysaphis plantaginea* rosy apple aphid, *Lipaphis erysimi* mustard aphid, turnip aphid, *Macrosiphum euphorbiae* potato aphid, *Myzus persicae* green peach aphid, peach potato aphid, *Rhopalosiphum padi* bird cherry oat aphid, *Schizaphis graminum* greenbug, *Sitobion avenae* English grain aphid, *Toxoptera citricida* brown citrus aphid, oriental citrus aphid, *Empoasca vitis* green frogfly, *Idioscopus* spp. mango leafhopper, *Nilaparvata lugens* rice brown planthopper, *Aonidiella aurantii* citrus scale, *Euschistus* spp. brown stinkbugs, *Diaphorina citri* Asian citrus psyllid, *Paratrioza cockerelli* potato psyllid, tomato psyllid, *Scirpophaga incertulas* yellow (rice) stemborer, *Anarsia lineatella* peach twig borer, *Tuta absoluta* tomato leafminer, *Leucoptera coffeella* white coffee leafminer, *Alabama argillacea* cotton leafworm, *Helicoverpa armigera* American bollworm, cotton bollworm, *Helicoverpa punctigera* climbing cutworm, *Heliothis virescens* tobacco budworm, *Helicoverpa zea* corn earworm, *Pseudoplusia includens* soybean looper, *Sesamia inferens* pink (rice) stemborer, *Spodoptera eridania* southern armyworm, *Spodoptera exigua* beet armyworm, *Spodoptera frugiperda* fall armyworm, *Spodoptera littoralis* cotton leafworm, *Spodoptera litura* cluster caterpillar, *Thermesia gemmatilis* velvetbean caterpillar, *Trichoplusia ni* cabbage looper, *Phyllocnistis citrella* citrus leafminer, *Pieris brassicae* cabbage butterfly, large white, *Pieris rapae* imported cabbage worm, cabbage white, *Plutella xylostella* diamondback moth, *Chilo suppressalis* Asiatic rice stemborer, *Cnaphalocerus medinalis* rice leafroller, *Leucinodes orbonalis* brinjal fruit borer, *Ostrinia furnicalis* Asian corn borer, *Ostrinia nubilalis* European corn borer, *Choristoneura rosaceana* oblique-banded leafroller, *Eupoecilia ambiguella* grape berry moth, *Cydia pomonella* codling moth, *Grapholita molesta* oriental fruit moth, *Lobesia botrana* grape vine moth, *Frankliniella fusca* tobacco thrips, *Frankliniella intonsa* European flower thrips, *Frankliniella occidentalis* western flower thrips, *Scirtothrips citri* citrus thrips, *Scirtothrips dorsalis* yellow tea thrips, chilli thrips, *Thrips palmi* melon thrips, and *Thrips tabaci* onion thrips, common cotton thrips.

[0092] In some cyantraniliprole aspects of the disclosure, the compositions produced according to the disclosure are effective against *Conotrachelus nenuphar* plum curculio, *Liomyza huidobrensis* pea leafminer, *Liriomyza sativae* serpentine/vegetable leafminer, *Liomyza trifolii* American serpentine leafminer, *Bemisia tabaci* sweet potato whitefly, cotton whitefly, *Trialeurodes vaporariorum*, greenhouse whitefly, *Acyrtosiphon pisum* pea aphid, *Aphis craccivora* cowpea aphid, *Aphis gossypii* cotton aphid, melon aphid, *Brevicoryne brassicae* cabbage aphid, *Dysaphis plantaginea* rosy apple aphid, *Myzus persicae* green peach aphid, peach potato aphid, *Diaphorina citri* Asian citrus psyllid, *Paratrioza cockerelli* potato psyllid, tomato psyllid, *Scirpophaga incertulas* yellow (rice) stemborer, *Anarsia lineatella* peach twig borer, *Tuta absoluta* tomato leafminer, *Leucoptera coffeella* white coffee leafminer, *Alabama argillacea* cotton leafworm, *Helicoverpa armigera* American bollworm, cotton bollworm, *Helicoverpa punctigera* climbing cutworm, *Heliothis virescens* tobacco budworm, *Helicoverpa zea* corn earworm, *Pseudoplusia includens* soybean looper, *Sesamia inferens* pink (rice) stemborer, *Spodoptera eridania* southern armyworm, *Spodoptera exigua* beet armyworm, *Spodoptera frugiperda* fall armyworm, *Spodoptera littoralis* cotton leafworm, *Spodoptera litura* cluster caterpillar, *Phyllocnistis citrella* citrus leafminer, *Plutella xylostella* diamondback moth, *Chilo suppressalis* Asiatic rice stemborer, *Cnaphalocerus medinalis* rice leafhopper, *Choristoneura rosaceana* oblique-banded leafroller, *Eupoecilia ambiguella* grape berry moth, *Cydia pomonella* codling moth, *Grapholita molesta* oriental fruit moth, *Lobesia botrana* grape vine moth, *Frankliniella fusca* tobacco thrips, *Frankliniella occidentalis* western flower thrips, *Scirtothrips dorsalis* yellow tea thrips, chilli thrips, *Thrips palmi* melon thrips, and *Thrips tabaci* onion thrips, common cotton thrips.

[0093] In chlorantraniliprole aspects of the disclosure, the compositions produced according to the disclosure are effective against: Coleoptera (*Chrysomelida*, *Leptinotarsa decemlineata* Colorado potato beetle, *Curculionidae*, *Lissorhoptrus oryzophilus* rice water weevil, *Listronotus maculicollis* annual bluegrass weevil, *Oryzophagus oryzae* rice water weevil, *Sphenophorus* spp. Billbug, *Scarabaeidae* *Ataenius spretulus* black turfgrass ataenius, *Aphodius* spp. scarab beetles, *Cotinis nitida* green June beetle, *Cyclocephala* spp. masked chafers, *Exomala orientalis* oriental beetle grub, *Maladera castanea* Asiatic garden beetle, *Phyllophaga* spp. June beetles, *Popillia japonica* Japanese beetle, and *Rhizotrogus majalis* European chafer); Diptera (*Agromyzidae*, *Chromatomyia horticola* garden pea leafminer, and *Liriomyza* spp. Leafminers);

Hemiptera (Aleyrodidae, Bemisia spp. Whitefly, Trialeurodes abutiloneus bandedwinged whitefly, Cicadellidae, and Typhlocyba pomaria white apple leafhopper); Isoptera (Rhinotermitidae, Heterotermes tenuis sugarcane termite, Termitidae, Microtermes obesi sugarcane termite, and Odontotermes obesus sugarcane termite); and Lepidoptera (Arctiidae, Estigmene acrea saltmarsh caterpillar, Crambidae, Achyra rantalis garden webworm, Desmia funeralis grape leafroller, Ostrinia nubilalis European corn borer, Gelechiidae, Anarsia lineatella peach twig borer, Keiferia lycopersicella tomato pinworm, Phthorimaea operculella potato tuberworm, Tuta absoluta S. American tomato pinworm, Geometridae, Operophtera brumata winter moth, Gracilaridae, Phyllocnistis citrella citrus leafminer, Lithocolletis ringoniella apple leafminer, Phyllonorycter blancardella spotted tentiform leafminer, Lyonetidae, Leucoptera spp. (ie: malifoliella, coffeella) coffee leafminer, pear leaf blister moth, Noctuidae, Agrotis ipsilon black cutworm, Alabama argillacea cotton leafworm, Amphipyra pyramidoides humped green fruitworm, Anticarsia gemmatilis velvetbean caterpillar, Autographa gamma common silver Y moth, Barathra brassicae cabbage armyworm, Earias spp. (ie: huegeliana, insulana, vitella) rough, spiny, northern rough bollworm, Helicoverpa spp. (ie: armigera, punctigera, zea) bollworms/budworms/fruitworms, Heliothis virescens tobacco budworm, Lithophane antennata green fruitworm, Mamestra brassicae cabbage moth, Orthosia hibisci green fruitworm, Phalaenoides glycinae grape vine moth, Phytometra acuta tomato semi-looper, Pseudoplusia includens soybean looper, Spodoptera spp. (ie: exigua, frugiperda, littoralis) beet armyworm, fall armyworm, Egyptian cotton leafworm, Trichoplusia ni cabbage looper, Pieridae, Pieris spp. (ie: brassica, rapae) large white, imported cabbageworm, Plutellidae, Plutella xylostella diamondback moth, Pyralidae, Amyelois transitella navel orangeworm, Chilo spp. (ie: infuscatellus, polychrysus, suppressalis) sugarcane/rice stem borers, Cnaphalocrocis medinalis rice leafroller, Crambus spp. sod webworm, Crocidolomia binotalis cabbage cluster caterpillar, Diaphania spp. (ie: hyalinata, nitidalis) melonworm, pickleworm, Diatraea saccharalis, Brazilian sugarcane borer, Elasmopalpus lignosellus lesser stalk borer, Evergestis rimosalis cross-stripped cabbageworm, Hedylepta indicata soybean leafroller, Hellula spp. (ie: hydralis, undalis) cabbage centre-grub, cabbage webworm, Leucinodes orbonalis eggplant shoot and fruit borer, Maruca spp. pod borer, Neoleucinodes elegantalis tomato small borer, Scirpophaga spp. sugarcane/rice stem borer, Sesamia spp. (ie: inferens, nonagrioides) pink stem borer/corn stalk borer, Sphingidae, Manduca spp. (ie: quinquemaculata, sexta) tomato/tobacco hornworm, Tortricidae,

