

(51) International Patent Classification:
A01H 5/00 (2006.01)(21) International Application Number:
PCT/US2011/043882(22) International Filing Date:
13 July 2011 (13.07.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/371,619 6 August 2010 (06.08.2010) US

(71) Applicants (for all designated States except US): **THE CURATORS OF THE UNIVERSITY OF MISSOURI** [US/US]; Office Of Technology And Special Projects, University Of Missouri System, 475 Mcreynolds Hall, Columbia, MO 65211-2015 (US). **CORNELL RESEARCH FOUNDATION, INC.** [US/US]; 395 Pine Tree Road, Suite 310, Ithaca, NY 14850 (US). **NORTH CAROLINA STATE UNIVERSITY** [US/US]; Campus Box 8210, Raleigh, NC 27695-8210 (US). **IOWA STATE UNIVERSITY RESEARCH FOUNDATION, INC.** [US/US]; 310 Lab Of Mechanics, Ames, IA 50011-2131 (US). **UNIVERSITY OF GEORGIA RESEARCH FOUNDATION, INC.** [US/US]; Uga - 809 Boyd G.s.r.c., Athens, GA 30602 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MITCHUM, Melissa, G.** [US/US]; 371h Bond Life Sciences Center, University Of Missouri, Columbia, MO 65211 (US). **RE-PLOGLE, Amy** [US/US]; 315 Bond Life Sciences Center, University Of Missouri, Columbia, MO 65211 (US). **WANG, Jianying** [CN/US]; 315 Bond Life Sciences Center, University Of Missouri, Columbia, MO 65211 (US). **WANG, Xiaohong** [US/US]; Robert W. Holley Center For Agriculture And, Health Cornell University, Ithaca, NY 14853 (US). **CHEN, Shiyan** [CN/US]; Department Of Plant Pathology And Plant-, Microbe, Cornell University, Ithaca, NY 14853 (US). **LANG, Ping** [CN/US]; Department Of Plant Pathology And Plant-, Microbe, Cornell University, Ithaca, NY 14853 (US). **DAVIS, Eric, L.** [US/US]; 840 Method Road, Unit 4, Box 7903, North Carolina State University, Raleigh, NC 27695 (US). **BAUM, Thomas, J.** [US/US]; Department Of Plant Pathology, Iowa State University, Ames, ID 50011 (US). **HUSSEY, Richard, S.** [US/US]; Department Of Plant Pathology, University Of Georgia, Athens, GA 30602 (US).

(74) Agent: **ROMANO, Charles, P.**; THOMPSON COBURN LLP, One Us Bank Plaza, St. Louis, MO 63101 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,

[Continued on next page]

(54) Title: NEMATODE RESISTANT CROPS

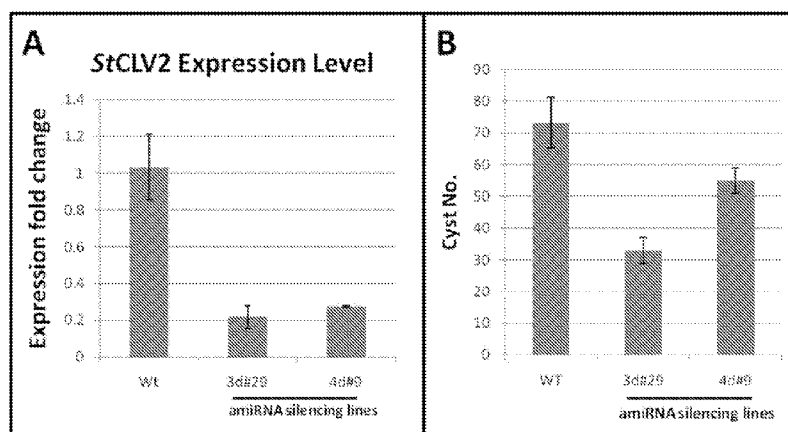


FIGURE 19

(57) Abstract: Methods of inhibiting plant parasitic nematodes, methods of obtaining transgenic plants useful for inhibiting such nematodes, and transgenic plants that are resistant to plant parasitic nematodes through inhibition of plant nematode CLE peptide receptor genes are provided. Methods for expressing genes at plant parasitic nematode feeding sites with plant nematode CLE peptide receptor gene promoters are also provided, along with nematode CLE peptide receptor gene promoters that are useful for expressing genes in nematode feeding sites as well as transgenic plants and nematode resistant transgenic plants comprising the promoters.



DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ,

TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- without international search report and to be republished upon receipt of that report (Rule 48.2(g))
- with sequence listing part of description (Rule 5.2(a))

PCT PATENT APPLICATION
For
Nematode Resistant Crops

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit under 35 USC § 119(e) of U.S. provisional application Serial No. 61/371,619, filed August 6, 2010, and incorporated herein by reference in its entirety.

STATEMENT REGARDING GOVERNMENTAL SUPPORT

[0002] This invention was made with Government support under Grant Numbers 2007-35607-17790, 2008-34113-19420, 2009-35302-0534, all awarded by the USDA-NRI. The government has certain rights to this invention.

INCORPORATION OF SEQUENCE LISTING

[0003] The sequence listing that is contained in the file named “52553_97808_ST25.txt”, which is 312332 bytes in size (measured in operating system MS-Windows), created on July 13, 2011, is filed herewith by electronic submission and incorporated herein by reference in its entirety.

BACKGROUND

[0004] Obligate biotrophs are pathogens that establish intimate parasitic relationships with the host that they infect. Often times these relationships involve some kind of modification or reprogramming of the host cell(s) to accommodate the pathogen’s subsequent growth and development. Plant-parasitic nematodes are obligate biotrophs that mainly attack the roots of plants and cause over \$100 billion in crop damage annually (Sasser and Freckman, 1987). The most economically important plant-parasitic nematodes include the cyst forming nematodes of Heterodera and Globodera spp. These sedentary endoparasitic nematodes form intimate parasitic relationships with their hosts by penetrating the root as motile juveniles and migrating intracellularly until they reach the root vasculature where they select a single cell to initiate a feeding site. The initial syncytial cell undergoes developmental changes to re-differentiate into a syncytium to support subsequent nematode growth and development in later sedentary stages (Davis et al., 2004). The syncytium forms when neighboring cells fuse

as a result of partial cell wall degradation (Endo, 1964), creating a permanent feeding cell that shares characteristics with plant cell types including meristematic cells, endosperm cells, transfer cells, and developing xylem (Mitchum et al., 2008). It has been proposed that the development and maintenance of the syncytium is dependent on the secretory effector proteins originating in the esophageal gland cells and delivered into the host root through the stylet of plant-parasitic nematodes (Davis et al., 2008). Recently, the cyst nematode secreted CLAVATA3/ESR(CLE)-like effector proteins have been shown to act as ligand mimics of plant CLE peptides, and are required for successful nematode infection (Wang et al., 2005; Patel et al., 2008; Lu et al., 2009; Wang et al., 2010a; Wang et al., 2010b).

[0005] Plant CLEs are small peptide ligands involved in regulating a population of specialized cells, called stem cells, which allow postembryonic organogenesis to occur (Simon and Stahl 2006). These stem cell pools can be found in the shoot apical meristem (SAM), the root apical meristem (RAM), and the vascular cambium. Whether or not these stem cells remain in an undifferentiated state or differentiate into new plant tissues is tightly controlled by CLE signaling pathways. In *Arabidopsis*, the population of stem cells which resides in the organizing center (OC) of the SAM is maintained by the expression of the transcription factor WUSCHEL (WUS) (Laux et al., 1996). Differentiation of those stem cells is promoted when the ligand-receptor pair of CLAVATA3 (CLV3), a small extracellular peptide ligand in the CLE family (Fletcher et al., 1999; Rojo et al., 2002), binds to CLV1 (Ogawa et al., 2008), a leucine-rich-repeat receptor like kinase (LRR-RLK) and downregulates WUS. Previous models have suggested that CLV1 forms a receptor complex with the LRR-receptor like protein (RLP) CLV2 (Clark et al., 1993; Kayes and Clark, 1998; Jeong et al., 1999; Trotochaud et al., 1999). More recently, it has been suggested that CLV1 acts in parallel or together with the heterodimer receptor complex of CLV2 and CORYNE (CRN) (Miwa et al., 2008; Muller, 2008; Bleckmann et al., 2010; Zhu et al., 2010). In comparison to the SAM, much less is known about the regulation of the stem cells in the RAM. The quiescent center (QC) is the equivalent to the OC in the SAM. However, there are significant differences between the OC and the QC. In contrast to the OC, the cells surrounding the QC are maintained as stem cells. In addition, stem cells are differentiated in both proximal and distal directions. This indicates that there is a signaling ligand involved in cell-cell communication to maintain the cells surrounding the QC as stem cells, and a signal to promote differentiation (Sarkar et al., 2007; Stahl et al., 2009). Previous reports have identified that the WUS-related homeobox 5 (WOX5) transcription factor is expressed in the

QC of the RAM and is required to maintain the distal stem cell pool (Sarkar et al., 2007). Recently it has been shown that CLE40, the closest homolog to CLV3, is expressed in the columella cells and regulates expression of WOX5 (Stahl et al., 2009). The WOX5/CLE40 signaling pathway appears to only control the distal stem cell pool, indicating that other CLE signaling pathways may exist to control the proximal stem cell pool. Consistent with these observations, a number of Arabidopsis CLEs are expressed in roots (Sharma et al., 2003), and when some of these CLEs are overexpressed they have been shown to cause premature termination of the primary root meristem (Fiers et al., 2004; Strabala et al., 2006; Meng et al., 2010). In addition, the short root phenotype has been shown to be dependent on CLV2 and CRN perception (Casamitjana-Martinez et al., 2003; Fiers et al., 2005; Miwa et al., 2008; Meng et al., 2010). Taken together this indicates that a CLV-like and CLE-controlled signaling pathway can act in the root.

[0006] CLE-like genes from nematodes have been reported in the soybean cyst nematode (SCN, *H. glycines*) (Wang et al., 2005; Wang et al., 2010a), the beet cyst nematode (BCN, *H. schachtii*) (Patel et al., 2008; Wang et al., 2010b), and the potato cyst nematode (PCN, *G. rostochiensis*) (Lu et al., 2009). BCN CLEs have been detected in the dorsal gland ampulla indicating they are likely secreted from the stylet into host cells (Patel et al., 2008). More recently, SCN CLEs have been shown to be secreted directly to the syncytial cytoplasm where the variable domain is thought to redirect the nematode CLE peptides to the apoplast (Wang et al., 2010a). These findings suggest that when delivered to the apoplast, nematode CLEs would be available to interact with extracellular receptors to function as ligand mimics of plant CLE signaling pathways. Overexpression studies have shown that nematode CLEs can trigger plant CLE signaling pathways (Wang et al., 2005; Lu et al., 2009; Wang et al., 2010a; Wang et al., 2010b), but the identity of the receptors and downstream signaling pathways that are activated to initiate developmental cascades required for the re-differentiation of root cells to form syncytia, are currently unknown.

[0007] US Patent Applications 20090077687 and 20090012029, identified nematode parasitism (effector) genes and described potential mechanisms to disrupt their expression and the function of their products to inhibit nematode parasitism of plants.

SUMMARY OF INVENTION

[0008] This invention provides for methods of inhibiting plant parasitic nematodes, methods of obtaining transgenic plants useful for inhibiting such nematodes, methods for expressing

genes at plant parasitic nematode feeding sites, and transgenic plants that are resistant to plant parasitic nematodes. Also provided are promoters including, but not limited to a BAM1 promoter, that are useful for expressing genes in nematode feeding sites as well as transgenic plants and nematode resistant transgenic plants comprising the same. It is anticipated that the BAM1 and other promoters provided herewith can in certain embodiments be operably linked to genes that provide for inhibition of plant parasitic nematodes when introduced into transgenic plants and for plants that display such inhibition. Such genes that provide for inhibition of plant parasitic nematodes that can be used with the promoters provided herewith are disclosed in US Patent Application 20090012029, which is specifically incorporated herein by reference in its entirety.

[0009] In certain embodiments, a method for inhibiting plant parasitic nematode damage to a plant comprising growing a plant comprising a mutation or a transgene that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide in the presence of plant parasitic nematodes is provided. In certain embodiments of these methods, the plant gene encoding a receptor for a nematode CLE peptide is selected from the group consisting of a CLV1-like gene, a CLV2-like gene, a BAM1-like gene, a BAM2-like gene, a CRN-like gene, a ACR4-like gene, an ER-like gene, and an ERL2 –like gene. In certain embodiments of these methods, CLV1-like gene, said CLV2-like gene, BAM1-like gene, a BAM2-like gene, a CRN-like gene, a ACR4-like gene, an ER-like gene, or an ERL2 –like gene is an ortholog of a corresponding *Arabidopsis*, soybean, or potato CLV1, CLV2, BAM1, BAM2, CRN, ACR4, ER, or ERL2 gene. In certain embodiments of these methods, the methods can further comprise the step of harvesting a product of said plant. In certain embodiments of these methods, the harvested product is a leaf, stem, flower, seed, root, or tuber. In certain embodiments of these methods, the yield and/or quality of said product is increased relative to a control plant that is grown in presence of plant parasitic nematodes and that lacks said mutation or said transgene that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide. In certain embodiments of these methods, the transgene comprises: i) an siRNA directed against said plant gene; ii) an artificial microRNA targeting said plant gene; iii) a dominant negative form of said plant gene; iv) an antisense or sense form of said plant gene; or v) a genomic insertion that disrupts said plant gene.

[0010] In certain embodiments, a method for obtaining a transgenic plant that exhibits resistance to a plant parasitic nematode comprising the steps of: a) introducing a transgene

that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide into a plant cell or a transgene that provides for inhibition of at least one CLV1-like, a CLV2-like, a BAM1-like, a BAM2-like, a CRN-like, a ACR4-like, an ER-like, and/or an ERL2 –like gene; and b) selecting a transgenic plant obtained from said plant cell, wherein said selected transgenic plant comprises said transgene and exhibits resistance to a plant nematode is provided. In certain embodiments of these methods, CLV1-like gene, said CLV2-like gene, BAM1-like gene, a BAM2-like gene, a CRN-like gene, a ACR4-like gene, an ER-like gene, or an ERL2 –like gene is an ortholog of a corresponding *Arabidopsis*, soybean, or potato CLV1, CLV2, BAM1, BAM2, CRN, ACR4, ER, or ERL2 gene.

[0011] In certain embodiments, a method for obtaining a transgenic plant expressing a gene product at a plant parasitic nematode feeding site, comprising the steps of: a) introducing a transgene wherein a *CRN*, *CLV*, or *BAM* promoter is operably linked to a gene encoding said gene product into a plant cell; and, b) selecting a transgenic plant obtained from said plant cell, wherein said selected transgenic plant comprises said transgene and exhibits expression of said gene product at said nematode feeding site is provided. In certain embodiments of these methods, the gene product is inhibitory to the plant parasitic nematode. In certain embodiments of these methods, the inhibitory gene product is a siRNA directed against a plant parasitic nematode gene. In certain embodiments of these aforementioned methods, an ACR4, BAM1, BAM2, CLV1, CLV2, CRN, ER, or ERL2 promoter is operably linked to a gene encoding the gene product. In certain embodiments of these aforementioned methods, an ACR4, BAM1, BAM2, CLV1, CLV2, CRN, ER, or ERL2 promoter is operably linked to a gene product that is inhibitory to a plant parasitic nematode. In certain embodiments of these methods, the inhibitory gene product is an amiRNA directed against a plant parasitic nematode gene.

[0012] In certain embodiments of any of the aforementioned methods of inhibiting plant parasitic nematode damage, obtaining a transgenic plant that exhibits resistance to a plant parasitic nematode, or obtaining a transgenic plant expressing a gene product at a plant parasitic nematode feeding site, the plant nematode is a cyst nematode. In certain embodiments of these methods, the cyst nematode is a *Heterodera* or *Globodera* spp. In certain embodiments of these methods, the *Heterodera* spp. is *H. avenae*, *H. bifenestra*, *H. cajani*, *H. carotae*, *H. ciceri*, *H. cruciferae*, *H. cynodontis*, *H. cyperi*, *H. davert*, *H. elachista*, *H. fii*, *H. galeopsidis*, *H. goettingiana*, *H. graminis*, *H. hordecalis*, *H. humuli*, *H. iri*, *H. latipons*, *H. lespedeza*, *H. leucilyma*, *H. longicaudata*, *H. mani*, *H. maydis*, *H. medicaginis*,

H. oryzae, *H. oryzaicola*, *H. sacchari*, *H. salixophila*, *H. schachtii*, *H. sorghii*, *H. trifolii*, *H. urticae*, *H. vigna*, or *H. zea*. In certain embodiments of these methods, the *Globodera* spp. is *G. achilleae*, *G. artemisiae*, *G. hypolysi*, *G. leptonepia*, *G. mali*, *G. pallida*, *G. rostochiensis*, *G. tabacum*, or *G. zeylandica*.

[0013] In certain embodiments of any of the aforementioned methods of inhibiting plant parasitic nematode damage, obtaining a transgenic plant that exhibits resistance to a plant parasitic nematode, or obtaining a transgenic plant expressing a gene product at a plant parasitic nematode feeding site, the plant is a monocot or dicot plant, or is selected from the group consisting of a tobacco, cereal, sugar beet, cotton, fruit, fiber, oilseed, potato, rice, corn, soybean, vegetable, and wheat plant.

[0014] In certain embodiments of any of the aforementioned methods of inhibiting plant parasitic nematode damage or obtaining a transgenic plant that exhibits resistance to a plant parasitic nematode, the endogenous plant gene encoding a receptor for a nematode CLE is a potato StCLV1, StCLV2, StBAM1, StBAM2, StCRN, StACR4, StER, or StERL2 gene and the plant is a potato plant. In certain embodiments of these methods, the plant parasitic nematode is *G. rostochiensis* or *G. pallida*.

[0015] In certain embodiments of any of the aforementioned methods of inhibiting plant parasitic nematode damage or obtaining a transgenic plant that exhibits resistance to a plant parasitic nematode, the endogenous plant gene encoding a receptor for a nematode CLE is selected from the group consisting of soybean genes provided in Table 3 of Example 2 and said plant is a soybean plant. In certain embodiments of any of the aforementioned methods of inhibiting plant parasitic nematode damage, the plant parasitic nematode is *Heterodera glycines* or *H. schachtii*.

[0016] In certain embodiments, a plant parasitic nematode resistant transgenic plant comprising a transgene that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide is provided. In certain embodiments, the transgene comprises: i) an siRNA directed against said plant gene; ii) an artificial microRNA targeting said plant gene; iii) a dominant negative form of said plant gene; iv) an antisense or sense form of said plant gene; or v) a genomic insertion that disrupts said plant gene. In certain embodiments of any of the aforementioned transgenic plants, the endogenous plant gene encoding a receptor for a nematode CLE is selected from the group consisting of soybean genes of provided in Table 3 of Example 2 and the plant is a soybean plant. In certain embodiments of any of the aforementioned transgenic plants, the endogenous plant

gene encoding a receptor for a nematode CLE is a potato StCLV1, StCLV2, StBAM1, StBAM2, StCRN, StACR4, StER, or StERL2 gene and the plant is a potato plant.

[0017] In certain embodiments, a plant parasitic nematode resistant transgenic plant comprising a transgene wherein a *CRN*, *CLV*, or *BAM* promoter is operably linked to a gene encoding a gene product that is inhibitory to a plant parasitic nematode is provided. In certain embodiments, the gene product is an siRNA directed against a plant parasitic nematode gene. In certain embodiments of any of the aforementioned plants, the CRN, CLV, or BAM promoter is the CRN1, CLV2, or BAM1 promoter sequence provided in Example 3. In certain embodiments of these aforementioned methods, an ACR4, BAM1, BAM2, CLV1, CLV2, CRN, ER, or ERL2 promoter is operably linked to a gene product that is inhibitory to a plant parasitic nematode. In certain embodiments, the gene product is a siRNA or an amiRNA directed against a plant parasitic nematode gene.

[0018] In certain embodiments, a recombinant DNA construct comprising a BAM1 promoter that is operably linked to a heterologous gene, wherein said BAM1 promoter comprises any one of: i) the BAM1 promoter sequence provided in Example 3; ii) a promoter that has at least 70%, 85%, 90%, 95%, or 99% sequence identity to the BAM1 promoter sequence provided in Example 3; or ii) a promoter comprising a deletion of about up to about 10, 50, 100, 200, 500, 700, 1000, or 1500 nucleotides of the 5' nucleotides of the BAM1 promoter sequence provided in Example 3 is provided. In certain embodiments, the *BAM* promoter is operably linked to a gene encoding a gene product that is inhibitory to a plant parasitic nematode.

DESCRIPTIONS OF THE FIGURES

FIGURE LEGENDS

[0019] Figure 1. Effect of cyst nematode CLE peptides on receptor mutants.

(a) Average root length wild-type (*Ler*), *clv2-1*, and *crn-1* seedlings grown for 9 days on media with or without the synthetic nematode dodecapeptide CLE motif. Data represent the mean $\pm$ SE, n = 10. (b)-(d) Representative roots tips of seedlings grown on media with or without synthetic CLE peptides for 10 days and visualized with differential interference microscopy. (b) No peptide, (c) Sensitive to peptide, and (d) Resistant to peptide. (Scale bar, 50 μ m).

[0020] Figure 2. *CRN:GUS* expression during nematode infection. (a)-(c) GUS expression in uninfected *Arabidopsis* root tips (a), middle of the root (b), and older part of the root towards the hypocotyl (c). (d)-(g) *CRN:GUS* expression in response to *H. schachtii*; early parasitic J2 (d), late parasitic J2 (e), J3 parasitic (f), J4 parasitic (g). Abbreviations: nematode, N; Syn, Syncytium. (Scale bar, 50 μ m).

[0021] Figure 3. Confocal images of *CLV2:H2B-mCherry* expression during nematode infection. (a) J2 parasitic with DIC. (b) J2 parasitic with mCherry fluorescence. (c) J3 parasitic with DIC. (d) J3 parasitic with mCherry fluorescence. Abbreviations: nematode, N; Syn, Syncytium. (Scale bars, 50 μ m).

[0022] Figure 4. Effect of *clv2-1* and *crn-1* mutant alleles on *H. schachtii* infection.

(a) J4 females were counted at 14 dpi and adult females were counted at 30 dpi. Data represent mean $\pm$ SE, n = 35 for *Ler*, 32 for *crn-1*, 34 for *clv2-1*, and 29 for *crn-1 clv2-1*.

Data are representative of three independent experiments.

(b) Seedlings were grown on vertical square plates for 10 days and inoculated with 10 J2s/root. At 14 dpi, syncytia that fed only one nematode and appeared translucent were microscopically examined and their area was determined. Data represent mean $\pm$ SE, n = 11 for *Ler* and *crn-1*, 14 for *clv2-1*, and 12 for *crn-1 clv2-1*.

Asterisks indicate statistically significant differences compared to *Ler* by Student's *t* test ($P < 0.05$)

[0023] Figure 5. Response of wild-type (*Utr*) and *sol2-1* seedlings to the synthetic 12-aa nematode CLE peptide.

[0024] Figure 6. Confocal images of nematode autofluorescence in wild-type roots

[0025] Figure 7. Effect of *sol2-1* mutant allele on *Heterodera schachtii* infection.

[0026] Figure 8. Effect of *Heterodera glycines* (HgCLE) and *Heterodera schachtii* (HsCLE) nematode CLE peptides on receptor mutants.

[0027] Figure 9. Effect of *Globodera rostochiensis* (GrCLE) nematode CLE peptides on receptor mutants.

[0028] Figure 10. Effect of receptor mutant alleles on *H. schachtii* infection.

[0029] Figure 11. *CRN:GUS* expression during nematode infection.

[0030] Figure 12. *CLV2:GUS* expression during nematode infection.

[0031] Figure 13. *BAM1:GUS* expression in *Arabidopsis* in response to nematode infection.

[0032] Figure 14 Differential expression of candidate potato CLE receptor genes in *G. rostochiensis*-infected potato roots.

[0033] Figure 15. Effect of *crn-1*, *clv2-6*, *bam1-3* mutant alleles and combinations thereof on *H. schachtii* infection in *Arabidopsis*.

[0034] Figure 16 shows the expression of a pCLV1 promoter fusion to a GUS gene in the vasculature of plants and upregulation at sites of *H. schachtii* in transgenic *Arabidopsis*.

[0035] Figure 17 shows a StCLV2 Potato Promoter:GUS transgenic plant line and activity of this promoter in *G. rostochiensis*-induced feeding sites.

[0036] Figure 18 shows a StCRN Potato Promoter:GUS transgenic plant line and activity of this promoter in *G. rostochiensis*-induced feeding sites.

[0037] Figure 19 A shows expression levels of the endogenous StCLV2 gene in transgenic potato plants expressing an artificial miRNA (amiRNA) directed against the StCLV2 gene (3d#29 and 4d#9) and wild type (Wt) control plants that lack the amiRNA.

[0038] Figure 19 B shows the number of *G. rostochiensis* cysts in transgenic potato plants expressing an artificial miRNA (amiRNA) directed against the StCLV2 gene (3d#29 and 4d#9) and wild type (Wt) control plants that lack the amiRNA.

DESCRIPTION OF THE INVENTION

[0039] We describe the use of synthetic CLE peptides, nematode CLE overexpression lines, promoter-reporter lines, and nematode infection assays of receptor mutants to investigate a role for CLV2 and CRN in nematode CLE signaling. Our results indicate that the CLV2/CRN signaling pathway is required for successful nematode infection and syncytium development.

[0040] Plant-parasitic cyst nematodes secrete CLAVATA3 (CLV3)/ESR(CLE)-like effector proteins. These proteins have been shown to act as ligand mimics of plant CLE peptides and are required for successful nematode infection; however, the receptors for nematode CLE-like peptides have not been identified. Here we demonstrate that CLV2 and CORYNE (CRN), members of the receptor kinase family, are required for nematode CLE signaling. Exogenous peptide assays and overexpression of nematode CLEs in *Arabidopsis* showed that CLV2 and CRN are required for nematode CLE perception. In addition, promoter-reporter assays showed that both receptors are expressed in nematode-induced syncytia. Lastly, infection assays with receptor mutants revealed a decrease in both nematode infection and syncytia size. Taken together, our results indicate that nematode CLE perception by CLV2 and CRN is not only required for successful nematode infection, but is also involved in the formation or maintenance of nematode-induced syncytia.

Plant nematode CLE receptor genes that can be used to obtain nematode resistant plants and methods of use

[0041] A variety of plant nematode CLE peptide receptor genes (hereinafter referred to as “PNCLEPRG”) that provide for inhibition of plant parasitic nematode infections are provided herewith, along with associated methods of use, and plants comprising transgenes or mutations wherein expression of the PNCLEPRG are inhibited. Reduced expression of the PNCLEPRG in plants inhibits infection of the plants by nematodes. Such reductions in nematode infection result in improved plant yield and plant product quality.

[0042] Reductions in expression of the endogenous PNCLEPRG can be effected by any method that at least provides for reductions in the amount or activity of the PNCLEPRG at the site of nematode infection in the plant. Such sites of infection are commonly the plant roots, but can also comprise other plant parts such as tubers.

[0043] In certain embodiments, inhibition of PNCLEPRG expression in a plant can be effected by transgenes. Such transgenes include, but are not limited to, transgenes that: i) produce an siRNA directed against the PNCLEPRG; ii) produce an artificial microRNA targeting the PNCLEPRG; iii) produce a dominant negative form of the protein product of the PNCLEPRG; iv) produce an antisense or sense form of the PNCLEPRG; or v) comprise a genomic insertion that disrupts the endogenous PNCLEPRG.

[0044] Exemplary vector systems that can provide for production of siRNA in plants include, but are not limited to, vectors disclosed by Dafny-Yelin, et al. (Plant Physiology, 2007, Vol. 145, pp. 1272–1281), Wesley et al. 2001, Plant J. 27: 581–590, and Miki and Shimamoto, (2004) Plant Physiol 138: 1903–1913. Vectors for producing an siRNA are also described in U.S. Pat. No. 6,635,805, incorporated herein by reference in its entirety.

[0045] Exemplary vector systems that can provide for production of artificial miRNA in plants include, but are not limited to, vectors disclosed by Warthmann et al. (2008) PLoS ONE 3(3): e1829. doi:10.1371/journal.pone.0001829; and Alvarez et al. (2006) Plant Cell 18: 1134–1151. Vectors for effecting efficient inhibition of endogenous plant genes by expression of hairpin RNAs are also disclosed in U.S. Patent Application Nos. 20050164394, 20050160490, and 20040231016, each of which is incorporated herein by reference in their entirety. Exemplary dominant negative mutations that can provide for inhibition endogenous PNCLEPRG include , but are not limited, mutations modeled after dominant negative mutations in other Leucine Rich Repeat-Receptor Like Kinase (LRR-RLK) proteins.

[0046] In one embodiment, the dominant negative mutation can comprise a deletion or other loss-of-function mutation in the kinase domain. Such mutations have been disclosed for plant LRR-RLK proteins (Shpak et al., *Plant Cell*, Vol. 15, 1095-1110, 2003). Methods of identifying transgene insertions into specific genomic loci have also been disclosed. T-DNA of *Agrobacterium* is also an insertional mutagen that can be used as an agent to reduce expression of an endogenous PNCLEPRG. T-DNA mutagenesis has been described in *Arabidopsis* (Krysan et al., *Plant Cell*, 1999, 1: 2283-2290) and rice (Jeon et al., *Plant J.* June 2000;22(6):561-70). Transposons such as those in the Ac/Ds (Activator-Disassociation) family and the Enhancer-inhibitor system can also be used to effect mutagenesis of an endogenous PNCLEPRG. Transposon mutagenesis schemes have been described (Speulman et al. *Plant Cell*, Vol. 11, 1853-1866, October 1999; Das, L., and Martienssen, R, 1995, *Plant Cell* 7:287-294).