Adoxophyes orana summer fruit tortrix, *Argyrotaenia* spp. (ie: *pulchellana*, *velutinana*) grape tortrix, redbanded leafroller, *Bonagota cranaodes* Brazilian apple leafroller, *Carposina* spp. (ie: *niponensis*, *sasaki*) peach fruit borer, peach fruit moth, *Choristoneura rosaceana* obliquebanded leafroller, *Cryptophlebia leucotreta* false codling moth, *Cydia pomonella* codling moth, *Ecodytolopha aurantiana* citrus borer, *Endopiza vitana* grape berry moth, *Epiphyas postvittana* light brown apple moth, *Eupoecilia ambiguella* European grape berry moth, *Grapholita molesta* oriental fruit moth, *Lobesia botrana* European grapevine moth, *Pandemis* spp. (ie: *cerasana*, *heparana*, barred fruit tree tortrix, *limitata*, *pyrusana*) apple brown tortrix, three-lined leafroller, apple pandemic, *Platynota* spp. (ie: *idaeusalis*, *stultana*) tufted apple bud moth, omnivorous leafroller, *Zygaenidae*, and *Harrisina* spp. (ie: *americana*, *brillians*) grapeleaf/western grapeleaf skeletonizer).

[0094] In some chlorantraniliprole aspects of the disclosure, the compositions produced according to the disclosure are effective against: *Leptinotarsa decemlineata* Colorado potato beetle, *Liriomyza* spp. Leafminers, *Bemisia* spp. Whitefly, *Trialeurodes abutiloneus* bandedwinged whitefly, *Heterotermes tenuis* sugarcane termite, *Microtermes obesi* sugarcane termite, and *Odontotermes obesus* sugarcane termite), *Ostrinia nubilalis* European corn borer, *Anarsia lineatella* peach twig borer, *Phthorimaea operculella* potato tuberworm, *Tuta absoluta* S. American tomato pinworm, *Phyllocnistis citrella* citrus leafminer, *Phyllonorycter blancardella* spotted tentiform leafminer, *Leucoptera* spp. (ie: *malifoliella*, *coffeella*) coffee leafminer, *Agrotis ipsilon* black cutworm, *Alabama argillacea* cotton leafworm, *Anticarsia gemmatilis* velvetbean caterpillar, *Helicoverpa* spp. (ie: *armigera*, *punctigera*, *zea*) bollworms/budworms/fruitworms, *Heliothis virescens* tobacco budworm, *Pseudoplusia includens* soybean looper, *Spodoptera* spp. (ie: *exigua*, *frugiperda*, *littoralis*) beet armyworm, fall armyworm, Egyptian cotton leafworm, *Trichoplusia ni* cabbage looper, *Pieris* spp. (ie: *brassica*, *rapae*) large white, imported cabbageworm, *Plutella xylostella* diamondback moth, *Amyelois transitella* navel orangeworm, *Chilo* spp. (ie: *infuscatellus*, *polychrysus*, *suppressalis*) sugarcane/rice stem borers, *Cnaphalocrocis medinalis* rice leafroller, *Diatraea saccharalis*, Brazilian sugarcane borer, *Leucinodes orbonalis* eggplant shoot and fruit borer, *Scirpophaga* spp. sugarcane/rice stem borer, *Sesamia* spp. (ie: *inferens*, *nonagrioides*) pink stem borer/corn stalk borer, *Carposina* spp. (ie: *niponensis*, *sasaki*) peach fruit borer, peach fruit moth, *Choristoneura rosaceana* obliquebanded

leafroller, *Cydia pomonella* codling moth, *Eupoecilia ambiguella* European grape berry moth, *Grapholita molesta* oriental fruit moth, and *Lobesia botrana* European grapevine moth.

[0095] In some chlorantraniliprole aspects of the disclosure, the compositions produced according to the disclosure are effective against: *Liriomyza* spp. Leafminers, *Bemisia* spp. Whitefly, *Trialeurodes abutiloneus* bandedwinged whitefly, *Heterotermes tenuis* sugarcane termite, *Microtermes obesi* sugarcane termite, and *Odontotermes obesus* sugarcane termite), *Ostrinia nubilalis* European corn borer, *Anarsia lineatella* peach twig borer, *Tuta absoluta* S. American tomato pinworm, *Anticarsia gemmatilis* velvetbean caterpillar, *Helicoverpa* spp. (ie: *armigera*, *punctigera*, *zea*) bollworms/budworms/fruitworms, *Heliothis virescens* tobacco budworm, *Pseudoplusia includens* soybean looper, *Spodoptera* spp. (ie: *exigua*, *frugiperda*, *littoralis*) beet armyworm, fall armyworm, Egyptian cotton leafworm, *Plutella xylostella* diamondback moth, *Amyelois transitella* navel orangeworm, *Chilo* spp. (ie: *infuscatellus*, *polychrysus*, *suppressalis*) sugarcane/rice stem borers, *Cnaphalocrocis medinalis* rice leafroller, *Diatraea saccharalis*, Brazilian sugarcane borer, *Scirpophaga* spp. sugarcane/rice stem borer, *Sesamia* spp. (ie: *inferens*, *nonagrioides*) pink stem borer/corn stalk borer, *Cydia pomonella* codling moth, *Grapholita molesta* oriental fruit moth, and *Lobesia botrana* European grapevine moth.

[0096] In some embodiments, the pest is selected from, but not limited to, the group consisting of pests of the family Tephritidae, fruit flies, *Anastrepha fraterculus* South American fruit fly, *Anastrepha ludens* Mexican fruit fly, *Anastrepha striata* guava fruit fly, *Bactrocera cucurbitae* melon fly, *Bactrocera dorsalis* oriental fruit fly, *Bactrocera oleae* olive fly, *Ceratitis capitata* Mediterranean fruit fly, *Chromatomyia horticola* garden pea leafminer, *Rhagoletis cerasi* cherry fruit fly, *Rhagoletis cingulata* cherry fruit fly, *Rhagoletis indifferens* western cherry fruit fly, *Rhagoletis pomonella* apple maggot, and combinations thereof.

[0097] The compositions produced according to the present disclosure are useful for protecting agronomic field crops other non-agronomic horticultural crops and plants from phytophagous invertebrate pests. This utility includes protecting crops and other plants (*i.e.*, both agronomic and nonagronomic) that contain genetic material introduced by genetic engineering (*i.e.*, transgenic) or modified by mutagenesis to provide advantageous traits.

Examples of such traits include tolerance to herbicides, resistance to phytophagous pests (e.g., insects, mites, aphids, spiders, nematodes, snails, plant-pathogenic fungi, bacteria and viruses), improved plant growth, increased tolerance of adverse growing conditions such as high or low temperatures, low or high soil moisture, and high salinity, increased flowering or fruiting, greater harvest yields, more rapid maturation, higher quality and/or nutritional value of the harvested product, or improved storage or process properties of the harvested products. Transgenic plants can be modified to express multiple traits. Examples of plants containing traits provided by genetic engineering or mutagenesis include varieties of corn, cotton, soybean and potato expressing an insecticidal *Bacillus thuringiensis* toxin such as YIELD GARD[®], KNOCKOUT[®], STARLINK[®], BOLLGARD[®], NuCOTN[™] and NEWLEAF[®], INVICTA RR2 PRO[™], and herbicide-tolerant varieties of corn, cotton, soybean and rapeseed such as ROUNDUP READY[®], LIBERTY LINK[®], IMI[®], STS[®] and CLEARFIELD[®], as well as crops expressing *N*-acetyltransferase (GAT) to provide resistance to glyphosate herbicide, or crops containing the HRA gene providing resistance to herbicides inhibiting acetolactate synthase (ALS). The compositions produced according to the present disclosure may interact synergistically with traits introduced by genetic engineering or modified by mutagenesis, thus enhancing phenotypic expression or effectiveness of the traits or increasing the invertebrate pest control effectiveness of the present compounds and compositions. In particular, the compositions produced according to the present disclosure may interact synergistically with the phenotypic expression of proteins or other natural products toxic to invertebrate pests to provide greater-than-additive control of these pests, *i.e.*, produce a combined effect greater than the sum of their separate effects.

[0098] Plants within the scope of the present disclosure include crops, vegetables, fruits, trees other than fruit trees, lawn, and other uses (flowers, biofuel plants and ornamental foliage). Crops include: corn, rice, wheat, barley, rye, oat, sorghum, cotton, soybean, peanut, buckwheat, beet, rapeseed, sunflower, sugar cane, tobacco, and others known in the art. Vegetables include: solanaceous vegetables (for example, eggplant, tomato, pimento, pepper and potato); cucurbitaceous vegetables (for example, cucumber, pumpkin, zucchini, water melon, and melon); cruciferous vegetables (for example, Japanese radish, white turnip, horseradish, kohlrabi, Chinese cabbage, cabbage, leaf mustard, broccoli, and cauliflower); asteraceous vegetables (for example, burdock, crown daisy, artichoke and lettuce); liliaceous vegetables (for

example, green onion, onion, garlic and asparagus); ammiaceous vegetables (for example, carrot, parsley, celery and parsnip); chenopodiaceous vegetables (for example, spinach and Swiss chard); and lamiaceous vegetables (for example, *Perilla frutescens*, mint and basil). Fruits include: pomaceous fruits (for example, apple, pear, Japanese pear, Chinese quince and quince); stone fleshy fruits (for example, peach, plum, nectarine, *Prunus mume*, cherry fruit, apricot and prune); citrus fruits (for example, *Citrus unshiu*, orange, lemon, lime and grapefruit); nuts (for example, chestnut, walnuts, hazelnuts, almond, pistachio, cashew nuts and macadamia nuts); berry fruits (for example, blueberry, cranberry, blackberry, strawberry, and raspberry); grape; kaki; persimmon; olive; Japanese plum; banana; coffee; date palm; coconuts; and oil palm. Trees other than fruit trees include: tea; mulberry; and other trees (for example, ash, birch, dogwood, Eucalyptus, *Ginkgo biloba*, lilac, maple, *Quercus*, poplar, Judas tree, *Liquidambar formosana*, plane tree, zelkova, Japanese arborvitae, fir wood, hemlock, juniper, *Pinus*, *Picea*, *Taxus cuspidate*, elm and Japanese horse chestnut), Sweet viburnum, *Podocarpus macrophyllus*, Japanese cedar, Japanese cypress, croton, Japanese spindletree, and *Photinia glabra*). Lawn uses include: sods (for example, *Zoysia japonica*, *Zoysia matrella*); bermudagrasses; bent grasses; festucae; ryegrasses. Flower uses include: rose, carnation, chrysanthemum, *Eustoma*, *gypsophila*, gerbera, marigold, salvia, petunia, verbena, tulip, aster, gentian, lily, pansy, cyclamen, orchid, lily of the valley, lavender, stock, ornamental cabbage, primula, poinsettia, gladiolus, cattleya, daisy, cymbidium and begonia. Bio-fuel plants include: *jatropha*, safflower, *Camelina*, switch grass, *Miscanthus giganteus*, *Phalaris arundinacea*, *Arundo donax*, kenaf, cassava, and willow.

[0099] All plants or any part of a plant can be treated in accordance with compositions produced according to the processes of the disclosure. The term “plants” as used herein is to be understood as all plants and plant populations such as, for example, desired and undesired wild plants or crop plants (including naturally occurring crop plants). Crop plants can be plants that can be obtained by conventional breeding and optimization methods or by biotechnological and genetic engineering methods or by combinations of these methods, including transgenic plants and including plant cultivars which can or cannot be protected by plant breeders' rights. Plant parts are to be understood as meaning all parts and organs of plants above and below the ground, such as shoot, leaf, flower and root, examples which may be mentioned being leaves, needles, stalks, stems, flowers, fruit bodies, fruits and seeds, as well as roots, tubers and rhizomes. The

plant parts also include harvested material, and vegetative and generative propagation material, for example cuttings, tubers, rhizomes, offshoots and seeds.

[0100] Treatment of the plants and plant parts with the compositions produced according to the processes of the present disclosure is carried out by direct contact with the plant or plant part, or by action on the plant's environment, habitat or storage space using customary treatment methods. For example, treatment as described herein can be by dipping, spraying, evaporating, atomizing, broadcasting, spreading-on, injecting and, in the case of propagation material -- particularly in the case of seeds -- by applying a layer of a coating comprising the composition, optionally with additional layers.

[0101] In one embodiment, the compositions produced according to the processes of the present disclosure are aerially delivered to plants. In another embodiment, the compositions produced according to the present disclosure are delivered by an unmanned aerial vehicle (UAV). In yet another embodiment, the compositions produced according to the present disclosure are delivered by a helicopter or fixed-wing airplane.

[0102] Wild plant species and plant cultivars, or those obtained by conventional biological breeding methods, such as crossing or protoplast fusion, and parts thereof, may be treated. Also, transgenic plants and plant cultivars obtained by genetic engineering methods, if appropriate in combination with conventional methods (Genetically Modified Organisms), and parts thereof are treated. Plants of the plant cultivars that are in each case commercially available or in use are treated according to the disclosure. Plant cultivars are to be understood as meaning plants having novel properties ("traits") which have been obtained by conventional breeding, by mutagenesis or by recombinant DNA techniques. These can be cultivars, biotypes or genotypes.

[0103] The transgenic plants or plant cultivars (obtained by genetic engineering) that may be treated according to the disclosure include all plants which, by the genetic modification, received genetic material which imparted particular advantageous, useful traits to these plants. Examples of such traits are better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to water or soil salt content, increased flowering performance, easier harvesting, accelerated maturation, higher harvest yields, higher quality and/or a higher

nutritional value of the harvested products, better storage stability and/or processability of the harvested products. Further and particularly emphasized examples of such traits are a better defense of the plants against animal and microbial pests, such as against insects, mites, phytopathogenic fungi, bacteria and/or viruses, and increased tolerance of the plants to certain herbicidally active compounds. Examples of transgenic plants include the important crop plants, such as cereals (wheat, rice), maize, soybeans, potatoes, sugar beet, tomatoes, peas and other vegetable varieties, cotton, tobacco, oilseed rape and fruit plants (with the fruits apples, pears, citrus fruits and grapes), and emphasis is given to maize, soybeans, potatoes, cotton, tobacco and oilseed rape. Traits include the increased defense of the plants against insects, arachnids, nematodes and slugs and snails by toxins formed in the plants, particularly those formed in the plants by the genetic material from *Bacillus thuringiensis* (for example by the genes CryIA(a), CryIA(b), CryIA(c), CryIIA, CryIIIA, CryIIIB2, Cry9c, Cry2Ab, Cry3Bb and CryIF and also combinations thereof) ("Bt plants"). Other traits are the increased defense of plants against fungi, bacteria and viruses by systemic acquired resistance (SAR), systemin, phytoalexins, elicitors and resistance genes and correspondingly expressed proteins and toxins. Traits also include the increased tolerance of the plants to certain herbicidally active compounds, for example imidazolinones, sulfonylureas, glyphosate or phosphinotricin (for example the "PAT" gene). The genes which impart the desired traits in question can also be present in combinations with one another in the transgenic plants. Examples of "Bt plants" include maize varieties, cotton varieties, soybean varieties and potato varieties which are sold under the trade names YIELD GARD® (for example maize, cotton, soybeans), KnockOut® (for example maize), StarLink® (for example maize), Bollgard® (cotton), Nucoat® (cotton) and NewLeaf® (potato). Examples of herbicide-tolerant plants are maize varieties, cotton varieties and soybean varieties that are sold under the trade names Roundup Ready® (tolerance to glyphosate, for example maize, cotton, soybean). Liberty Link® (tolerance to phosphinotricin, for example oilseed rape), IMI® (tolerance to imidazolinones) and STS® (tolerance to sulfonylureas, for example maize). Herbicide-resistant plants (plants bred in a conventional manner for herbicide tolerance) include the varieties sold under the name Clearfield® (for example maize). The agricultural crops are selected from the group consisting of cereals, fruit trees, citrus fruits, legumes, horticultural crops, cucurbits, oleaginous plants, tobacco, coffee, tea, cocoa, sugar beet, sugar cane, and cotton.