[0047] Plants wherein expression of the endogenous PNCLEPRG is inhibited by a mutation and the use of such plants is also provided. Methods of identifying plants comprising mutations in PNCLEPRG include, but are not limited to, "TILLING" (Targeting Induced Local Lesions in Genomes). The TILLING technique comprises the induction of mutations across the genome followed by the identification and isolation of plants with mutations in desired genes (McCallum, *Plant Physiology*, 2000, Vol. 123, pp. 439-44).

[0048] PNCLEPRG target genes useful in the methods and plants of this invention include, but are not limited to, the ACR4, CLV1, CLV2, CRN, BAM1, BAM2, ER, and ERL2 genes of *Arabidopsis* and the orthologous ACR4, CLV1, CLV2, CRN, BAM1, BAM2, ER, and ERL2 genes of crop and ornamental plants subject to nematode infestation. Such orthologous genes are referred to herein as "ACR4-like, CLV1-like, CLV2-like, CRN-like, BAM1-like, BAM2-like, ER-like, and ERL2-like" genes. As used herein, the terms "orthologous" and "-like" (when appended to a gene) thus refer to genes that at least have a similar role in plant nematode CLE peptide signal transduction in their respective plant species of origin. In certain embodiments, the PNCLEPRG target genes are obtained from a plant that is a monocot or dicot plant, or that is a crop plant such as a tobacco, cereal, sugar beet, cotton, fruit, fiber, oilseed, potato, rice, corn, soybean, vegetable, and wheat plant. Exemplary vegetable plants include, but are not limited to, carrot, pepper, cucurbit, and tomato plants.

[0049] In certain embodiments, the PNCLEPRG target genes are derived from the plant that will be used (i.e. protected from nematode infection). However, a PNCLEPRG of a given plant specie can be used in a distinct plant species when it has sufficient homology to the

orthologous PNCLEPRG of a distinct plant species. In this context, “sufficient homology” is that amount of homology necessary to provide for transgene-mediated inhibition of the orthologous gene. For certain transgene-mediated gene inhibition methods, a PNCLEPRG sequence of about 23 nucleotides or longer with least 80%, 85%, 90%, 95%, 98%, 99% or 100% identity to the target orthologous sequence can be used. In certain embodiments, a hairpin RNA may comprise a 5' sequence of roughly 19-24 nucleotides of sense strand target gene sequence with 100% identity followed by a spacer nucleotide of about 8-10 nucleotides followed by a sequence of roughly 19-24 nucleotides of antisense sequence that is capable of base pairing with the preceding sense strand sequence. In certain embodiments, a 19-24 base region of a PNCLEPRG that exhibits 100% identity over 19-24 nucleotides to an orthologous PNCLEPRG can also be used to inhibit that orthologous gene.

[0050] In certain embodiments, an *Arabidopsis* PNCLEPRG can be used to obtain nematode resistant plants, where the plants are *Arabidopsis* or other plants that comprise orthologous PNCLEPRGs that can be inhibited by the *Arabidopsis* PNCLEPRG. *Arabidopsis* PNCLEPRG include, but are not limited to, the ACR4, CLV1, CLV2, CRN, BAM1, BAM2, ER, and ERL2 can in certain embodiments be used to control plant parasitic nematode infections of cruciferous plants that include, but are not limited to, arugula, cauliflower, cabbage, cress, bok choy, broccoli, radish, canola, turnip, watercress, and the like.

[0051] In certain embodiments, a potato PNCLEPRG can be used to obtain nematode resistant plants, where the plants are potato plants or other plants that comprise orthologous PNCLEPRGs that can be inhibited by the potato PNCLEPRG. Potato PNCLEPRG provided herein include, but are not limited to, stCRN (SEQ ID NO:6), stBAM1 (SEQ ID NO:7), stBAM2 (SEQ ID NO:8), stER (SEQ ID NO:9), stCLV1 (SEQ ID NO:10), stCLV2 (SEQ ID NO:11), stACR4 (SEQ ID NO:12), and stERL2 (SEQ ID NO:13). Also provided herewith are related sequences with at least 70%, 80%, 85%, 90%, 95%, 97%, 98%, or 99% identity to stCRN (SEQ ID NO:6), stBAM1 (SEQ ID NO:7), stBAM2 (SEQ ID NO:8), stER (SEQ ID NO:9), stCLV1 (SEQ ID NO:10), stCLV2 (SEQ ID NO:11), stACR4 (SEQ ID NO:12), and stERL2 (SEQ ID NO:13) as well as methods of using such sequences to control plant nematodes.

[0052] In certain embodiments, the use of such potato PNCLEPRGs and related sequences to control plant nematode, and particularly, plant cyst nematode infections, in solanaceous plants including, but not limited to, eggplant, tobacco, potato, and tomato is provided. In certain embodiments, the use of such potato PNCLEPRGs and related sequences to control

Globedera sp. infections of potato plants is provided. In any of the aforementioned embodiments, inhibition of the plant PNCLEPRG can be limited to inhibition in roots or limited to inhibition at the site of nematode infection by use of root-specific and/or nematode inducible promoters, respectively.

[0053] In certain embodiments, a soybean PNCLEPRG can be used to obtain nematode resistant plants, where the plants are soybean plants or other plants that comprise orthologous PNCLEPRGs that can be inhibited by the soybean PNCLEPRG. Soybean PNCLEPRG provided herein include, but are not limited to, soybean CRN (SEQ ID NO:44, 45, 47, and 48), BAM1 (SEQ ID NO:23, 24, 26, 27), BAM2 (SEQ ID NO:29, 30, 32, 33), CLV1 (SEQ ID NO:38,39,41,42), and CLV2 (SEQ ID NO:35,36, 50, 51) orthologs. Also provided herewith are related sequences with at least 70%, 80%, 85%, 90%, 95%, 97%, 98%, or 99% identity to soybean CRN (SEQ ID NO:44, 45, 47, 48), BAM1 (SEQ ID NO:23, 24, 26, 27), BAM2 (SEQ ID NO:29, 30, 32, 33), CLV1 (SEQ ID NO:38,39,41,42), and CLV2 (SEQ ID NO: 35,36, 50, 51) orthologs as well as methods of using such sequences to control plant nematodes. In certain embodiments, the use of such soybean PNCLEPRGs and related sequences to control plant nematodes, and particularly, plant cyst nematode infections, in leguminous plants including, but not limited to , alfalfa, clover, peas, beans, lentils, lupins, mesquite, carob, soybean, and peanuts, is provided. In certain embodiments, the use of such soybean PNCLEPRGs and related sequences to control *Heterodera glycine* infections of soybean plants is provided. In any of the aforementioned embodiments, inhibition of the plant PNCLEPRG can be limited to inhibition in roots or limited to inhibition at the site of nematode infection by use of root-specific and/or nematode inducible promoters, respectively.

[0054] In certain embodiments of the invention, combinations of two or more a plant PNCLEPRG are inhibited in a plant to provide resistance to plant parasitic nematode infections. Plants wherein combinations of two or more PNCLEPRG selected from the group of CRN, BAM1, BAM2, ER, CLV1, CLV2, ACR4, and ERL2 genes or orthologs thereof are inhibited can be used to provide resistance to plant parasitic nematode infections. In certain embodiments, a plant CLV2-like and a plant BAM1-like gene are both inhibited in parallel to reduce nematode infections in the plant. In certain embodiments of the invention, a plant CRN-1-like and a plant BAM1-like gene are both inhibited in parallel to reduce nematode infections in the plant. In certain embodiments, combinations of two or more of a soybean CRN (SEQ ID NO:44, 45, 47, and 48), BAM1 (SEQ ID NO:23, 24, 26, 27), BAM2 (SEQ ID NO:29, 30, 32), CLV1 (SEQ ID NO:38,39,41,42), and CLV2 (SEQ ID NO:35,36, 50, 51) orthologs or a related sequence are inhibited in a soybean or other plant to provide resistance to plant parasitic nematode infections. In certain embodiments, combinations of two or more of a potato stCRN (SEQ ID NO:6), stBAM1 (SEQ ID NO:7), stBAM2 (SEQ ID NO:8), stER (SEQ ID NO:9), stCLV1 (SEQ ID NO:10), stCLV2 (SEQ ID NO:11), stACR4 (SEQ ID NO:12), and stERL2 (SEQ ID NO:13) are inhibited in a potato or other plant to provide resistance to plant parasitic

nematode infections. In any of the aforementioned embodiments, inhibition of the plant PNCLEPRG can be limited to inhibition in roots or limited to inhibition at the site of nematode infection by use of root-specific and/or nematode inducible promoters, respectively.

[0055] In addition to nematode resistant plants, the instant invention also provides for parts of those plants and plant cells. Plant parts provided herein include, but are not limited to, seeds, tubers, roots, leaves, stalks, lint, and the like. Also provided herein are processed products of the nematode resistant plants. Such processed plant products include, but are not limited to, a ground meal, a feed, a cake, and the like. In certain embodiments, such processed product would comprise a detectable amount of a transgene used to inhibit the PNCLEPRG.

Promoters from Plant nematode CLE receptor genes and methods of use

[0056] Promoters from PNCLEPRG and recombinant DNA constructs providing such promoters that are useful for expressing genes of interest in plant cells where the nematodes feed are provided. Such promoters are particularly useful for expressing nucleic acid and/or protein sequences that are inhibitory to plant parasitic nematodes. Particular advantages of the promoters include, but are not limited to, providing for expression of the operably linked nucleic acid sequences at nematode feeding sites within the plant while limiting expression of the gene in other parts of the plant where such expression is not required or desired. As used herein in the context of a promoter, the term "operably linked" means that a promoter is connected to a sequence of interest such that the transcription of that sequence of interest is controlled and regulated by that promoter. When the sequence of interest encodes a protein and when expression of that protein is desired, "operably linked" means that the promoter is linked to the sequence in such a way that the resulting transcript will be efficiently translated. If the linkage of the promoter to the coding sequence is a transcriptional fusion and expression of the encoded protein is desired, the linkage is made so that the first translational initiation codon in the resulting transcript is the initiation codon of the coding sequence. Alternatively, if the linkage of the promoter to the coding sequence is a translational fusion and expression of the encoded protein is desired, the linkage is made so that the first translational initiation codon contained in the 5' untranslated sequence associated with the promoter and is linked such that the resulting translation product is in frame with the translational open reading frame that encodes the protein desired.

[0057] A variety of recombinant DNA molecules comprising promoters of the invention that are operably linked to heterologous genes or nucleic acids of interest are provided. Heterologous genes or nucleic acids that provide for inhibition of plant parasitic nematodes

can be operably linked to the PNCLEPRG promoters. In certain embodiments, the heterologous genes or nucleic acids of interest provide for inhibition of a plant parasitic nematode gene or function. Such plant parasitic nematode genes or functions include, but are not limited to, nematode genes that are essential or required for nematode viability or nematode genes involved in any aspect of plant host parasitism. In certain embodiments, the promoters are used to drive expression of heterologous genes or nucleic acids that are inhibitory to nematode genes disclosed in US Patent Application publication US20090012029, which discloses inhibitory nucleic acid specific for one or more cyst nematode esophageal gland cell proteins and which is incorporated herein by reference in its entirety.

[0058] In certain embodiments, the promoters are used to drive expression of genes or nucleic acids that inhibit formation and/or maintenance of the plant cells of the nematode feeding site. In certain embodiments, the promoters are thus used to: i) drive expression of heterologous genes or nucleic acids that are inhibitory to endogenous plant genes involved in formation and/or maintenance of the plant cells of the nematode feeding site; and/or, ii) drive expression of heterologous genes that comprise endogenous plant genes that are downregulated during the formation and/or maintenance of the plant cells of the nematode feeding site. Endogenous plant genes involved in formation and/or maintenance of the plant cells of the nematode feeding site that include, but are not limited to, genes involved in the cell wall architectural modifications during feeding site formation/maintenance, genes involved in sugar or carbohydrate, metal ion, and amino acid transport, and genes involved in plant phytohormone signaling and biosynthesis. A variety of soybean plant genes suitable for use with the promoters of the invention are disclosed in Ithal et al., *Molec. Plant. Microb. Interact.* Vol. 20, No. 5, 2007, pp. 510–525, incorporated herein by reference in its entirety. PNCLEPRG promoters useful in the methods and plants of this invention include, but are not limited to, the ACR4, CLV1, CLV2, CRN, BAM1, BAM2, ER, and ERL2 promoters of *Arabidopsis* and the orthologous ACR4, CLV1, CLV2, CRN, BAM1, BAM2, ER, and ERL2 promoters of crop and ornamental plants subject to nematode infestation. Such orthologous promoters are referred to herein as “ACR4-like, CLV1-like, CLV2-like, CRN-like, BAM1-like, BAM2-like, ER-like, and ERL2-like” promoters. As used herein, the terms “orthologous” and “-like” (when appended to a promoter) thus refer to promoters that at least have a similar role or expression pattern in plant nematode CLE peptide signal transduction in their respective plant species of origin. In certain embodiments, the PNCLEPRG

promoters are obtained from a plant that is a monocot or dicot plant, or that is a crop plant such as a tobacco, cereal, sugar beet, cotton, fruit, fiber, oilseed, potato, rice, corn, soybean, vegetable, and wheat plant. Exemplary vegetable plants include, but are not limited to, carrot, pepper, cucurbit, and tomato plants.

[0059] In certain embodiments, a recombinant DNA construct comprising a PNCLEPRG promoter that is operably linked to a heterologous gene, or a plant, plant cell, plant part, or processed plant product comprising the same, is provided. In certain embodiments, the PNCLEPRG promoter comprises any one of : i) a potato ACR4 promoter (SEQ ID NO:15), an *Arabidopsis* (SEQ ID NO:14), potato (SEQ ID NO:16), or soybean (SEQ ID NO: 38 or 41) CLV1 promoter; ii) an *Arabidopsis* (SEQ ID NO:4), potato (SEQ ID NO:17), or soybean (SEQ ID NO:35 or 50) CLV2 promoter; iii) an *Arabidopsis* (SEQ ID NO:5), potato (SEQ ID NO:18), or soybean (SEQ ID NO: 44 or 47) CRN promoter; iv) an *Arabidopsis* (SEQ ID NO:3), potato (SEQ ID NO:19), or soybean (SEQ ID NO: 23 or 26) BAM1 promoter; v) a potato (SEQ ID 20), or soybean (SEQ ID NO: 29 or 32) BAM2 promoter ; vi) a potato ER promoter (SEQ ID NO:21); vii) or a potato ERL2 promoter (SEQ ID NO:22). Also provided are recombinant DNA constructs comprising a variant PNCLEPRG promoter that has at least 70%, 85%, 90%, 95%, or 99% sequence identity to any one of : i) a potato ACR4 promoter (SEQ ID NO:15), an *Arabidopsis* (SEQ ID NO:14), potato (SEQ ID NO:16), or soybean (SEQ ID NO: 38 or 41) CLV1 promoter; ii) an *Arabidopsis* (SEQ ID NO:4), potato (SEQ ID NO:17), or soybean (SEQ ID NO:35 or 50) CLV2 promoter; iii) an *Arabidopsis* (SEQ ID NO:5), potato (SEQ ID NO:18), or soybean (SEQ ID NO: 44 or 47) CRN promoter; iv) an *Arabidopsis* (SEQ ID NO:3), potato (SEQ ID NO:19), or soybean (SEQ ID NO: 23 or 26) BAM1 promoter; v) a potato (SEQ ID 20), or soybean (SEQ ID NO: 29 or 32) BAM2 promoter ; vi) a potato ER promoter (SEQ ID NO:21); vii) or a potato ERL2 promoter (SEQ ID NO:22).