[0104] Depending on the plant species or plant cultivars, their location and growth conditions (soils, climate, vegetation period, diet), the treatment according to the disclosure may also result in superadditive ("synergistic") effects. Thus, for example, reduced application rates and/or a widening of the activity spectrum and/or an increase in the activity of the substances and compositions which can be used according to the disclosure, better plant growth, increased tolerance to high or low temperatures, increased tolerance to drought or to water or soil salt content, increased flowering performance, easier harvesting, accelerated maturation, higher harvest yields, higher quality and/or a higher nutritional value of the harvested products, better storage stability and/or processability of the harvested products are possible, which exceed the effects which were actually to be expected.

[0105] Crops that can be protected with the compositions produced according to the processes of this disclosure, for example, comprise cereals (wheat, barley, rye, oats, rice, maize, sorghum, etc.), fruit trees (apples, pears, plums, peaches, almonds, cherries, bananas, grapes, strawberries, raspberries, blackberries, etc.), citrus trees (oranges, lemons, mandarins, grapefruit, etc.), legumes (beans, peas, lentils, soybean, etc.), vegetables (spinach, lettuce, asparagus, cabbage, carrots, onions, tomatoes, potatoes, eggplants, peppers, etc.), cucurbitaceae (pumpkins, zucchini, cucumbers, melons, watermelons, etc.), oleaginous plants (sunflower, rape, peanut, castor, coconut, etc.), tobacco, coffee, tea, cocoa, sugar beet, sugar cane, and cotton.

[0106] To protect the agricultural crops, the compositions produced according to the processes of this disclosure can be applied to any part of the plant, or on the seeds before sowing, or on the soil in which the plant grows.

[0107] Non-agronomic uses refer to invertebrate pest control in the areas other than fields of crop plants. Nonagronomic uses of the compositions produced according to the present disclosure include control of invertebrate pests in stored grains, beans and other foodstuffs, and in textiles such as clothing and carpets. Nonagronomic uses of the compositions produced according to the present disclosure also include invertebrate pest control in ornamental plants, forests, in yards, along roadsides and railroad rights of way, and on turf such as lawns, golf courses and pastures. Nonagronomic uses of the compositions produced according to the present disclosure also include invertebrate pest control in houses and other buildings which may be

occupied by humans and/or companion, farm, ranch, zoo or other animals. Nonagronomic uses of the compositions produced according to the present disclosure also include the control of pests such as termites that can damage wood or other structural materials used in buildings

[0108] Nonagronomic uses of the compositions produced according to the present disclosure also include protecting human and animal health by controlling invertebrate pests that are parasitic or transmit infectious diseases. The controlling of animal parasites includes controlling external parasites that are parasitic to the surface of the body of the host animal (e.g., shoulders, armpits, abdomen, inner part of the thighs) and internal parasites that are parasitic to the inside of the body of the host animal (e.g., stomach, intestine, lung, veins, under the skin, lymphatic tissue). External parasitic or disease transmitting pests include, for example, chiggers, ticks, lice, mosquitoes, flies, mites and fleas. Internal parasites include heartworms, hookworms and helminths. Compositions produced according to the present disclosure are suitable for systemic and/or non-systemic control of infestation or infection by parasites on animals. Compositions produced according to the present disclosure are particularly suitable for combating external parasitic or disease transmitting pests. Compositions produced according to the present disclosure are suitable for combating parasites that infest agricultural working animals, such as cattle, sheep, goats, horses, pigs, donkeys, camels, buffalos, rabbits, hens, turkeys, ducks, geese and bees; pet animals and domestic animals such as dogs, cats, pet birds and aquarium fish; as well as so-called experimental animals, such as hamsters, guinea pigs, rats and mice. By combating these parasites, fatalities and performance reduction (in terms of meat, milk, wool, skins, eggs, honey, etc.) are reduced, so that applying a composition of the present disclosure allows more economic and simple husbandry of animals.

[0109] The composition embodiments of this disclosure may be combined with the method embodiments of this disclosure in any manner. Similarly, the method embodiments of this disclosure may be combined in any manner. The following embodiments are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever.

[0110] Aspects of the present disclosure are provided by the subject matter of the following clauses:

[0111] 1. A bait composition comprising:

- (i) at least one pesticidal active ingredient;
- (ii) at least one bait;
- (iii) at least one dispersant; and
- (iv) at least one thickener in an amount no more than about 0.80 wt%;

wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants.

[0112] 2. The bait composition of the preceding clause, wherein the at least one thickener is present in an amount in a range of from about 0.30 wt% to about 0.80 wt%.

[0113] 3. The bait composition of any preceding clause, wherein the at least one thickener is selected from hydrated magnesium aluminosilicate, xanthan gum, amorphous silica, sodium carboxymethylcellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxypropylmethyl cellulose, gum arabic, and combinations thereof.

[0114] 4. The bait composition of any preceding clause, wherein the at least one dispersant is present in an amount in a range of from about 0.10 wt% to about 2.0 wt%.

[0115] 5. The bait composition of any preceding clause, wherein the at least one dispersant is selected from sulfosuccinates, sodium dioctyl sulfosuccinate (e.g., STEPWET DOS 70-PG), lignosulfonates (e.g., REAX 88B or POLYFON F, Borresperse NA), naphthalene sulfonate condensates (e.g., Morwet D425, Morwet D400, Supragil MNS88), alkyl ethoxyl phosphate esters (e.g., Dextrol OC180, Stepfac 1818K), alkyl sulfates (e.g., Sodium Lauryl sulfate, Sodium Dodecyl sulfate), and combinations thereof.

[0116] 6. The bait composition of any preceding clause, wherein the bait composition comprises at least one non-ionic dispersant selected from graft polymers, acrylic graft copolymers (e.g., ATLOX 4913), polymethyl methacrylate-polyethylene glycol graft copolymers (e.g., STEP-FLOW 4000), alkyl polyglycosides, C₉₋₁₁ alkyl polyglucosides (e.g., AGNIQUE PG 9116), C₈₋₁₀ alkyl polyglucosides (e.g., AGNIQUE PG 8107), polyvinylpyrrolidones (e.g., PVP K-30, PVP 60, PVP 90), polyalkylene oxide block copolymers, polyalkylene glycol ethers (e.g., Atlas G5000), butyl polyalkylene oxide block copolymers (e.g., TOXIMUL 8330, Emulsogen EP4910), alkyl

ethoxylates, tristerylphenol ethoxylates (e.g., Sorprophor BSU, Markon TSP), and combinations thereof.

[0117] 7. The bait composition of any preceding clause, wherein the at least one pesticidal active ingredient is present in an amount in a range of from about 0.10 wt% to about 0.70 wt%.

[0118] 8. The bait composition of any preceding clause, wherein the pesticidal active ingredient is selected from insecticides, nematocides, biopesticides, and combinations thereof.

[0119] 9. The bait composition of any preceding clause, wherein the pesticidal active ingredient comprises an insecticide.

[0120] 10. The bait composition of any preceding clause, wherein the insecticide is a diamide selected from chlorantraniliprole, cyantraniliprole, tetrachlorantraniliprole, bromoantraniliprole, dichlorantraniliprole, tetraniliprole, cyclaniliprole, cyhalodiamide, flubendiamide, and combinations thereof.

[0121] 11. The bait composition of any preceding clause, wherein the insecticide is cyantraniliprole.

[0122] 12. The bait composition of any preceding clause, wherein the composition comprises a pesticidal active ingredient selected from abamectin, acephate, acequinocyl, acetamiprid, acrinathrin, acynonapyr, afidopyropen ([[(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-6,12-dihydroxy-4,6a,12b-trimethyl-11-oxo-9-(3-pyridinyl)-2H,11H-naphtho[2,1-b]pyrano[3,4-e]pyran-4-yl]methyl cyclopropanecarboxylate), amidoflumet, amitraz, avermectin, azadirachtin, azinphos methyl, benfuracarb, bensultap, benzpyrimoxan, bifenthrin, kappa-bifenthrin, bifenazate, bistrifluron, borate, broflanilide, buprofezin, cadusafos, carbaryl, carbofuran, cartap, carzol, chlorantraniliprole, chlorfenapyr, chlorfluazuron, chloroprallethrin, chlorpyrifos, chlorpyrifos-e, chlorpyrifos-methyl, chromafenozide, clofentezin, chloroprallethrin, clothianidin, cyantraniliprole, (3-bromo-1-(3-chloro-2-pyridinyl)-N-[4-cyano-2-methyl-6-[(methylamino)carbonyl]phenyl]-1H-pyrazole-5-carboxamide), cyclaniliprole (3-bromo-N-[2-bromo-4-chloro-6-[[[(1-cyclopropylethyl)amino]carbonyl]phenyl]-1-(3-chloro-2-pyridinyl)-1H-pyrazole-5-carboxamide), cycloprothrin, cycloxaprid ((5S,8R)-1-[(6-chloro-3-pyridinyl)methyl]-

2,3,5,6,7,8-hexahydro-9-nitro-5,8-Epoxy-1H-imidazo[1,2-a]azepine), cyenopyrafen, cyflumetofen, cyfluthrin, beta cyfluthrin, cyhalodiamide, cyhalothrin, gamma-cyhalothrin, lambda-cyhalothrin, cypermethrin, alpha-cypermethrin, zeta-cypermethrin, cyromazine, deltamethrin, diafenthiuron, diazinon, dicloromezotiaz, dieldrin, diflubenzuron, dimefluthrin, dimehypo, dimethoate, dimpropyridaz, dinotefuran, diofenolan, emamectin, emamectin benzoate, endosulfan, esfenvalerate, ethiprole, etofenprox, epsilon-metofluthrin, etoxazole, fenbutatin oxide, fenitrothion, fenothiocarb, fenoxycarb, fenpropathrin, fenvalerate, fipronil, flometoquin (2-ethyl-3,7-dimethyl-6-[4-(trifluoromethoxy)phenoxy]-4-quinolinyl methyl carbonate), flonicamid, fluazaindolizine, flubendiamide, flucythrinate, flufenimer, flufenoxuron, flufenoxystrobin (methyl (α E)-2-[[2-chloro-4-(trifluoromethyl)phenoxy]methyl]- α -(methoxymethylene)benzeneacetate), fluensulfone (5-chloro-2-[(3,4,4-trifluoro-3-buten-1-yl)sulfonyl]thiazole), fluhexafon, fluopyram, flupiprole (1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-5-[(2-methyl-2-propen-1-yl)amino]-4-[(trifluoromethyl)sulfinyl]-1H-pyrazole-3-carbonitrile), flupyradifurone (4-[[[(6-chloro-3-pyridinyl)methyl](2,2-difluoroethyl)amino]-2(5H)-furanone]), flupyrimin, fluvalinate, tau fluvalinate, fluxametamide, fonophos, formetanate, fosthiazate, gamma-cyhalothrin, halofenozide, heptafluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 2,2-dimethyl-3-[(1Z)-3,3,3-trifluoro-1-propen-1-yl]cyclopropanecarboxylate), hexaflumuron, hexythiazox, hydramethylnon, imidacloprid, indoxacarb, insecticidal soaps, isofenphos, isocycloseram, kappa-tefluthrin, lambda-cyhalothrin, lufenuron, malathion, meperfluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl (1R,3S)-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate), metaflumizone, metaldehyde, methamidophos, methidathion, methiocarb, methomyl, methoprene, methoxychlor, metofluthrin, methoxyfenozide, epsilon-metofluthrin, epsilon-momfluorothrin, monocrotophos, monofluorothrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 3-(2-cyano-1-propen-1-yl)-2,2-dimethylcyclopropanecarboxylate), nicotine, nitenpyram, nithiazine, novaluron, noviflumuron, *N*-[1,1-dimethyl-2-(methylthio)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-[1,1-dimethyl-2-(methylsulfinyl)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-[1,1-dimethyl-2-(methylsulfonyl)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-(1-methylcyclopropyl)-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, and *N*-[1-(difluoromethyl)cyclopropyl]-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, oxamyl, oxazosulfyl, parathion, parathion methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb,

profenofos, profluthrin, propargite, protrifenbute, pyflubumide (1,3,5-trimethyl-N-(2-methyl-1-oxopropyl)-N-[3-(2-methylpropyl)-4-[2,2,2-trifluoro-1-methoxy-1-(trifluoromethyl)ethyl]phenyl]-1H-pyrazole-4-carboxamide), pymetrozine, pyrafluprole, pyrethrin, pyridaben, pyridalyl, pyrifluquinazon, pyriminostrobin (methyl (αE)-2-[[[2-[(2,4-dichlorophenyl)amino]-6-(trifluoromethyl)-4-pyrimidinyl]oxy]methyl]-α-(methoxymethylene)benzeneacetate), pydiflumetofen, pyriprole, pyriproxyfen, rotenone, ryanodine, silafluofen, spinetoram, spinosad, spiroadiclofen, spiromesifen, spiropidion, spirotetramat, sulprofos, sulfoxaflor (N-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-λ4-sulfanylidene]cyanamide), tebufenozide, tebufenpyrad, teflubenzuron, tefluthrin, kappa-tefluthrin, terbufos, tetrachlorantraniliprole, tetrachlorvinphos, tetramethrin, tetramethylfluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 2,2,3,3-tetramethylcyclopropanecarboxylate), tetraniliprole, thiacloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tioxazafen (3-phenyl-5-(2-thienyl)-1,2,4-oxadiazole), tolfenpyrad, tralomethrin, triazamate, trichlorfon, triflumezopyrim (2,4-dioxo-1-(5-pyrimidinylmethyl)-3-[3-(trifluoromethyl)phenyl]-2H-pyrido[1,2-a]pyrimidinium inner salt), triflumuron, tyclopyrazoflor, zeta-cypermethrin, *Bacillus thuringiensis* delta-endotoxins, entomopathogenic bacteria, entomopathogenic viruses, entomopathogenic fungi, and combinations thereof.

[0123] 13. The bait composition of any preceding clause, wherein the at least one bait comprises a component selected from feedants, attractants, sugary attractants, ammonia, ammonium salts, hydrolyzed proteins, vegetable proteins, hydrolyzed vegetable proteins, yeast proteins, hydrolyzed yeast proteins, animal proteins, hydrolyzed animal proteins, and combinations thereof.

[0124] 14. The bait composition of any preceding clause, wherein the at least one bait does not comprise an animal protein or a hydrolyzed animal protein.

[0125] 15. The bait composition of any preceding clause, wherein the at least one bait comprises about 55 wt% to about 80 wt% of at least one feedant, about 0.50 wt% to about 0.90 wt% of at least one sugary attractant, and/or about 0.50 wt% to about 0.90 wt% of at least one ammonium salt.

[0126] 16. The bait composition of any preceding clause, wherein the ammonium salts are selected from ammonium acetate, ammonium citrate, ammonium tartrate, ammonium lactate, water-soluble ammonium salts of fatty acids, and combinations thereof.

[0127] 17. The bait composition of any preceding clause, further comprising at least one auxillary selected from antifoams, antifreeze, biocides, and combinations thereof.

[0128] 18. The bait composition of any preceding clause, wherein the bait composition is a premix formulation.

[0129] 19. The bait composition of any preceding clause, wherein the bait composition does not leave a readily visible residue on a surface after application of the bait composition to the surface.

[0130] 20. A method of preparing a bait composition, the method comprising

A) forming a mixture comprising:

- (i) at least one pesticidal active ingredient;
- (ii) at least one bait;
- (iii) at least one dispersant; and
- (iv) at least one thickener in an amount no more than about 0.80 wt%;

wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants; and

B) optionally diluting the mixture with water.

[0131] 21. A method for controlling a pest comprising contacting the pest or its environment with a biologically effective amount of a composition comprising:

- (i) at least one pesticidal active ingredient;
- (ii) at least one bait;

(iii) at least one dispersant; and

(iv) at least one thickener in an amount no more than about 0.80 wt%;

wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants.

[0132] 22. The method of the preceding clause, wherein the pest is selected from invertebrate pests, insects, arthropods, and combinations thereof.

[0133] 23. The method of any preceding clause, wherein the environment is selected from agricultural fields, orchards, forests, and combinations thereof.

[0134] 24. The method of any preceding clause, wherein contacting the pest or its environment with a biologically effective amount of a composition comprises applying the bait composition with an applicator selected from land-based sprayers, tractors, knapsacks, aerial-based sprayers, drones, and combinations thereof.

[0135] Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever.

EXAMPLES

[0136] Example 1. Bait compositions.

[0137] Bait compositions according to the present disclosure were prepared and are shown in Tables 1-2. Composition IE10 is a 75% diluted version of composition IE1. Diluted formulations like composition IE10 are particularly beneficial for manufacturing due to their lower viscosities compared to non-diluted formulations.

[0138] None of the bait compositions of Tables 1-2 left a readily visible residue upon application to a surface.

[0139] Table 1. Bait compositions.