[0060] In certain embodiments, recombinant DNA constructs comprising a PNCLEPRG promoter comprising a deletion of about up to about 10, 50, 100, 200, 500, 700, 1000, or 1500 nucleotides of the 5' nucleotides of any one of: : i) a potato ACR4 promoter (SEQ ID NO:15), an *Arabidopsis* (SEQ ID NO:14), potato (SEQ ID NO:16), or soybean (SEQ ID NO: 38 or 41) CLV1 promoter; ii) an *Arabidopsis* (SEQ ID NO:4), potato (SEQ ID NO:17), or soybean (SEQ ID NO:35 or 50) CLV2 promoter; iii) an *Arabidopsis* (SEQ ID NO:5), potato (SEQ ID NO:18), or soybean (SEQ ID NO: 44 or 47) CRN promoter; iv) an *Arabidopsis* (SEQ ID NO:3), potato (SEQ ID NO:19), or soybean (SEQ ID NO: 23 or 26) BAM1

promoter; v) a potato (SEQ ID NO: 20), or soybean (SEQ ID NO: 29 or 32) BAM2 promoter ; vi) a potato ER promoter (SEQ ID NO:21); vii) or a potato ERL2 promoter (SEQ ID NO:22) is provided. Those skilled in the art will appreciate that promoter and 5'UT regions of PNCLEPRG provided herewith as genomic sequences in association with the coding regions can be dissociated from those coding regions and operably linked to heterologous nucleic acids or genes by transcriptional or translational fusions. In certain embodiments, the soybean PNCLEPRG promoters and 5'UT of Table 5 (SEQ ID NO: 23, 26, 29, 32, 35, 38, 41, 44, 47, and 50) thus comprise the nucleic acid sequences located 5' to the start codon of those genomic sequences.

[0061] In certain embodiments, variants of any of the aforementioned PNCLEPRG promoters comprising at least about 300, 500, 800, 900, 1,000, 1,500, 2,500, or 3,000 nucleotides of the nucleic acid sequence located 5' to the start codon or located 5' to mRNA 5' cap site of the endogenous gene associated with said promoter are provided. Also provided are recombinant DNA constructs wherein any of the aforementioned promoters is operably linked to a gene encoding a gene product that is inhibitory to a plant parasitic nematode.

[0062] In addition to nematode resistant plants comprising the recombinant DNA constructs of the aforementioned PNCLEPRG promoters, the instant invention also provides for parts of those plants and plant cells. Plant parts provided herein include, but are not limited to, seeds, tubers, roots, leaves, stalks, lint, and the like. Also provided herein are processed products of the nematode resistant plants. Such processed products include, but are not limited to, a ground meal, a feed, a cake, and the like.

[0063] In certain embodiments, such processed product would comprise a detectable amount of a recombinant DNA comprising a PNCLEPRG promoter that is operably linked to a heterologous gene.

EXAMPLES

[0064] The disclosed embodiments are merely representative of the invention, which may be embodied in various forms. Thus, specific structural and functional details disclosed herein are not to be interpreted as limiting.

Example 1.

EXPERIMENTAL PROCEDURES

Peptide assays

[0065] Arabidopsis seeds were sterilized using the chlorine gas method (Wang *et al.*, 2010b). Sterilized seeds were germinated on vertical plates in a growth chamber at 22°C under long-day conditions (16h light/8h dark) containing synthetic peptides (Sigma-Genosys) as previously described (Wang *et al.*, 2010b). The *clv2-1* mutant in the *Ler* background (Koornneef *et al.*, 1983) was obtained from the Arabidopsis Biological Resource Center. The *crn-1* mutant in the *Ler* background (Muller, 2008) and the *sol2-1* mutant in the *Utr* background (Miwa *et al.*, 2008) have been described previously. The HgCLEp, HsCLE1p, and HsCLE2p peptides used in this study were as described (Wang *et al.*, 2010b). Two days after germination, root length was marked each day for nine days. Plates were scanned using an Epson Perfection V200 PHOTO scanner and total root length was determined using Scion Image. Primary root tips of Arabidopsis were mounted on glass slides and visualized with an Olympus Vanox AHB3 microscope equipped with Nomarski optics.

Overexpression in mutant backgrounds

[0066] The *CLE* gene sequences from the soybean cyst nematode (*HgCLE2^{ASP}*) and the beet cyst nematode (*HsCLE1* and *HsCLE2*) used to generate the overexpression constructs were previously described (Wang *et al.*, 2010a; Wang *et al.*, 2010b). Constructs were transformed into the mutant backgrounds using the Arabidopsis floral dip method (Clough and Bent, 1998). Seeds from primary Arabidopsis transformants (T1) were selected on 0.5X MS media [MS basal nutrients salts (Caisson Laboratories), 2% sucrose, 0.8% Type A agar (Sigma), pH 5.7] containing 50µg/mL timentin (GlaxoSmithKline) to control *Agrobacterium* contamination, and 50µg/mL kanamycin and grown under the same conditions as above. Seedlings resistant to kanamycin were transplanted to soil seven days after germination. Two weeks after transplanting to soil the shoot phenotypes were observed.

Promoter-reporter lines

[0067] *CRN:GUS* has been previously described and characterized (Muller *et al.*, 2008). To generate *CLV2:H2B-mCherry*, vector pMDC99 (Curtis and Grossniklaus, 2003) was modified by introducing the CDS of chimeric construct mCherry-H2B at the 3' site of the gateway cassette using the unique *PacI* restriction site to give pAB149. To analyze the expression of *CLV2* 1252 bp of the 5' region and 9 bp of the CDS was amplified using the primers AB_CLV2_Pro_F (5' CACCAGACACAAAGCCCTTCCATTGTC 3'; SEQ ID NO:1) and AB_CLV2_Pro_R (5' CTTTATCATAGCTCAGAGGA 3'; SEQ ID NO:2) to give a CACC-TOPO containing amplicon, which was cloned into pENTR/D-TOPO (Invitrogen™). This entry clone was used in a LR reaction with pAB149 to give pAB183

(*CLV2:H2B-mCherry*). Expression of *CLV2* under the control of the endogenous promoter, using 1252 bp of the *CLV2* 5' region was sufficient to rescue the *clv2-1* mutant in all isolated lines (N=20).

Nematode infection of promoter-reporter lines

[0068] The beet cyst nematode (BCN) *Heterodera schachtii* was propagated on greenhouse-grown sugar beets (*Beta vulgaris* cv Monohi). BCN eggs were isolated and hatched as previously described (Mitchum *et al.*, 2004). After 2 days, second stage juveniles (J2) were collected and surfaced sterilized according to Wang *et al.* (2007) except 0.004% mercuric chloride, 0.004% sodium azide, and 0.002% Triton X-100 were used. Sterilized seeds were grown on modified Knop's medium (Brunschwig Chemie) (Sijmons *et al.*, 1991). Ten days after germination seedlings were inoculated with 20 sterilized J2/root.

Histochemical β -glucuronidase (GUS) assays

[0069] At the indicated timepoints, freshly excised *CRN:GUS* tissues were infiltrated with GUS substrate buffer (0.5 mM 5-bromo-4chloro-3-indolyl glucuronide, 100 mM Tris, pH 7.0, 50 mM NaCl, 0.06% Triton X-100, 3 mM potassium ferricyanide) and incubated overnight at 37°C (Jefferson *et al.*, 1987). Stained roots were placed in glass Petri dishes and visualized with a Nikon Eclipse TS100 inverted microscope.

Confocal microscopy

[0070] *CLV2:H2B-mCherry* seed was sterilized, grown, and inoculated with nematodes as described above. At the indicated timepoints, infected roots were mounted on glass slides and visualized with a 510 META confocal scanning microscope (Carl Zeiss, Thornwood, NY, USA) excited at 543 nm.

Infection assay with receptor mutants

[0071] Sterilized receptor mutants were plated in 12-well Falcon tissue culture plates (BD Biosciences) containing modified Knop's medium with 0.8% Daishin agar in a randomized block design. Plants were grown at 24°C with a 12 hour photoperiod. Fourteen days after germination, seedlings were inoculated with 200 surface-sterilized BCN J2. J4 females were counted at 14 days post-inoculation (dpi) and adult females were counted at 30 dpi. The average values were calculated and significant differences were determined by using Student's *t* test ($P < 0.05$). To measure syncytia size, receptor mutants were germinated on modified Knop's medium in vertical square plates and inoculated at 10 days after germination with 10 surface-sterilized BCN J2. At 14 dpi, syncytia that were transparent and only fed upon by only one nematode were visualized with a Nikon Eclipse TS100 inverted

microscope. Area of syncytia was measured using Adobe Photoshop CS5 and significant differences were determined by using Student's *t* test ($P < 0.05$).

RESULTS

CLV2 and CRN are required for nematode CLE perception

[0072] We have previously shown that exogenously applied 12-aa peptides corresponding to the CLE motifs of the SCN (HgCLEs) and the BCN (HsCLEs) CLEs can function as plant CLE peptide mimics causing termination of the primary root meristem in a concentration dependent manner (Wang et al., 2010b). In Arabidopsis, it has been shown that the short root phenotype caused by overexpression or exogenous application of some plant CLE peptides is dependent on CLV2 signaling (Fiers et al., 2005; Miwa et al., 2008; Muller, 2008; Meng et al., 2010). More recent evidence indicates that CLV2 forms a complex with CRN and can transmit the signal from CLV3 binding in a CLV1-independent manner (Miwa et al., 2008; Muller, 2008; Bleckmann et al., 2010; Zhu et al., 2010). To determine whether or not CLV2 and CRN might play a role in cyst nematode CLE perception we screened the Arabidopsis *clv2-1* null mutant and the *crn-1* amorphic allele for resistance to the HgCLE, HsCLE1, and HsCLE2 12-aa peptides. Seeds were grown on vertical plates in the absence of exogenous peptide or in the presence of 1 μ M HgCLE or 10 μ M of the HsCLEs and roots were measured 9 days after germination. Wild-type seedlings (Landsberg erecta [Ler]) had significantly shorter roots when grown on plates with any of the CLE peptides in comparison to the no peptide control (Figure 1a). In contrast, *clv2-1* and *crn-1* root growth was relatively unimpaired in the presence of the different CLE peptides (Figure 1a). The same observation was made with *sol2-1*, another mutant allele of CRN (Miwa et al., 2008) (Figure 5). Previous reports have indicated that the short root phenotype can be attributed to a decrease in the number of meristematic cells (Fiers et al., 2005). Using Nomarski optics we confirmed that *clv2-1* and *crn-1* were insensitive to peptide application resulting in root meristems that were indistinguishable from the no peptide control (Figure 1b-d).

[0073] Nematode CLEs function in planta through a CLV2- and CRN-dependent pathway Overexpression of HgCLE2, HsCLE1, and HsCLE2 in wild-type Arabidopsis has been shown to cause wus-like phenotypes similar to other plant CLEs (Strabala et al., 2006; Meng et al., 2010; Wang et al., 2005; Wang et al., 2010a; Wang et al., 2010b). If CLV2 and/or CRN are involved in nematode CLE perception then we would expect the phenotypes to be diminished or abolished when overexpressed in *clv2-1* and/or *crn-1*. Each of the nematode CLE genes was cloned into an

overexpression vector and transformed into the mutant backgrounds. Transgenic seedlings in the T1 generation were screened and characterized in soil. In contrast to the overexpression phenotypes seen in wild-type *Arabidopsis* where a high percentage of *wus*-like phenotypes were observed (Wang et al., 2010a; Wang et al., 2010b), no *wus*⁻-like phenotypes were observed when HgCLE2, HsCLE1, and HsCLE2 were overexpressed in *clv2-1* or *crn-1* (Table 1). These results demonstrate that mutations in CRN and CLV2 suppress nematode CLE overexpression phenotypes.

[0074] Table 1. Summary of nematode *CLE* overexpression phenotypes in *clv2-1* and *crn-1*.

Background	Construct	T1 Shoot Phenotypes		
		<i>wus</i> -like (%)	WT (%)	Total T1 (#)
<i>clv2-1</i>	HgCLE2	0	100	96
	HsCLE1	0	100	67
	HsCLE2	0	100	28
<i>crn-1</i>	HgCLE2	0	100	85
	HsCLE1	0	100	41
	HsCLE2	0	100	37

[0075] Spatial and temporal relationship between CLV2, CRN, and nematode feeding sites
Cyst nematodes enter the root near the zone of elongation, migrate through root cortical cells using their stylet to puncture through cell walls, and begin feeding from a single cell near the vascular cylinder. Once cyst nematodes initiate a feeding site the dorsal esophageal gland cell becomes active and the secreted CLE peptides are delivered to the host root cells (Wang et al., 2010a). In order for CLV2 and CRN to be able to perceive the nematode CLE as a ligand mimic they must be expressed in the correct spatial and temporal context.

[0076] Using a CRN:GUS transgene in *Arabidopsis*, CRN expression was previously shown to be expressed throughout the root including the vasculature where the nematode initiates feeding (Figure 2a-c; Muller et al., 2008). To confirm whether CRN is expressed in nematode feeding sites, transgenic *Arabidopsis* seedlings expressing CRN:GUS were infected with BCN and monitored during nematode development. GUS expression was detected in feeding sites as soon as early second-stage juveniles (J2) began to feed. (Figure 2d). GUS expression reached its peak once nematodes reached late J2 parasitic stages, but remained detectable in the feeding sites of third stage juvenile (J3) parasitic nematodes (Figure 2e and f). By the time the nematodes reached the fourth stage juvenile (J4) life stage, GUS expression was either weak or absent in feeding sites (Figure 2g).