		Amount (wt%)									
Component	Function	IE1	IE2	IE3	IE4	IE5	IE6	IE7	IE8	IE9	IE10
Cyantraniliprole	Active Ingredient	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.43
Corn Steep Liquor	Feedant	82	82	84.5	84	82	82	82	82	82	63.20
Xiameter AFE-0100	Antifoam	0.17	0.17	0.2	0.2	0.17	0.17	0.17	0.17	0.17	0.15
ATLOX 4913	Surfactant (nonionic dispersant)	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05
Agnique PG 9116	Surfactant (nonionic dispersant)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.15
Stepwet DOS PG70	Dispersant (nonionic)					2.0	2.0	2.0			
PVP K-30	Surfactant (nonionic dispersant)		2.0		0.25				2.00	2.00	
REAX 88 B	Dispersant (anionic)								1.0		
Polyfon F	Dispersant (anionic)									1.0	
Rhodopol 23	Thickener	0.6	0.5	0.3	0.6	0.5	0.5	0.7	0.5	0.5	0.45
Corn Syrup	Feedant	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.75

Ammonium Acetate	Attractant	1.0	1.0	1.0	1.0	1.00	0.5	1.0	1.0	1.0	0.75
Acetic Acid	Attractant and/or pH adjuster				5.0						
HCl	pH adjuster						6.0				
Glycerin	Solvent	6.00	4.0	6.0	4.0	4.00	4.0	4.00	4.0	4.0	4.51
Citric Acid	Buffer	4.05	6.0	4.05		6.00		6.00	6.0	6.0	3.03
Acticide SPX	Biocide	0.1	0.1	0.15		0.1		0.1	0.1	0.1	0.11
Acticide LA 1209	Biocide				0.3						
Morwet D425 Powder	Dispersant		1.0								
Water	Diluent	to 100	to 100	to 100	to 100	to 100	to 100	to 100	to 100	to 100	to 100

[0140] Table 2. Bait compositions.

Component	Role	Amount (wt%)							
		IE11	IE12	IE13	IE14	IE15	IE16	IE17	IE18
Cyantraniliprole	Active	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.43
Corn Steep Liquor	Feedant	63.2	63.2	63.2	63.2	63.2	63.2	63.2	63.2

Xiameter AFE-0100	Antifoam	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
ATLOX 4913	Surfactant (nonionic dispersant)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Agnique PG 9116	Surfactant (nonionic dispersant)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Stepwet DOS PG70	Dispersant (nonionic)	1	0.5	0.25	0.125	-	-	-	-
REAX 88 B	Dispersant (anionic)	-	-	-	-	2	0.5	0.25	0.125
Rhodopol 23	Thickener	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Corn Syrup	Feedant	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Ammonium Acetate	Attractant	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Glycerin	Antifreeze	4.51	4.51	4.51	4.51	4.51	4.51	4.51	4.51
Citric Acid	Buffer	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
Acticide SPX	Biocide	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Water	Diluent	to 100	to 100	to 100	to 100	to 100	to 100	to 100	to 100

[0141] Example 2. Efficacy.

[0142] Efficacies were evaluated for the bait compositions of Tables 1-2 applied to fruit flies. Laboratory-reared Tephritid fruit flies were exposed for 7 hours to a cotton wick treated with

1 ml of 333 ppm AI bait solution in an insect cage. After 7 hours, the bait was removed and replaced by a sugar solution until the last mortality assessment. Mortality was evaluated at 5 DAE counting the number of dead and moribund flies. Male and female flies were counted separately. Each trial was replicated 3 times. Mortality levels of at least 70% were considered acceptable.

[0143] The results are shown in Table 3. The results are an average of two tests.

[0144] Composition CE1 is a comparative commercial fruit fly bait composition including 0.02 wt% Spinosad and 99.8 wt% inert ingredients, to which 0.16 wt% cyantraniloprole was added. The inert ingredients include hydrolyzed protein, high-fructose corn syrup (also referred to as invertose sugar or invertose), vegetable oils, adjuvants, humectants, and attractants. Composition CE1 was applied at a rate of 12 ppm AI.

[0145] Composition CE2 is a comparative commercial fruit fly bait composition including inert ingredients, to which 0.43 wt% cyantraniloprole was added. The inert ingredients include hydrolyzed protein. Composition CE2 was applied at a rate of 333 ppm AI.

[0146] Composition CE3 consists of water.

[0147] Table 3. Efficacy five days after exposure.

Component	Female Mortality (%)
IE1	73
IE2	50
IE3	60.9
IE4	83.3
IE5	32
IE6	19.2

IE7	32
IE8	54.2
IE9	41.7
IE10	88.2
IE11	55
IE12	81
IE13	80
IE14	94
IE15	92
IE16	77
IE17	87
IE18	85
CE1	87
CE2	87
CE3	0

[0148] It was observed that, in general, the presence of relatively high amounts of anionic dispersant resulted in lower efficacy. It was also observed that, in general, the presence of relatively high amounts of thickener resulted in lower efficacy, even in the absence of anionic dispersant. Thus, it was realized that controlling the amounts of anionic dispersant and thickener could result in improved efficacy.

[0149] The use of controlled amounts of anionic dispersant and thickener is also beneficial in reducing visible residue after application. None of the inventive examples exhibited a readily visible residue after application on surfaces.

[0150] Example 3. Phytotoxicity.

[0151] Citrus crop responses and olive crop responses to the application of premix bait compositions according to the present disclosure were evaluated as follows. Plants of the crop of interest were grown in open field in farm condition. Plants were sprayed using a motorpump sprayer at different rates. After 7 and 14 days, phytotoxicity (%) was evaluated based on treated part of the canopy assessment considering area damaged and intensity.

[0152] CE4 is a comparative composition including 0.02 wt% Spinosad A & D, 0.025-0.05 wt% 1,2-benzisothiazol-3(2H)-one, and other components including vegetable proteins, stabilizing substances, sugars, and humectants.

[0153] The results for citrus are provided in Table 4. They are the average results of 6 trials. The results for olives are provided in Table 5. They are the average results of 4 trials. For both crops, no phytotoxicity was observed after either 7 DAT or 14 DAT.

[0154] Table 4. Phytotoxicity evaluation for citrus.

Composition	Rate (gia/ha)	Crop response after 7 DAT	Crop response after 14 DAT
IE10	7.5	0.0	0.0
IE10	10	0.0	0.0
IE10	12.5	0.0	0.0
CE4	0.24	0.0	0.0

[0155] Table 5. Phytotoxicity evaluation for olives.

Composition	Rate (gia/ha)	Crop response after 7 DAT	Crop response after 14 DAT
IE10	5	0.0	0.0

IE10	7.5	0.0	0.0
IE10	10	0.0	0.0
CE4	0.24	0.0	0.0

[0156] Example 4. Visible residue.

[0157] Residue spray deposits on olives and citrus fruits and leaves from the application of premix compositions according to the present disclosure were evaluated as follows. The test compositions were sprayed onto olives or citrus fruits and leaves. Visible residue was measured with the following scale: 0 = no visible residues, 1 = lightly visible residues, 2 = medium visible residues, and 3 = strongly visible residues. The number of fruits were counted for each class.

[0158] The results for citrus are provided in Table 6. They are the average results of 3 trials. The results for olives are provided in Table 7. They are the average results of 4 trials. For both crops, no residue for spray deposit was observed for inventive compositions except for some trials at high rates.

[0159] Table 6. Residue evaluation for citrus.

Composition	Rate (gia/ha)	Spray deposit after 7 DD after last application
IE10	7.5	0
IE10	10	0
IE10	12.5	0.6
CE4	0.24	1.17

[0160] Table 7. Residue evaluation for olives.

Composition	Rate (gia/ha)	Spray deposit after 7 DD after last application
IE10	5	0.0
IE10	7.5	0.0
IE10	10	0.0

CE4	0.24	1.7
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[0161] Further results are shown in Figures 1A-1B and Figures 2A-2B. In particular, Figure 1A is a photograph of a citrus fruit after application of inventive composition IE10, Figure 1B is a photograph of leaves after application of inventive composition IE10, Figure 2A is a photograph of a citrus fruit after application of comparative composition CE4, and Figure 2B is a photograph of leaves after application of comparative composition CE4. As can be seen, inventive composition imparts no visible residue to citrus fruit or leaves, while comparative composition CE4 imparts a readily visible dark residue to citrus fruit and leaves.

[0162] Example 5. Citrus Systemic Potency.

[0163] Systemic potency on fruit fly (FF) *Ceratitidis capitata* adults and damage on fruits from the application of premix compositions according to the present disclosure was evaluated as follows. Adults were assessed using pheromone trap, 1 trap per plot placed in the center of the plot. Assessment was done weekly, where the number of adults in the trap were counted.

[0164] The adult results are provided in Table 8. They are the average results of 3 trials. It was observed that all inventive compositions reduced the number of adults in the trap.