[0077] Similar to CRN, CLV2 is expressed in many different vegetative tissues (Jeong et al., 1999). However little is known about the expression pattern of CLV2 in roots. To visualize CLV2 expression in roots and nematode feeding sites, mCherry was fused to the C-terminus of the Arabidopsis Histone 2B (H2B) gene and placed under the transcriptional control of the CLV2 promoter. The H2B protein has been shown to be a valid marker for chromatin organization in plant nuclei and has been used to describe development of the syncytial endosperm in Arabidopsis (Boisnard-Lorig et al., 2001). In uninfected roots, CLV2:H2B-mCherry fluorescence was detected throughout the root vasculature with the strongest expression detected in lateral root primordia and the zone of elongation extending down to the root apical meristem (A. Bleckmann and R. Simon, unpublished). Upon nematode infection, increased expression of CLV2:H2B-mCherry fluorescence was detected in the nuclei of syncytia fed upon by parasitic J2s (Figure 3a-b). At the J3 life stage CLV2:H2B-mCherry continued to be specifically expressed within feeding sites (Figure 3c-d). No fluorescence was detected in nuclei of syncytia fed upon by parasitic J2s in wild-type plants (Figure 6a-b).

[0078] Mutant alleles of CLV2 and CRN cause a reduction in nematode infection and defects in syncytial size.

[0079] By using an RNAi approach targeting nematode CLE genes, previous reports have shown that nematode CLE peptides are important for successful infection of host plants roots (Bakhetia et al., 2007; Patel et al., 2008). To determine if nematode CLE perception by CLV2 or CRN is required, root infection assays with nematodes were performed on the *clv2-1* and *crn-1* single mutants, and the *crn-1 clv2-1* double mutant. According to Muller et al. (2008), *crn-1 clv2-1* is morphologically indistinguishable from either of the single mutants, indicating that they act in the same pathway. The mutant alleles and the wild-type Ler were randomized in 12-well plates and grown on modified Knop's medium.

[0080] Two weeks after germination seedlings were inoculated with infective J2s. J4 females were counted at 14 days post-inoculation (dpi) and adult females were counted at 30 dpi. Both the single and double mutants showed a statistically significant reduction in nematode infection with the exception of *crn-1* at 14 dpi (Figure 4a). At 30 dpi nematode infection was reduced by approximately 25% in all receptor mutants tested. A similar reduction in nematode infection across all mutant lines supports the hypothesis that CLV2 and CRN are acting in the same signaling pathway. Using *sol2-1*, we observed a 40% reduction in nematode infection (Figure 7a). Since the establishment of a feeding site is required for

nematode development and reproduction, the above observations motivated us to determine if there were any defects in syncytial size between the receptor mutants and wild-type.

[0081] The mutant alleles and the wild-type Ler were grown on vertical square plates and inoculated with infective J2s. At 14 dpi, syncytia that were transparent and fed upon by only one nematode were measured. The average area of wild-type (Ler) syncytia was $1402 \pm 147 \mu\text{m}^2$ (Figure 4b). In contrast, the syncytia of the receptor mutant alleles were reduced by approximately 40%. The average area of *crn-1*, *clv2-1*, and *crn-1 clv2-1* was $797 \pm 89 \mu\text{m}^2$, $745 \pm 61 \mu\text{m}^2$, and $808 \pm 57 \mu\text{m}^2$, respectively (Figure 4b). The same reduction in syncytia size was seen in the *sol2-1* mutant allele (Figure 7b).

[0082] Nematode CLE genes have been found to be upregulated in the dorsal esophageal gland cell at the onset of parasitism and remain on through the adult female life stage. CLE genes are turned off in adult males that are no longer feeding (Wang et al., 2005; Patel et al., 2008; Lu et al., 2009; Wang et al., 2010a). In SCN and BCN, immunolocalization studies have localized nematode CLEs along the dorsal gland extension and in the ampulla at the base of the nematode stylet indicating they are secreted into host plant roots via the stylet (Wang et al., 2005; Patel et al., 2008; Wang et al., 2010a). Consistent with these results an immunofluorescence study found that SCN CLEs are secreted directly into host plant root cytoplasm (Wang et al., 2010a). The variable domain of SCN CLEs is then able to redirect the proteins into the apoplast where they can act as plant CLE ligand mimics by interacting with extracellular membrane bound plant CLE receptors. However, thus far, host plant receptors that perceive nematode CLE signals have not been identified.

[0083] Many studies have used synthetic CLE peptides to help determine the roles that plant CLE peptides play in plant growth and development. Previous studies have shown that nematode CLE peptides cause root growth phenotypes similar to other plant CLEs (Lu et al., 2009; Wang et al., 2010a; Wang et al., 2010b). Other studies have also shown that these peptide screens can identify receptors that may be involved in certain CLE signaling pathways by utilizing receptor mutants (Fiers et al., 2005; Stahl et al., 2009; Meng et al., 2010).

[0084] To identify potential nematode CLE receptors we tested plant CLE receptors implicated in CLE signaling in the RAM for a role in nematode CLE perception. In the root, exogenous peptide assays and overexpression studies have shown that *CLV2* is required for proper proximal meristem function (Stahl et al., 2009; Meng et al., 2010).

[0085] It has also been shown that a new member of the receptor kinase family, CRN, forms a heterodimer with CLV2 and is required for proper localization of the CLV2/CRN complex to the plasma membrane (Bleckmann et al., 2010; Zhu et al., 2010). In *Arabidopsis*, CRN has been found to be widely expressed in both shoot and root tissues suggesting dual roles in shoot and root development (Muller et al., 2008). CLV2 has been found to be expressed in shoot tissues (Jeong et al., 1999), but less is known about its expression in the root. In this paper we screened a null mutant allele of CLV2 and an amorphic mutant allele of CRN for resistance to the nematode CLE peptides. Both *clv2-1* and *crn-1* were resistant to HgCLEp, HsCLE1p, and HsCLE2p (Figures 1 and 5). Similar to synthetic peptide assays, overexpression of HgCLE, HsCLE1, and HsCLE2 in the *clv2-1* and *crn-1* mutant backgrounds abolished the *wus*-like phenotypes seen when the nematode CLEs are overexpressed in wild-type backgrounds (Wang et al., 2005; Wang et al., 2010a; Wang et al., 2010b). Taken together, the peptide assays and overexpression data indicate that CLV2 and CRN are required for nematode CLE perception.

[0086] In order to serve as a receptor complex for nematode CLE peptides, CLV2 and CRN would most likely need to be expressed in feeding cell initials as well as the developing feeding sites. With the use of promoter-reporter lines we confirmed that both CLV2 and CRN were expressed in nematode-induced feeding sites (Figure 2 and 3), consistent with a role in nematode CLE perception. It is also possible that nematode CLE receptors are expressed in the cells adjacent to the expanding syncytium. As the nematode CLEs are redirected to the host root apoplast, extracellular receptors of the adjacent cells that are primed for incorporation could trigger plant CLE signaling pathways needed to fully form the syncytium. In the future it will be interesting to more precisely localize the CLV2 and CRN proteins within syncytia using immunofluorescence techniques. This will aid in determining whether or not these nematode CLE receptors are expressed within the cell wall openings that occur during syncytium formation or if they are expressed on the outer plasma membrane of the syncytium and/or adjacent cells.

[0087] Previous reports have demonstrated that SCN and BCN CLEs are important for nematode parasitism by showing a reduction in nematode infection after knocking down CLE expression in the worm using RNAi approaches (Bakhetia et al., 2007; Patel et al., 2008). To directly test for a role of CLV2/CRN in nematode CLE perception we performed infection assays on the receptor mutants.

[0088] We showed that a reduction in nematode infection occurs on the receptor mutants (Figure 4a and 6). Concurrently, we also saw a reduction in syncytium size in the receptor mutants (Figure 4b and 7). The fact that we saw a similar reduction in both nematode infection and syncytia size in both the single and double mutants is consistent with genetic and biochemical data that CLV2 and CRN are acting in the same pathway (Muller et al., 2008; Bleckmann et al., 2010; Zhu et al., 2010). These data indicate that not only is nematode CLE perception by CLV2 and CRN important for successful nematode infection, but demonstrates that CLE signaling also plays a role feeding cell formation.

[0089] The involvement of CRN in nematode CLE signaling also opens up the interesting possibility that nematode CLE signaling may be directly or indirectly suppressing host plant defense responses. It has been reported that in root tips of *sol2-1*, another mutant allele of CRN, plant disease resistance-related and stress responsive genes were upregulated (Miwa et al., 2008). Therefore, when nematode CLEs are secreted they could activate the CLV2/CRN signaling pathway leading to a suppression of plant disease resistance-related and plant stress responsive genes. One might speculate that the main target for nematode CLEs is a signaling pathway which allows developmental programming of root cells for syncytium formation to occur and that suppression of plant defense responses is just an added benefit to the nematode. Alternatively, the nematode may require suppression of plant defense responses through plant CLE signaling in order for the syncytium to form properly. Further studies will need to be performed to investigate this possibility.

[0090] Several possibilities exist for why we only see a partial reduction in nematode numbers and syncytia size in the *clv2-1* and *crn-1* mutant backgrounds. First, besides CLEs, nematodes secrete many different effectors that likely play an important role in feeding cell formation (Wang et al., 2001; Gao et al., 2003).

[0091] For example, when BCN CLEs were targeted with RNAi a similar partial reduction in nematode infection was observed (Patel et al., 2008), either as a consequence of limited reductions in transcript levels or an indication that the other effectors still active in the nematode allow infection to proceed. A second possibility for the partial reduction in the receptor mutants is that there could be multiple nematode CLE receptors. So far, the nematode CLEs reported belong to gene families (Lu et al., 2009; Wang et al., 2010a; Wang et al., 2010b). In addition, PCN CLEs have multiple CLE motifs that may be simultaneously processed to release different CLE peptides (Lu et al., 2009). This leaves the possibility that nematode CLE peptides may activate multiple plant CLE signaling pathways concurrently to

function in an antagonistic or synergistic fashion as reported for plant CLEs (Whitford et al., 2008). The current plant CLV3 signaling pathway in the shoot indicates that there are parallel signaling pathways. Genetic evidence indicates that CLV1 acts in a separate pathway from the CLV2/CRN pathway (Muller et al., 2008). In support of the genetic data, recent reports using luciferase complementation assays and FRET analysis have shown that CLV1 forms a homodimer and that CLV2 and CRN form a heterodimer without CLV3 stimulation (Bleckmann et al., 2010; Zhu et al., 2010).

[0092] These reports also found evidence for CLV1 interacting with the CLV2/CRN complex leading to the possibility that different signaling pathways could be activated depending on which receptor in the complex interacts with the CLE ligand (Bleckmann et al., 2010; Zhu et al., 2010). Thus it is possible that in the *crn-1 clv2-1* double mutants, nematodes are still able to signal through other receptors in the roots. Unlike CLV2, which has a broad expression pattern in plants, CLV1 expression is thought to be restricted to the center of the SAM and its function is thought to be confined to stem cell specification in the shoot (Clark et al., 1997; Fletcher et al., 1999). Therefore, in order to utilize CLV1 as a receptor, nematodes would have to activate CLV1 expression in the roots. Recently, CLV1-related Barely Any Meristem (BAM) 1 and BAM2 have been shown to act redundantly in the SAM and are widely expressed throughout the plant, including root tissues (DeYoung et al., 2006; Deyoung and Clark, 2008). We have found that *bam1* is also resistant to exogenous application of synthetic nematode CLE peptides (A. Replogle, S. Chen, X. Wang and M.G. Mitchum, unpublished data). Moreover, there are over 200 LRR-RLKs in *Arabidopsis* and only a few receptor-CLE ligand pairs have been identified (Shiu and Bleecker, 2001). Thus, further studies using a combination of mutants will need to be performed to investigate the possible involvement of other host plant receptors in nematode CLE signaling.

[0093] It is shown here that nematode CLE signaling through the CLV2/CRN receptor complex is important for proper syncytium formation and ultimately successful nematode infection. These findings open the door for identifying the downstream signaling components regulated by CLV2/CRN to uncover the role nematode CLE signaling plays in syncytium formation.

REFERENCES

- [0094] Bakhetia, M., Urwin, P.E. and Atkinson, H.J. (2007) qPCR analysis and RNAi define pharyngeal gland cell-expressed genes of *Heterodera glycines* required for initial interactions with the host. *Mol. Plant Microbe Interact.* **20**, 306-312.
- [0095] Bleckmann, A., Weidtkamp-Peters, S., Seidel, C.A. and Simon, R. (2010) Stem cell signaling in Arabidopsis requires CRN to localize CLV2 to the plasma membrane. *Plant Physiol.* **152**, 166-176.
- [0096] Boissard-Lorig, C., Colon-Carmona, A., Bauch, M., Hodge, S., Doerner, P., Bancharel, E., Dumas, C., Haseloff, J. and Berger, F. (2001) Dynamic analyses of the expression of the HISTONE::YFP fusion protein in Arabidopsis show that syncytial endosperm is divided in mitotic domains. *Plant Cell*, **13**, 495-509.
- [0097] Casamitjana-Martinez, E., Hofhuis, H.F., Xu, J., Liu, C.M., Heidstra, R. and Scheres, B. (2003) Root-specific *CLE19* overexpression and the *soll/2* suppressors implicate a CLV-like pathway in the control of Arabidopsis root meristem maintenance. *Curr. Biol.* **13**, 1435-1441.
- [0098] Clark, S.E., Running, M.P. and Meyerowitz, E.M. (1993) CLAVATA1, a regulator of meristem and flower development in Arabidopsis. *Development*, **119**, 397-418.
- [0099] Clark, S.E., Williams, R.W. and Meyerowitz, E.M. (1997) The *CLAVATA1* gene encodes a putative receptor kinase that controls shoot and floral meristem size in Arabidopsis. *Cell*, **89**, 575-585.
- [00100] Clough, S.J. and Bent, A.F. (1998) Floral dip: a simplified method for *Agrobacterium*-mediated transformation of *Arabidopsis thaliana*. *Plant J.* **16**, 735-743.
- [00101] Curtis, M.D. and Grossniklaus, U. (2003) A gateway cloning vector set for high-throughput functional analysis of genes in planta. *Plant Physiol.* **133**, 462-469.
- [00102] Davis, E.L., Hussey, R.S. and Baum, T.J. (2004) Getting to the roots of parasitism by nematodes. *Trends Parasitol.* **20**, 134-141.
- [00103] Davis, E.L., Hussey, R.S., Mitchum, M.G. and Baum, T.J. (2008) Parasitism proteins in nematode-plant interactions. *Curr. Opin. Plant Biol.* **11**, 360-366.
- [00104] DeYoung, B.J., Bickle, K.L., Schrage, K.J., Muskett, P., Patel, K. and Clark, S.E. (2006) The CLAVATA1-related BAM1, BAM2 and BAM3 receptor kinase-like proteins are required for meristem function in Arabidopsis. *Plant J.* **45**, 1-16.