[0165] Table 8. Adults on citrus.

Composition	Rate (gia/ha)	Adult in the trap after 7 dd after last application
Untreated	0	67.66
IE10	7.5	3.33
IE10	10	1.33
IE10	12.5	2.67
CE4	0.24	8

[0166] The fruit damage results are provided in Table 9. They are the average results of 6 trials. There was a minimum of 100 fruits assessed per plot. It was observed that all inventive compositions reduced the number of damaged fruits.

[0167] Table 9. Adults on citrus.

Composition	Rate (gia/ha)	Efficacy of the % of damage fruits per plot
Untreated	0	10
IE10	7.5	90
IE10	10	93
IE10	12.5	96
CE4	0.24	88

[0168] Example 6. Olive Systemic Potency.

[0169] Systemic potency on fruit fly (FF) *Bractrocera oleae* adults and damage on fruits from the application of premix compositions according to the present disclosure was evaluated as follows. Adults were assessed using pheromone trap, 1 trap per plot placed in the center of the plot. Assessment was done weekly, where the number of adults in the trap were counted.

[0170] The adult results are provided in Table 10. They are the average results of 2 trials. It was observed that all inventive compositions reduced the number of adults in the trap.

[0171] Table 10. Adults on olive.

Composition	Rate (gia/ha)	Adult in the trap after 7 dd after last application
Untreated	0	89
IE10	5	6.5
IE10	7.5	22.5
IE10	10	12.5
CE4	0.24	6.5

[0172] The fruit damage results are provided in Table 11. They are the average results of 4 trials. There was a minimum of 20 fruits assessed per plot. It was observed that all inventive compositions reduced the number of damaged fruits.

[0173] Table 11. Adults on olive.

Composition	Rate (gia/ha)	Efficacy of the % of damage fruits per plot
Untreated	0	50
IE10	5	91
IE10	7.5	96
IE10	10	97
CE4	0.24	64

[0174] Bait compositions according to the present disclosure exhibit numerous advantages. They are efficacious and applicable to a wide variety of crops and pests. They are premix formulations that do not require further mixing. Where the bait compositions include a protein, they can be directly applied without reformulation of the bait compositions because they do not include an animal protein. And because the bait compositions do not leave readily visible residue on fruit, minimum processing is required to remove residue after harvesting.

WHAT IS CLAIMED IS:

1. A bait composition comprising:

- (i) at least one pesticidal active ingredient;
- (ii) at least one bait;
- (iii) at least one dispersant; and
- (iv) at least one thickener in an amount no more than about 0.80 wt%;

wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants.

- 2. The bait composition of claim 1, wherein the at least one thickener is present in an amount in a range of from about 0.30 wt% to about 0.80 wt%.
- 3. The bait composition of any one of claims 1-2, wherein the at least one thickener is selected from hydrated magnesium aluminosilicate, xanthan gum, amorphous silica, sodium carboxymethylcellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxypropylmethyl cellulose, gum arabic, and combinations thereof.
- 4. The bait composition of any one of claims 1-3, wherein the at least one dispersant is present in an amount in a range of from about 0.010 wt% to about 2.0 wt%.
- 5. The bait composition of any one of claims 1-4, wherein the at least one dispersant is selected from sulfosuccinates, sodium dioctyl sulfosuccinate (e.g., STEPWET DOS 70-PG), lignosulfonates (e.g., REAX 88B or POLYFON F, Borresperse NA), naphthalene sulfonate condensates (e.g., Morwet D425, Morwet D400, Supragil MNS88), alkyl ethoxyl phosphate esters (e.g., Dextrol OC180, Stepfac 1818K), alkyl sulfates (e.g., Sodium Lauryl sulfate, Sodium Dodecyl sulfate), and combinations thereof.
- 6. The bait composition of any one of claim 1-5, wherein the bait composition comprises at least one non-ionic dispersant selected from graft polymers, acrylic graft copolymers (e.g., ATLOX 4913), polymethyl methacrylate-polyethylene glycol graft copolymers (e.g., STEP-FLOW 4000), alkyl polyglycosides, C₉₋₁₁ alkyl polyglucosides (e.g., AGNIQUE PG 9116), C₈₋₁₀ alkyl

polyglucosides (e.g., AGNIQUE PG 8107), polyvinylpyrrolidones (e.g., PVP K-30, PVP 60, PVP 90), polyalkylene oxide block copolymers, polyalkylene glycol ethers (e.g., Atlas G5000), butyl polyalkylene oxide block copolymers (e.g., TOXIMUL 8330, Emulsogen EP4910), alkyl ethoxylates, tristyrylphenol ethoxylates (e.g., Sorprophor BSU, Markon TSP), and combinations thereof.

7. The bait composition of any one of claims 1-6, wherein the at least one pesticidal active ingredient is present in an amount in a range of from about 0.10 wt% to about 0.70 wt%.
8. The bait composition of any one of claims 1-7, wherein the pesticidal active ingredient is selected from insecticides, nematocides, biopesticides, and combinations thereof.
9. The bait composition of any one of claims 1-8, wherein the pesticidal active ingredient comprises an insecticide.
10. The bait composition of claim 9, wherein the insecticide is a diamide selected from chlorantraniliprole, cyantraniliprole, tetrachlorantraniliprole, bromoantraniliprole, dichlorantraniliprole, tetraniliprole, cyclaniliprole, cyhalodiamide, flubendiamide, and combinations thereof.
11. The bait composition of claim 9, wherein the insecticide is cyantraniliprole.
12. The bait composition of any of claims 1 to 11, wherein the composition comprises a pesticidal active ingredient selected from abamectin, acephate, acequinocyl, acetamiprid, acrinathrin, acynonapyr, afidopyropen $[(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-3-[(cyclopropylcarbonyl)oxy]-1,3,4,4a,5,6,6a,12,12a,12b-decahydro-6,12-dihydroxy-4,6a,12b-trimethyl-11-oxo-9-(3-pyridinyl)-2H,11H-naphtho[2,1-b]pyrano[3,4-e]pyran-4-yl]methyl\ cyclopropanecarboxylate)$, amidoflumet, amitraz, avermectin, azadirachtin, azinphos methyl, benfuracarb, bensultap, benzpyrimoxan, bifenthrin, kappa-bifenthrin, bifenazate, bistrifluron, borate, broflanilide, buprofezin, cadusafos, carbaryl, carbofuran, cartap, carzol, chlorantraniliprole, chlorfenapyr, chlorfluazuron, chloroprallethrin, chlorpyrifos, chlorpyrifos-e, chlorpyrifos-methyl, chromafenozide, clofentezin, chloroprallethrin, clothianidin, cyantraniliprole, (3-bromo-1-(3-chloro-2-pyridinyl)-N-[4-cyano-2-methyl-6-[(methylamino)carbonyl]phenyl]-1H-pyrazole-5-carboxamide), cyclaniliprole (3-bromo-N-[2-

bromo-4-chloro-6-[[[(1-cyclopropylethyl)amino]carbonyl]phenyl]-1-(3-chloro-2-pyridinyl)-1H-pyrazole-5-carboxamide), cycloprothrin, cycloxaprid ((5S,8R)-1-[(6-chloro-3-pyridinyl)methyl]-2,3,5,6,7,8-hexahydro-9-nitro-5,8-Epoxy-1H-imidazo[1,2-a]azepine), cyenopyrafen, cyflumetofen, cyfluthrin, beta cyfluthrin, cyhalodiamide, cyhalothrin, gamma-cyhalothrin, lambda-cyhalothrin, cypermethrin, alpha-cypermethrin, zeta-cypermethrin, cyromazine, deltamethrin, diafenthiuron, diazinon, dicloromezotiaz, dieldrin, diflubenzuron, dimefluthrin, dimethypo, dimethoate, dimpropyridaz, dinotefuran, diofenolan, emamectin, emamectin benzoate, endosulfan, esfenvalerate, ethiprole, etofenprox, epsilon-metofluthrin, etoxazole, fenbutatin oxide, fenitrothion, fenothiocarb, fenoxycarb, fenpropathrin, fenvalerate, fipronil, flometoquin (2-ethyl-3,7-dimethyl-6-[4-(trifluoromethoxy)phenoxy]-4-quinolinyl methyl carbonate), flonicamid, fluazaindolizine, flubendiamide, flucythrinate, flufenerim, flufenoxuron, flufenoxystrobin (methyl (αE)-2-[[2-chloro-4-(trifluoromethyl)phenoxy]methyl]-α-(methoxymethylene)benzeneacetate), fluensulfone (5-chloro-2-[(3,4,4-trifluoro-3-buten-1-yl)sulfonyl]thiazole), fluhexafon, fluopyram, flupiprole (1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-5-[(2-methyl-2-propen-1-yl)amino]-4-[(trifluoromethyl)sulfinyl]-1H-pyrazole-3-carbonitrile), flupyradifurone (4-[[[(6-chloro-3-pyridinyl)methyl](2,2-difluoroethyl)amino]-2(5H)-furanone]), flupyrimin, fluvalinate, tau fluvalinate, fluxametamide, fonophos, formetanate, fosthiazate, gamma-cyhalothrin, halofenozide, heptafluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 2,2-dimethyl-3-[(1Z)-3,3,3-trifluoro-1-propen-1-yl]cyclopropanecarboxylate), hexaflumuron, hexythiazox, hydramethylnon, imidacloprid, indoxacarb, insecticidal soaps, isofenphos, isocycloseram, kappa-tefluthrin, lambda-cyhalothrin, lufenuron, malathion, meperfluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl (1R,3S)-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate), metaflumizone, metaldehyde, methamidophos, methidathion, methiocarb, methomyl, methoprene, methoxychlor, metofluthrin, methoxyfenozide, epsilon-metofluthrin, epsilon-momfluorothrin, monocrotophos, monofluorothrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 3-(2-cyano-1-propen-1-yl)-2,2-dimethylcyclopropanecarboxylate), nicotine, nitenpyram, nithiazine, novaluron, noviflumuron, *N*-[1,1-dimethyl-2-(methylthio)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-[1,1-dimethyl-2-(methylsulfinyl)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-[1,1-dimethyl-2-(methylsulfonyl)ethyl]-7-fluoro-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, *N*-(1-methylcyclopropyl)-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, and *N*-[1-