- [00105] **Deyoung, B.J. and Clark, S.E.** (2008) BAM receptors regulate stem cell specification and organ development through complex interactions with CLAVATA signaling. *Genetics*, **180**, 895-904.
- [00106] **Endo, B.Y.** (1964) Penetration and development of *Heterodera glycines* in soybean roots and related anatomical changes. *Phytopathology*, **54**, 79-88.
- [00107] **Fiers, M., Hause, G., Boutilier, K., Casamitjana-Martinez, E., Weijers, D., Offringa, R., van der Geest, L., van Lookeren Campagne, M. and Liu, C.M.** (2004) Mis-expression of the *CLV3/ESR*-like gene *CLE19* in Arabidopsis leads to a consumption of root meristem. *Gene*, **327**, 37-49.
- [00108] **Fiers, M., Golemiec, E., Xu, J., van der Geest, L., Heidstra, R., Stiekema, W. and Liu, C.M.** (2005) The 14-amino acid CLV3, CLE19, and CLE40 peptides trigger consumption of the root meristem in Arabidopsis through a CLAVATA2-dependent pathway. *Plant Cell*, **17**, 2542-2553.
- [00109] **Fletcher, L.C., Brand, U., Running, M.P., Simon, R. and Meyerowitz, E.M.** (1999) Signaling of cell fate decisions by CLAVATA3 in Arabidopsis shoot meristems. *Science*, **283**, 1911-1914.
- [00110] **Gao, B., Allen, R., Maier, T., Davis, E.L., Baum, T.J. and Hussey, R.S.** (2003) The parasitome of the phytonematode *Heterodera glycines*. *Mol. Plant Microbe Interact.* **16**, 720-726.
- [00111] **Jefferson, R.A., Kavanagh, T.A. and Bevan, M.W.** (1987) GUS fusions: β -glucuronidase as a sensitive and versatile gene fusion marker in higher plants. *EMBO J*, **6**, 3901-3907.
- [00112] **Jeong, S., Trotochaud, A.E. and Clark, S.E.** (1999) The Arabidopsis *CLAVATA2* gene encodes a receptor-like protein required for the stability of the CLAVATA1 receptor-like kinase. *Plant Cell*, **11**, 1925-1934.
- [00113] **Kayes, J.M. and Clark, S.E.** (1998) CLAVATA2, a regulator of meristem and organ development in Arabidopsis. *Development*, **125**, 3843-3851.
- [00114] **Koorneef, M., Van Eden, J., Hanhart, C.J., Stam, P., Braaksma, F.J. and Feenstra, W.J.** (1983) Linkage Map of *Arabidopsis thaliana*. *J. Hered.* **74**, 265-272.
- [00115] **Laux, T., Mayer, K.F.X., Berger, J. and Jurgens, G.** (1996) The *WUSCHEL* gene is required for shoot and floral meristem integrity in Arabidopsis. *Development*, **122**, 87-96.

- [00116] Lu, S.W., Chen, S., Wang, J., Yu, H., Chronis, D., Mitchum, M.G. and Wang, X. (2009) Structural and functional diversity of *CLAVATA3/ESR (CLE)*-like genes from the potato cyst nematode *Globodera rostochiensis*. *Mol. Plant Microbe Interact.* **22**, 1128-1142.
- [00117] Meng, L., Ruth, K.C., Fletcher, J.C. and Feldman, L. (2010) The roles of different CLE domains in Arabidopsis CLE polypeptide activity and functional specificity. *Mol. Plant*, doi:10.1093/mp/ssq021
- [00118] Mitchum, M.G., Sukno, S., Wang, X., Shani, Z., Tsabary, G., Shoseyov, O. and Davis, E.L. (2004) The promoter of the *Arabidopsis thaliana Cell* endo-1,4-beta glucanase gene is differentially expressed in plant feeding cells induced by root-knot and cyst nematodes. *Mol. Plant Pathol.* **5**, 175-181.
- [00119] Mitchum, M.G., Wang, X.H. and Davis, E.L. (2008) Diverse and conserved roles of CLE peptides. *Curr. Opin in Plant Biol.* **11**, 75-81.
- [00120] Miwa, H., Betsuyaku, S., Iwamoto, K., Kinoshita, A., Fukuda, H. and Sawa, S. (2008) The receptor-like kinase SOL2 mediates CLE signaling in Arabidopsis. *Plant Cell Physiol.* **49**, 1752-1757.
- [00121] Muller, R., Bleckmann, A. and Simon, R. (2008) The receptor kinase CORYNE of Arabidopsis transmits the stem cell-limiting signal CLAVATA3 independently of CLAVATA1. *Plant Cell*, **20**, 934-946.
- [00122] Ogawa, M., Shinohara, H., Sakagami, Y. and Matsubayashi, Y. (2008) Arabidopsis CLV3 peptide directly binds CLV1 ectodomain. *Science*, **319**, 294.
- [00123] Patel, N., Hamamouch, N., Chunying, L., Hussey, R., Mitchum, M., Baum, T., Wang, X. and Davis, E.L. (2008) Similarity and functional analyses of expressed parasitism genes in *Heterodera schachtii* and *Heterodera glycines*. *J. Nematol.* **40**, 299-310.
- [00124] Rojo, E., Sharma, V.K., Kovaleva, V., Raikhel, N.V. and Fletcher, J.C. (2002) CLV3 is localized to the extracellular space, where it activates the Arabidopsis CLAVATA stem cell signaling pathway. *Plant Cell*, **14**, 969-977.
- [00125] Sarkar, A.K., Luijten, M., Miyashima, S., Lenhard, M., Hashimoto, T., Nakajima, K., Scheres, B., Heidstra, R. and Laux, T. (2007) Conserved factors regulate signaling in *Arabidopsis thaliana* shoot and root stem cell organizers. *Nature*, **446**, 811-814.
- [00126] Sasser, J.N. and Freckman, D.W. (1987) A world perspective on Nematology: the role of the society. *Vistas on nematology*. Veech, J.A. and Dickson, D.W., Hyattsville, MD, USA: Society of Nematologists.

- [00127] **Sharma, V.K., Ramirez, J. and Fletcher, J.C.** (2003) The Arabidopsis *CLV3*-like (*CLE*) genes are expressed in diverse tissues and encode secreted proteins. *Plant Mol. Biol.* **51**, 415-425.
- [00128] **Shiu, S.H. and Bleecker, A.B.** (2001) Plant receptor-like kinase gene family: diversity, function, and signaling. *Sci STKE*, **2001**, re22.
- [00129] **Sijmons, P.C., Grundler, F.M.W., Von Mende, N., Burrows, P.R. and Wyss, U.** (1991) *Arabidopsis thaliana* as a new model host for plant parasitic nematodes. *Plant J.* **1**, 245-254.
- [00130] **Simon, R. and Stahl, T.** (2006) Plant Cells CLEave Their Way to Differentiation. *Science*, **313**, 773-774.
- [00131] **Stahl, Y., Wink, R.H., Ingram, G.C. and Simon, R.** (2009) A signaling module controlling the stem cell niche in Arabidopsis root meristems. *Curr. Biol.* **19**, 909-914.
- [00132] **Strabala, T.J., O'Donnell, P.J., Smit, A.M., Ampomah-Dwamena, C., Martin, E.J., Netzler, N., Nieuwenhuizen, N.J., Quinn, B.D., Foote, H.C.C. and Hudson, K.R.** (2006) Gain-of-function phenotypes of many *CLAVATA3/ESR* genes, including four new family members, correlate with tandem variations in the conserved *CLAVATA3/ESR* domain. *Plant Physiol.* **140**, 1331-1344.
- [00133] **Trotochaud, A.E., Hao, T., Wu, G., Yang, Z. and Clark, S.E.** (1999) The *CLAVATA1* receptor-like kinase requires *CLAVATA3* for its assembly into a signaling complex that includes KAPP and a Rho-related protein. *Plant Cell*, **11**, 393-406.
- [00134] **Wang, J., Lee, C., Replogle, A., Joshi, S., Korkin, D., Hussey, R., Baum, T.J., Davis, E.L., Wang, X. and Mitchum, M.G.** (2010a) Dual roles for the variable domain in protein trafficking and host-specific recognition of *Heterodera glycines* CLE effector proteins. *New Phytol.* 10.1111/j.1469-8137.2010.03300.x
- [00135] **Wang, J., Replogle, A., Hussey, R., Baum, T., Wang, X., Davis, E.L. and Mitchum, M.G.** (2010b) Identification of potential host plant mimics of *CLV3/ESR* (*CLE*)-like peptides from the plant-parasitic nematode *Heterodera schachtii*. *Mol. Plant Pathol.* (under review).
- [00136] **Wang, X., Allen, R., Ding, X., Goellner, M., Maier, T., de Boer, J.M., Baum, T.J., Hussey, R.S. and Davis, E.L.** (2001) Signal peptide-selection of cDNA cloned directly from the esophageal gland cells of the soybean cyst nematode *Heterodera glycines*. *Mol. Plant Microbe Interact.* **14**, 536-544.

- [00137] Wang, X., Mitchum, M.G., Gao, B., Li, C., Diab, H., Baum, T.J., Hussey, R.S. and Davis, E.L. (2005) A parasitism gene from a plant-parasitic nematode with function similar to *CLAVATA3/ESR* (*CLE*) of *Arabidopsis thaliana*. *Mol. Plant Pathol.* **6**, 187-191.
- [00138] Wang, X., Replogle, A., Davis, E.L. and Mitchum, M.G. (2007) The tobacco *Cel7* gene promoter is auxin-responsive and locally induced in nematode feeding sites of heterologous plants. *Mol. Plant Pathol.* **8**, 423-436.
- [00139] Whitford, R., Fernandez, A., De Groodt, R., Ortega, E. and Hilson, P. (2008) Plant CLE peptides from two distinct functional classes synergistically induce division of vascular cells. *Proc. Natl Acad. Sci. USA*, **105**, 18625-18630.
- [00140] Zhu, Y., Wang, Y., Li, R., Song, X., Wang, Q., Huang, S., Jin, J.B., Liu, C.M. and Lin, J. (2010) Analysis of interactions among the CLAVATA3 receptors reveals a direct interaction between CLAVATA2 and CORYNE in Arabidopsis. *Plant J.* **61**, 223-233.

Example 2.

[00141] Screening of plant CLE receptor mutants for resistance to nematode CLE peptides, overexpression of the nematode CLEs in the receptor mutant background, and infection assays of plant receptor mutants, has identified several receptors involved in nematode CLE peptide signaling. Plant receptor mutants exhibiting resistance to exogenous treatment of nematode CLE peptides include CLAVATA2 (*CLV2*; At1g65380), CORYNE (*CRN*; At5g13290), BARELY ANY MERISTEM (*BAM1*; At5g65700), and ERECTA-LIKE2 (*ERL2*; (At5g07180) (Figures 8 and 9). Overexpression of nematode CLEs in the *clv2* and *crn* mutant background abolished all phenotypes (Table 2) that are observed when nematode CLEs are overexpressed in wild type plants (Wang et al., 2005; 2010; Lu et al., 2009). Additionally, nematode infection is significantly reduced on several of the receptor mutants including *clv1*, *clv2*, and *crn* (Figure 10). Expression of receptors in nematode feeding cells was confirmed by infection of transgenic plants containing promoter-reporter fusions (Figures 11-13) and upregulation of candidate soybean and potato receptor genes in *H. glycines*-induced syncytia and *G. rostochiensis*-infected potato roots were revealed by microarray analysis of laser-captured syncytia (Table 2, 5% FDR; Ithal et al., 2007) and qRT-PCR analysis (Figure 14). Thus, the disruption or modulation of the host plant receptor proteins that perceive the nematode CLE peptides can be used to develop a novel management tactic to reduce cyst nematode parasitism in crop plants including, but not limited to potato or soybean. Nematode control can thus be obtained by inhibiting receptor

proteins that interact with any nematode CLE peptide. Endogenous plant gene encoding a receptor for a nematode CLE peptide that can be inhibited to provide include functional or structural orthologs of the receptor proteins in any plant species, including but not limited to receptor genes from monocot or dicot plant, or receptor genes selected from the group consisting of a tobacco, cereal, sugar beet, cotton, fruit, fiber, oilseed, potato, rice, corn, soybean, vegetable, and wheat plant.

[00142] Table 2.

Background	Construct	T1 Shoot Phenotypes			
		<i>wus</i> (%)	PNC (%)	WT (%)	Total (#)
Col-0	<i>HgCLE2^{ΔSP}</i>	78	6	15	80
	<i>HsCLE1</i>	30	7	63	156
	<i>HsCLE2</i>	6	5	89	158
<i>clv2-1</i>	<i>HgCLE2^{ΔSP}</i>	0	0	100	96
	<i>HsCLE1</i>	0	0	100	67
	<i>HsCLE2</i>	0	0	100	28
<i>crn-1</i>	<i>HgCLE2^{ΔSP}</i>	0	0	100	85
	<i>HsCLE1</i>	0	0	100	41
	<i>HsCLE2</i>	0	0	100	37

[00143] Table 3. Putative Soybean Receptors Upregulated in Soybean Cyst Nematode Induced Syncytia (5% FDR, LCM W82)

Sequences corresponding to the genes provided below can be obtained from the world wide web (internet) using the identifiers provided in Table 3 from the following internet locations:

- 1) "soybase.org" or soybase.org/gbrowse/cgi-bin/gbrowse/gmax1.01/
- 2) "www.phytozome.net" or www.phytozome.net/cgi-bin/gbrowse/soybean/?name=Gm09
- 3) "www.plantgdb.org" or www.plantgdb.org/GmGDB/ (Assembly version Glyrna1.170 (Apr 2009))
- 4) www.ncbi.nlm.nih.gov/sites/entrez

Affymetrix Probeset	Qvalue	FC dpi 2	Soybean Gene	Best At Hit	E-value	PFAM Description(30)
Putative Soybean Leucine-Rich Repeat Receptor-Like Kinases (LRR-RLK)						
<i>Upregulated</i>						
Gma.1778.1.S1_at	0.000696	11.19428	Glyma08g16220.1	AT3G12610.1	1E-100	Leucine Rich Repeat Leucine Rich Repeat L
GmaAffx.78459.1.S1_at	0.000947	15.6836	Glyma18g42700.1	AT4G08850.1	0	
Gma.17727.3.A1_at	0.001475	1.696212	Glyma13g37580.1	AT4G03390.1	0	Leucine rich repeat N-terminal domain Leu
Gma.9956.1.S1_at	0.001606	5.057105	Glyma15g26790.1	AT5G06860.1	1E-100	Leucine rich repeat N-terminal domain Leu
GmaAffx.3809.1.S1_at	0.001904	1.789864	Glyma18g00610.1	AT3G23750.1	0	
GmaAffx.50347.1.S1_at	0.002786	26.80867	Glyma16g06940.1	AT4G08850.1	0	
GmaAffx.91749.1.S1_s_at	0.003961	12.73998	Glyma15g26790.1	AT5G06860.1	1E-100	Leucine rich repeat N-terminal domain Leu
GmaAffx.49400.1.S1_at	0.006842	2.043868	Glyma07g31970.1	AT1G28340.1	0	Leucine rich repeat N-terminal domain Leu
Gma.17727.1.A1_at	0.007366	2.014757	Glyma13g37580.1	AT4G03390.1	0	Leucine rich repeat N-terminal domain Leu
GmaAffx.47891.1.S1_s_at	0.007905	8.874029	Glyma19g32700.1	AT5G06860.1	1E-112	Leucine rich repeat N-terminal domain Leu
GmaAffx.68769.1.S1_at	0.008658	4.20926	Glyma20g25570.1	AT2G01210.1	0	Leucine rich repeat N-terminal domain Leu
GmaAffx.24529.1.S1_at	0.008905	32.2986	Glyma12g00960.1	AT4G08850.1	0	
GmaAffx.5435.1.A1_at	0.009418	1.368383	Glyma09g13540.1	AT5G51350.1	0	
GmaAffx.65770.1.S1_at	0.012282	1.967988	Glyma18g06670.1	AT3G56050.2	1E-115	Leucine Rich Repeat Leucine Rich Repeat
Gma.9483.1.A1_at	0.016684	2.107688	Glyma19g29370.1	AT3G03770.1	0	Leucine Rich Repeat Leucine Rich Repeat L
Gma.16818.1.S1_s_at	0.017963	2.874609	Glyma11g04700.1	AT5G65700.1	0	
GmaAffx.6107.2.A1_at	0.018015	14.17985	Glyma06g13970.1	AT3G47570.1	0	
GmaAffx.51790.1.S1_at	0.023845	3.00325	Glyma17g18520.1	AT5G67200.1	0	Leucine rich repeat N-terminal domain Leu
Gma.405.1.A1_at	0.026584	16.80313	Glyma11g13970.1	AT3G20820.1	1E-125	Leucine rich repeat N-terminal domain Leu
GmaAffx.24583.1.S1_at	0.02776	1.951831	Glyma05g29150.1	AT4G18640.1	1E-169	Leucine rich repeat N-terminal domain Leu
Gma.16642.1.S1_at	0.034358	1.219904	Glyma12g03370.1	AT1G10850.1	0	Leucine rich repeat N-terminal domain Leu
Gma.4557.1.S1_at	0.040772	1.199444	Glyma08g01640.1	AT1G63430.1	0	Leucine Rich Repeat Leucine Rich Repeat L
Gma.5232.1.A1_at	0.044053	1.576101	Glyma06g36230.1	AT5G53890.1	0	
GmaAffx.18359.1.S1_at	0.047925	4.386757	Glyma03g32270.1	AT1G35710.1	0	
Gma.2806.1.S1_at	0.047969	1.0518	Glyma05g29530.1	AT1G29750.2	0	Leucine Rich Repeat Leucine Rich Repeat L
Gma.15907.1.A1_at	0.048874	1.454241	Glyma18g53970.1	AT2G33490.1	1E-164	Leucine rich repeat N-terminal domain Leu
Other Putative Soybean Receptor-Like Kinases						
<i>Upregulated</i>						
Gma.17579.1.S1_at	0.001029	2.926118	Glyma06g07170.1	AT4G32300.1	0	D-mannose binding lectin Protein kinase do
Gma.10903.1.A1_at	0.001984	3.921658	Glyma08g06620.1	AT5G54590.2	1E-101	Protein kinase domain Protein tyrosine kins
GmaAffx.15130.1.A1_at	0.002275	8.229938	Glyma20g27740.1	AT4G05200.1	0	Domain of unknown function DUF26 Doma
GmaAffx.46387.1.S1_at	0.002957	1.854171	Glyma18g12830.1	AT3G59110.1	0	Protein kinase domain Protein tyrosine kins
Gma.11892.1.S1_at	0.003085	2.491472	Glyma18g47170.1	AT1G01540.2	0	Protein kinase domain Protein tyrosine kins
Gma.13100.2.A1_at	0.003827	2.576388	Glyma16g03650.1	AT1G01540.2	0	Protein kinase domain Protein tyrosine kins
GmaAffx.4463.1.A1_at	0.004197	50.44552	Glyma10g39910.1	AT4G38830.1	0	Domain of unknown function DUF26 Doma
GmaAffx.8689.1.S1_at	0.004457	6.746447	Glyma06g02000.1	AT1G20650.1	1E-134	Protein kinase domain Protein tyrosine kins
Gma.5637.1.S1_at	0.005376	3.595321	Glyma10g28610.1	AT2G47180.1	1E-150	Glycosyl transferase family 8
GmaAffx.37615.1.S1_at	0.006409	3.634731	Glyma17g06430.1	AT2G17220.2	1E-117	Protein kinase domain Protein tyrosine kins
Gma.5416.1.S1_at	0.00667	1.151061	Glyma09g40650.1	AT5G01020.1	0	Protein kinase domain Protein tyrosine kins
GmaAffx.65711.1.S1_at	0.007597	3.149387	Glyma18g45000.1	AT3G08600.1	5E-87	Protein of unknown function (DUF1191)
Gma.8159.1.S1_at	0.007785	2.089075	Glyma14g03290.1	AT3G59110.1	0	Protein kinase domain Protein tyrosine kins
GmaAffx.8355.1.S1_at	0.009487	36.43414	Glyma06g41150.1	AT4G21380.1	0	D-mannose binding lectin S-locus glycoprot
GmaAffx.22464.1.A1_at	0.010743	2.290479	Glyma12g16650.1	AT5G54590.2	1E-176	Protein tyrosine kinase Protein kinase domi
GmaAffx.56567.1.A1_at	0.010919	8.11891	Glyma10g05990.1	AT1G16670.1	6E-90	Protein kinase domain Protein tyrosine kins
GmaAffx.60687.1.S1_at	0.014387	18.28579	Glyma08g46650.1	AT1G11300.1	1E-140	D-mannose binding lectin S-locus glycoprot
GmaAffx.8293.1.S1_at	0.015011	3.375224	Glyma08g22770.1	AT3G15890.1	1E-125	Protein kinase domain Protein tyrosine kins
GmaAffx.76163.1.S1_at	0.0178	1.444014	Glyma09g32390.1	AT3G24550.1	0	Protein tyrosine kinase Protein kinase domi
GmaAffx.87698.1.S1_at	0.020806	2.437942	Glyma12g11840.1	AT4G03390.1	1E-172	Protein tyrosine kinase Protein kinase domi
GmaAffx.91247.1.S1_at	0.024984	2.593136	Glyma15g09490.1	AT4G18950.1	0	Ankyrin repeat Ankyrin repeat Ankyrin rep
GmaAffx.10590.1.S1_s_at	0.026872	4.633997	Glyma06g40480.1	AT4G27290.1	0	D-mannose binding lectin S-locus glycoprot
Gma.4931.1.S1_s_at	0.030153	1.894182	Glyma18g44830.1	AT3G51550.1	0	Protein tyrosine kinase Protein kinase domi
Gma.7158.1.A1_at	0.032121	2.064156	Glyma12g08210.1	AT2G28250.2	1E-165	Protein kinase domain Protein tyrosine kins
Gma.14610.1.A1_at	0.039013	4.911538	Glyma20g37470.1	AT3G05140.1	1E-153	Protein kinase domain Protein tyrosine kins
Gma.3334.1.S1_at	0.042026	2.355478	Glyma02g43710.1	AT2G33580.1	1E-179	LysM domain LysM domain Protein kinase
GmaAffx.93403.1.S1_at	0.042465	3.481746	Glyma05g25370.1	AT5G06870.1	7E-77	Leucine rich repeat N-terminal domain Leu
Gma.8195.2.S1_s_at	0.042848	2.222409	Glyma18g16060.1	AT2G02800.2	1E-171	Protein kinase domain Protein tyrosine kins
GmaAffx.4480.1.S1_at	0.042861	6.312541	Glyma18g06610.1	AT5G58520.1	0	Protein tyrosine kinase Protein kinase domi
Gma.8195.2.S1_at	0.045596	11.62797	Glyma18g16060.1	AT2G02800.2	1E-171	Protein kinase domain Protein tyrosine kins
GmaAffx.19954.2.S1_at	0.045643	4.577217	Glyma10g43060.1	AT4G38470.1	0	ACT domain Protein tyrosine kinase Protei

REFERENCES

- Gao, B.L., Allen, R., Maier, T., Davis, E.L., Baum, T.J., and Hussey, R.S. (2003) The parasitome of the phytonematode *Heterodera glycines*. *Mol. Plant-Microbe Interact*, **16**, 720-726.
- Ithal N, Recknor J, Nettleton D, Maier T, Baum TJ, Mitchum MG. (2007) Developmental transcript profiling of cyst nematode feeding cells in soybean roots. *Mol. Plant-Microbe Interact*, **20**(5): 510-525.
- Lu, S. W., Chen, S., Wang, J., Yu, H., Chronis, D., Mitchum, M. G., and Wang, X. (2009) Structural and functional diversity of CLAVATA3/ESR (CLE)-like genes from the potato cyst nematode *Globodera rostochiensis*. *Mol. Plant-Microbe Interact*, **22**, 1128-1142.
- Mitchum, M. G., Wang, X. and Davis, E. L. (2008) Diverse and conserved roles of CLE peptides. *Curr Opin Plant Biol*, **11**, 75-81.
- Patel, N., Hamamouch, N., Chunying, L., Hussey, R., Mitchum, M., Baum, T., Wang, X., and Davis, E.L. (2008) Similarity and functional analyses of expressed parasitism genes in *Heterodera schachtii* and *Heterodera glycines*. *J Nematol*, **40**, 299-310.
- Wang, J., Lee, C., Replogle, A., Joshi, S., Korkin, D., Hussey, R.S., Baum, T.J., Davis, E.L., Wang, X., and Mitchum, M.G. (2010) Dual roles for the variable domain in protein trafficking and host-specific recognition of *Heterodera glycines* CLE effector proteins. *New Phytol*, doi: 10.1111/j.1469-8137.2010.03300.x
- Wang, J., Replogle, A., Hussey, R.S., Baum, T.J., Wang, X., Davis, E.L., and Mitchum, M.G. (2010) Identification of potential host plant mimics of CLV3/ESR (CLE)-like peptides from the plant-parasitic nematode *Heterodera schachtii*. *Mol. Plant Pathol.* (submitted).
- Wang, X. H., Allen, R., Ding, X. F., Goellner, M., Maier, T., de Boer, J. M., Baum, T.J., Hussey, R.S., Davis, E.L. (2001) Signal peptide-selection of cDNA cloned directly from the esophageal gland cells of the soybean cyst nematode *Heterodera glycines*. *Mol. Plant-Microbe Interact*, **14**, 536-544.

Example 3. Promoter sequences useful in the practice of the Invention

[00144] BARELY ANY MERISTEM (BAM1; At5g65700) – promoter sequence ; SEQ ID

NO:3

tctcattaagcacctacttccacatcttttcttaaagtttcttacataaagctcccttcacacgtgcttaccaaattc
agattgtcaataattcttctgctcaataatttttcgaaattttatgtatttatctaataaaaaatacattggttgagta
tgatatttttgccttaagaaggttgattattctccctatcaaagtcataaaagaagattacaaaacaattgtatggta
aattcatataaatttctgactagtagtttaataattacatatatacaataacttatagatgaaacgagaatgcagaa
atgattatagatagatcagtgacagtgaaactgtagcaaccggcaagaaacctcgtagctggacacacgattacga
tcatgccccagtcctctctgtccagacggctgcattaataacaacgagctagaggggtgttttcgtcttttcgatac
ttatcccaaaaccgacaattctctggttttgactcgaaggctgatttggtcaattcatagcaaccgaacgagcagtc
attcaagtccaaagagctccttagtggtaaaagatgtaattacgtagatgttccatgggtcaagaatgtattcagtc
aaataaatatttgacaaaacttttcggttaatttctaccaccagcaaaattataacttttttctaataattatcaat
cattttcaatctcttttaattttctttttcacttttttttattaattaaagtcaattcacactatacaaaaagaagg
aagtctaaatatttttttactttcatgttgcttttctaacttttataattttgctcttctcaacagattttgctgggt
tttgatttagaaatattattatgtttccagaaatgaattttttatgtcgtctggttcgtatatatatatttgaa
agtgaatttaattcatttgatttttttcttttgatatatgcacaaatcaaataaatatcgaccccatgtggtgattgt
taatgcaaaaaggcacaagtcacaaaaaaacataataattcactattttatttacagacacatgggccaattcata
cggccaattaccataaacctctcttttaagagtggtttccacagtggttaaaactttttgactatccattggaatga
ttgcatctggaccgttcatctacattaattatttggttttttcgcttttaaagcatcaattaacttattacgtatagg
attagattaccaataacgatcttttttagctttttgtcgttttccgataaaaccatacgattaagaatatgacctcttg
tatcttttgagggttttagttaattctttctacatttttttgttggtgctcatacaattatcctgtgtctctcaa
aataaaacaaaaattactctattttatttagtacattacacatgattatttagaaaatgtatattgtggtcatatgaaa
tgagaaattaaaggaaatttgtcaatacttgagaacatcaccattcaaatgtttcaagaacaacatgactccaaaac
aaaataaatgaacctttccctaataatagtagtattctccatcgtaaaagtctaaataatacaatattcatttcgt
caaagcatatgatgtgttggaatcagaattatctgcaaatgtttgaatttcaaatgttagtatcaggctatttttac
tgttttatcaaatatcgtttctctgcaatctatcacttgattgttttatcaaatcagcactagtagtatttgatttt
gtaattttgtgtttgtctacctccaattacttttttagtggttagtagtaataataaaatcacaatctgacgtg
gcacctatatacaattccaaaaacaagtggaaacgaatataaaacaaattcacaccttctcatcttcttctctgtct
tcacttaccttctctctacactcacaccatctcacaaccctaattctctccacacaagagagatagagagaaaca