(difluoromethyl)cyclopropyl]-2-(3-pyridinyl)-2*H*-indazole-4-carboxamide, oxamyl, oxazosulfonyl, parathion, parathion methyl, permethrin, phorate, phosalone, phosmet, phosphamidon, pirimicarb, profenofos, profluthrin, propargite, protrifenbute, pyflubumide (1,3,5-trimethyl-N-(2-methyl-1-oxopropyl)-N-[3-(2-methylpropyl)-4-[2,2,2-trifluoro-1-methoxy-1-(trifluoromethyl)ethyl]phenyl]-1*H*-pyrazole-4-carboxamide), pymetrozine, pyrafluprole, pyrethrin, pyridaben, pyridalyl, pyrifluquinazon, pyriminostrobin (methyl (α E)-2-[[[2-[(2,4-dichlorophenyl)amino]-6-(trifluoromethyl)-4-pyrimidinyl]oxy]methyl]- α -(methoxymethylene)benzeneacetate), pydiflumetofen, pyriprole, pyriproxyfen, rotenone, ryanodine, silafluofen, spinetoram, spinosad, spiroadiclofen, spiromesifen, spiropidion, spirotetramat, sulprofos, sulfoxaflor (N-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]- λ 4-sulfanylidene]cyanamide), tebufenozide, tebufenpyrad, teflubenzuron, tefluthrin, kappa-tefluthrin, terbufos, tetrachlorantraniliprole, tetrachlorvinphos, tetramethrin, tetramethylfluthrin ([2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl 2,2,3,3-tetramethylcyclopropanecarboxylate), tetraniliprole, thiachloprid, thiamethoxam, thiodicarb, thiosultap-sodium, tioazafen (3-phenyl-5-(2-thienyl)-1,2,4-oxadiazole), tolfenpyrad, tralomethrin, triazamate, trichlorfon, triflumezopyrim (2,4-dioxo-1-(5-pyrimidinylmethyl)-3-[3-(trifluoromethyl)phenyl]-2*H*-pyrido[1,2-*a*]pyrimidinium inner salt), triflumuron, tyclopyrazoflor, zeta-cypermethrin, *Bacillus thuringiensis* delta-endotoxins, entomopathogenic bacteria, entomopathogenic viruses, entomopathogenic fungi, and combinations thereof.

13. The bait composition of any one of claims 1-12, wherein the at least one bait comprises a component selected from feedants, attractants, sugary attractants, ammonia, ammonium salts, hydrolyzed proteins, vegetable proteins, hydrolyzed vegetable proteins, yeast proteins, hydrolyzed yeast proteins, animal proteins, hydrolyzed animal proteins, and combinations thereof.
14. The bait composition of any one of claims 1-13, wherein the at least one bait does not comprise an animal protein or a hydrolyzed animal protein.
15. The bait composition of any one of claims 1-14, wherein the at least one bait comprises about 55 wt% to about 80 wt% of at least one feedant, about 0.50 wt% to about 0.90 wt% of at least one sugary attractant, and/or about 0.50 wt% to about 0.90 wt% of at least one ammonium salt.

16. The bait composition of any one of claims 13-15, wherein the ammonium salts are selected from ammonium acetate, ammonium citrate, ammonium tartrate, ammonium lactate, water-soluble ammonium salts of fatty acids, and combinations thereof.
17. The bait composition of any one of claims 1-16, further comprising at least one auxillary selected from antifoams, antifreeze, biocides, and combinations thereof.
18. The bait composition of any one of claims 1-17, wherein the bait composition is a premix formulation.
19. The bait composition of any one of claims 1-18, wherein the bait composition does not leave a readily visible residue on a surface after application of the bait composition to the surface.
20. A method of preparing a bait composition, the method comprising
 - A) forming a mixture comprising:
 - (i) at least one pesticidal active ingredient;
 - (ii) at least one bait;
 - (iii) at least one dispersant; and
 - (iv) at least one thickener in an amount no more than about 0.80 wt%;wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants; and
 - B) optionally diluting the mixture with water.
21. A method for controlling a pest comprising contacting the pest or its environment with a biologically effective amount of a composition comprising:
 - (i) at least one pesticidal active ingredient;
 - (ii) at least one bait;
 - (iii) at least one dispersant; and

(iv) at least one thickener in an amount no more than about 0.80 wt%;

wherein the bait composition comprises no more than about 6.0 wt% anionic dispersants.

22. The method of claim 21, wherein the pest is selected from invertebrate pests, insects, arthropods, and combinations thereof.
23. The method of any one of claims 21-22, wherein the environment is selected from agricultural fields, orchards, forests, and combinations thereof.
24. The method of any one of claims 21-23, wherein contacting the pest or its environment with a biologically effective amount of a composition comprises applying the bait composition with an applicator selected from land-based sprayers, tractors, knapsacks, aerial-based sprayers, drones, and combinations thereof.



FIG. 1A



FIG. 1B



FIG. 2A



FIG. 2B

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2024/035604

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01N25/00 A01N43/56 A01P7/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01N A01P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/022917 A2 (BAYER CROPS SCIENCE AG [DE]; WIRTH WOLFGANG [DE] ET AL.) 4 March 2010 (2010-03-04)	1,4,5, 7-9, 12-14, 18,20-22
A	claims page 20, line 30 - page 21, line 5 examples; tables 1, 2 ----- -/-	2,3,6, 10,11, 15-17, 19,23,24



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

1 October 2024

Date of mailing of the international search report

10/10/2024

Name and mailing address of the ISA/

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Galley, Carl

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2024/035604

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NOBLE RALPH ET AL: "Control of spotted wing drosophila (Drosophila suzukii) in sweet cherry and raspberry using bait sprays", JOURNAL OF PEST SCIENCE, vol. 96, no. 2, 1 March 2023 (2023-03-01), pages 623-633, XP093209076, Berlin/Heidelberg ISSN: 1612-4758, DOI: 10.1007/s10340-022-01566-5 Retrieved from the Internet: URL:https://link.springer.com/content/pdf/10.1007/s10340-022-01566-5.pdf>	1,20-24
Y	abstract figures 1-4 tables 1,2	1-24
X	----- NOBLE RALPH ET AL: "Minimizing insecticides for control of spotted wing drosophila (Drosophila suzukii) in soft fruit using bait sprays", JOURNAL OF APPLIED ENTOMOLOGY, vol. 145, no. 10, 6 June 2021 (2021-06-06) , pages 977-985, XP093209097, DE ISSN: 0931-2048, DOI: 10.1111/jen.12917 Retrieved from the Internet: URL:https://onlinelibrary.wiley.com/doi/full-xml/10.1111/jen.12917>	1,20-24
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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2024/035604

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2021/127126 A1 (FMC CORP [US]; FMC AGRO SINGAPORE PTE LTD [SG]) 24 June 2021 (2021-06-24) claims claim 13 examples examples 1B, 1C, 5C-5I, 2A; tables -----	1 - 24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2024/035604

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