CACATACATagacacaaagccctttccattgtcctcttcgtttccttttgggtaaacaaccaatctcctgatttt
tacaaaaaaggcaacattttcttagttatatatgcttgtagtgaagaaagatgtgaaagtctgacaagagaacaag
acgaaggaggagtctttctccaagcttccaacattgcagaatctgatgcatatgaaccatttttctctacaaaat
gttgcaaccctagagagcaaaaacaaacatacccataaatcagaaatgatctgacgaaaatcgagttacaatacac
aagagaacatttttttagaattctcagatattaaaaatgacacagaaagctttatgcttttctcttaaaaaga
ctaaacaagttgaaatctagagaaagaactgaccaacctgagacaaacgagagagacttgagagatttcttcggca
cttactattagatctagggttttagataccatttataatagagaaaagtttttagagttgcacaaaacataaaattaatg
tgttagaatgggcctaaagctacaaagctggcctggttttggttttaaaattggttggtttcatggacattttcgaca
tcttcgaacatgttattttttgagactatgcaaacttgaagctcttttactcgagttgaaatcgatgacttatag
tgaaattgtacatttggtttcgatttttcttttacctcttttcttttgagccggtaaaatttggaaatttttctt
catagtggaaatcatatgctggttttttttttatagtaaacggtacaagaatgaatggtaaactttatccaaaaa
aaagaatcatattattttgaaatgatttttaagtaaaattctaggttcaataaacataaagatttgagactaaattaa
aatttcttagtaaaaatatatgattttttttataaaatcctataaaaattagtaataaacataacgattacgtaactg
aatcaaacctcttggtatttttttttctagaaataaagtgtagatttttggaattttgcattaattaataactcttc
ttgggtctgaaaggctaaaaacaaaagggaaccgaaagagaatgttctctctgtctttatcttccacttccacttcc
aggtcgcgttgcttactctccattgcaaagagaggtctctgcgattttctgcaactcaccctgaaaccttctta
atttacttcaactgccgtatacctaaaaacttcatcttttctctctgagctATGATAAAG

aaagatgcataggtcttgcgacataaaaaattccggagctatg
tttcatcggttgctttcacggtctgaagagccaatcaacactaaagaaggacctctaattgg
tctctagcaagtttagcccccaattaagtattgtattgatgttttttgatggttgata
taggctgcatattgggaaattatagtgtattgtattgtgtcgtgttggtgtgtatgtggga
ctatagcatcctgagtttgatgtccagacggttgtaacttgtaagcaattacttatgggt
tttgttcacttcgtattaacgtatttaatttggtggtcgattttggttttgaaatctgtgt
caaaactaagataatttacgtgttaaacagggcccaagtttgaaaagttaattgtcaattt
tcagaccagagtacatattgggtccacttattccattacattcatagttttgagtccttt
gataatagtgttaccatttcaattaggctaatttttttcaacccaagatatttttataa
aaaggaatgtggttcaaactcgaaaaacaagacctaactttgataaaaagcactacagcat
aaagctttttacctttaacaaaaaaaaatataaattttttacaaggaaaaagaagagaaa
gcaattattcttcagacaaaacaaaggaaccacttttgtaggtgtagtagtaatctcacagc
ctaagacaaaagtgcacaaattctcgagactctctctatccaacggtcccatctcact
aacgcctatcaataaacaggacaagatctctcttttggttcagctctcttttagtcctttac
ttccctcaagctcggctactcgatgtcttgccttcggccactcatgaaagcaacgagagct
tcccttttcacgcctacgtggctatgggaccagcttaaccacgaccacctgacatcg
tgggccccactgtaaggcggggaacccccatttttttttggtgtaagtaacggattctcgg
tcatgtcttttttgtaggatatagagagagagactgagagagagagagagtgtgtcacggct
tcgcagatactgtgtattgaaaagagagttctagagagagagagtgtgttatgtgtgtgtgt
gtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgtgt
ggatagttttgtttgtctgtttcatctttcaaccacagatatagtaatatgtgaaaaac
ccctcattgaagttttgttctctgtctctctctttttgggttagcactgagttttggggt
tatttcgagacataccatacaaaagtttgatactttttgtgtcccccttatcaagaaaat
tgtgggggttttttttttttttaataagcttcctttaaattttcaattttttattttggag
gaaaagagtgagaatttcagataagaatctatgagccaatgatattctaattcatctctc
tcgtgaagattttgagttgaattccattttctttctttgtctgtgtgtgtgtgtgtgtgt
ttctcgagaataattgtgtgttttgggagaagggcttcactgtagcattgaaaaagctct
aaacttttctgtgtctttttatgtaaagcttgaaacagcttcacctttctgggttttctca
gattgtgtctaattcttgaaaaaaccttttattcgtagaagcagca

35

Example 4. Sequences of various candidate potato nematode CLE receptor genes are provided.

[00146] Sequences correspond to potato genes analyzed in Figure 14 and as described in the claims and Example 2. The ATG start codon and TGA stop codon are underlined.

>StCRN cDNA (From clone 4-3: (SEQ ID NO:6))

ATCGCATGGTTTCATGGAGCTCCTTGTTTTTTTGTGGAATTTGATGATTTTCCAATTTGGTTATTATGTTGTTT
ATTGTTGTTGTTGAGTCTATTTTGTGGTGGTGCAGGAGGTGTGAGCTTTAAATTGGAGTTGGGGTGATTGTTGTTT
TGTTCCGCCGAGAAGCCATCTCCAGTGAGGTTGGTTGGAGAAGGAGAGAGATGAGGAGAGCAATGAGTAATTTCA
ACTATTAAGATTTCGTTTCAGAAAGAGAAAAAAGAAGAAAATGGTCACATTGTCGTCCTTGTTAACATTTCAGA
GGAGTGAACCCTAACTTGCCGACCCACAGAGAAAAACAACCCTAGTTTCCATGGGGACCTGCTGTAACAGTAGC
ACAGTTCTCAAGCTTTGTTTTTTGTGGCTACAACCTAATCTGTGTGCAATGCCATGGAAGGATACTCAAGGATGAT
ACCTCCTCATCTGATCAGTTTAAGAACAGATTTCAAAGGATTTTTCTGAGTATACTTTTTTGGTATGTTTACAGGA
TTGATTTGTGCACCTTGTTTTTGGCTTGCTTGGAGTTTGTTCGTTACATTAAACAAAGCCCCAATTTCTCAA
GGCCCTGTTGTATTCTCTCCTAAAATTCCATCCAAAACCTCTGCAATCAGCTCTTGCTAATGATACCCAGTTGATA
GGGTCAAGTAGTTCTGGAAAATACTACAGAACTGTTCTTGATAATGGGCTTACTGTTGCAGTTAAGAGAATGGAA
CCTGGTTCTCCACAGTTACATACCAAGTCATTTAAGAGAAGAATACAACACGAACCTGAACTTATTGCTAGTTTG
AGGCATAGGAATTTGATGAGTTTAAGGGCTTATGTTTCGTGAATCGAATACGTTCTTTCTGGTTTACGATTATGTA
AACACTGGCAGTCTTGAAGATGTAATGAACAAAGTTAGGGAAAATCAATTGCAACTTACCTGGGAAGTCAGGCTC
CGAATTGCGATTGGGATTGTTAAGGCTCTTCAGTATCTTCATTTCTCTTGTAACCCACAGTTTTCATCGGAAT
TTGAAACCCACAAATGTAATGTTGGATGCTGAGTTTGAGCCTAGGTTGGCTGATTGTGGTTTGGCTAAAATCATT
CCCACCTTTAAATCTCCCTGCTGCATCAAACCTATGGTCTCCAGAATCATTCCAGAGTTGCAGCAGGTATACCGAT
AAAAGTGATGTATTTAGCTTTGGGGTTATATTGGGTGTTCTATTAACCTGGAAAGTACCCAACAGATCCCTTCTTT
GGGGATACATCTACTGGAGGAAGTCTAGCACGTTGGCTTCAACGCTTGCAAGAACAGGCGATGCTCGAGAAGCA
TTGGATAAGAGTATTCTAGGGGAAGAGGTTGAGGAAGATGAGATGTTAATGGCAGTAAAAATAGCAGCGGTATGC
TTATCAGACATGCCTGCTGATCGACCTTCCAGTGATGAGCTCGTTTCCATGCTCACCCAATTAAATAGCTTCTGA
TTAATTACTTTGGTCGAGAGGGAAAGCAGTCAAGGATTCAAATAATACAAGATCTTTAAGGTTGTTCTTTTGGC
TTTCTAAGGTGATAGTTTGCTGTGTGCTTTTGGTAGTTGAGCAATGCCTTTTGGTTATCGCAATGAGCACGAGTG
TAGTTGGC

>StBam1 (SEQ ID NO:7)

TTCTCACTCTCACTGAGTGAATCTGCAAACCAAACAGTTGGTGGGCATTAGATTAAGGAAGGAAAAATGCGTCTT
CTTTTTCTTCTTCTTCTTGTATGCATTTTACTGACTTTTCCGCCGGTAAACAACCTCGGTTACCGGAATATCAG
GCTTTGCTTGCCCTGAAAACCTGCCATTACCGATGACCCACAGTTAACACTTGCCCTCATGGAACATCTCCACCAGT
CACTGTACGTGGAATGGTGTACGTGCGACACGCATCGTCACGTGACCTCTCTTGATATTTCTGGGTTTAATCTT
ACCGGTACTCTTCCGCCGGAAGTTGGGAATCTTCGTTTCTTACAAAATCTGTCTGTTGCTGTTAACCAGTTTACT
GGACCCATTCTGTTGAAATCTCCTTTATTCCAAATCTCGGTTACCTTAATCTTTCTAATAACATATTCGGGATG
GAATTCCTCCGCAGTTAACCCGTCTGCGTAACCTCCAAGTCCTTGACCTTTACAACAACAATATGACCGGTGAA
CTTCCCCTTGAGGTGTATCAGATGACTAACCTTCGACATCTACACCTCGGCGGGAACCTTTTCGGTGGCCGCATT
CCTCCGGAGTATGGAAGGTTCCCGTCTCTAGAGTACCTCGCAGTTTCAGGCAATGCACCTGGTAGGAGAGATACCA
CCGGAGATTGGAACATCACTACACTTCAGCAGTTGTATGTAGGATACTACAATACCTTCACCGGTGGGATTCCC
CCGGCAATAGGGAACCTTATCGCAGCTCCTCCGGTTTGATGCTGCTAACTGTGGACTTTCCGGGGAGATTCCACCG
GAGATTGGGAAGCTTCAGAACCTTGACACTCTCTTCTGCAAGTGAATTCTCTGTCTGGGTCTTAACTCCGGAG
ATAGGTTATCTGAAGAGCTTGAAATCTTTGGATCTGTGCAATAACATGTTCTCTGGCGAGATACCGCCAACATTT
GCGGAGCTTAAGAATATCACTCTTGTTAATCTTTTTCGGAATAAGCTTTATGGGTCAATACCAGAGTTCATAGAG
GACTTGCCGGAGCTAGAGGTGTTGCAACTTTGGGAAAATAACTTTACGGGAAGCATTCCACAGGGGTTAGGCACA
AAGAGCAAGCTCAAAAATGTTGATCTCAGTTCCAATAAATTGACTGGAAATTTACCCCCAACATGTGTTCCGGT
AACAATCTGCAGACAATTATCACTCTAGGGAACCTCTTGTTTGGCCCAATTCCTGAATCTTTGGGTAGGTGTGAA
TCACTTAATCGGATTAGGATGGGAGAGAATTATCTGAATGGGTCAATTCCAAAGGGGCTCTTAAGCTTGCCACGT
CTGTCAAAATTGAACTTCAGAATAATATTCTCACTGGTACATTTCTCTGATATTTCTTCCAAATCTAATAGTCTT
GGGCAGATTATCCTTTCAAATAATCGCCTAACTGGACCTTTGCCGCCAAGCATTGGAACTTTGCTGTAGCCCAA
AAATTGCTTCTTGATGGGAACAAATTTTCGGGACGAATTCAGCAGAAAATAGGAAAGCTTCAACAGCTATCCAAA
ATTGATTTCACTCACAACAACCTTTCTGGACCCATGGCTCCGGAGATTAGCCAGTGCAAGTTGCTGACTTATGTT
GATCTCAGCAGGAACCAACTTTCCGGTGAGATTCTTCTGAGATCACAGGTATGAGGATACTCAACTACTTGAAC

> StBam2 (from clone 6-4; (SEQ ID NO:8))

37

CACTTCGACTCCCGGAGACACGAAAGACCAGTACCACCATCAGCCATCACCTCAATCTCCTCCACCTGACCTACT
CAGCATATGACCTACAATGTTCCCTTCTAATAGAGGATG

>StER (From 8-16; (SEQ ID NO:9))

GTCGGTAAGTCCAAGAAGTGGTTTTTCAATTCAAAGGAGCTGAGTTAGTGTAACACTTTTGGTTTTGAGTTTTG
ACAGAGACTTGAGTCTCAGAGAACTACCATGGCATCATTTTTACTTCAAAGATGTAATCTTTTCTTTGAGGTTT
TTCTTTCTTTTGGGGTTCTTGATTTTCTTCAGCTTTGGTTCTGTGGTGTCTGATGATGGTTCTGCATTGTTGGAGA
TTAAGAAGTCAATTAGGGACATGGAGAATGTGTTGTATGACTGGACTGATTCTCCTTCATCTGATTACTGTGCCT
GGAGAGGTGTTACCTGTGATAATGTCACCTTCAATGTTGTTCAACTTAATCTTTGAGTTTAAATCTTGATGGGG
AGTTGTCTCCTGCAATTGGACAGCTCAAAGGCCTTATATCTATTGATGTTAGGGGAAATCGCCTTTCTGGCCAGA
TACCAGATGAGATTGGTGACTGTTGAGCACTGAAAACTTGGACCTATCCTTCAATGAGCTTTATGGTGATATTC
CGTTTTCCATATCAAACCTTAAGCAACTGGAATATCTGATTATAAAGAACAATCAGTTGATTGGACCAATTCCAT
CGACATTGTCACAGATCCCCAAGCTTGAAGGTCTTGGACCTGGCTCAAATAGGTTAAGTGGAGAAATTCCTAGGC
TGATATACTGGAATGGAGTCTGTCAGTATTTGGGACTGCGTGGCAACAACCTTGGGTGGATCACTTTCTCCTGATA
TGTGTCAGCTCACCGGCCTGTGGTACTTTGATGTTGGAACAATAGTTTGACTGGTTCCATTCCCTCAAAATATTG
GCAACTGTACTGCTTTCCAGGTTCTAGATTTGTCTTATAATGACTTGACTGGAGAGATTCCCTTTCAACATTGGTT
TCCTGCAAGTAGCGACCTTGTCTTTGCAAGGTAATCGCCTTTGAGGGCAGATCCCTTCTGTCTATTGGATTGATGC
AAGCTCTTGCAAGTTTGGACTTGAGCTGCAATATGTTGAGTGGAACAATTCCTTCAATTCTTGGGAATTTGACTT
ACACAGAAAAATGTATCTACATGGGAACAAGCTATCTGGTTCCATTCCCTCCAGAGCTGGGAAATATGACAAAGC
TTCACCTACTTAGAATTGAATGATAACCACTTACTGGACGCATACCACCAGAACTTGGAAAGCTGACGGAGTTGT
TTGACTTAAATGCTGCAACAACCACTTGTATGGGCCCATTCCTTCCAATCTTAGCTCATGTACCAATTTGAATA
GTCTCAACGTTTCATGGAAACAATTTGAATGGTACGATTCCACCTGCTTTTCAAAGCTGGAAAGTATGACCTATC
TTAATCTCTCCTCCAACAACCTCAAAGGCCAATTTCAATTGAGCTTTCTCGTATTGGGAATGTAGATACACTGG
ACTTGTCTCAACAACAGGATCAGTGGTCTTATACCTTTGTCCCTCGGTGATTGGAACATCTTCTTAACTGAACT
TGAGCAAGAACGAAATAAATGGAACCTTGCCAGCTAAATTTGGCAATTTAAGGAGCATCATGGAGATTGATCTGT
CAAGCAATCACCTCTCTGGTCCCTTGCCCTCAGGAACCTTGGTCAGCTTCCAAATCTGTACTTGCTGAAACTGGAAA
ACAACAATTTATCAGGCGATGTGATGTCCTTAGCCAGTTGTCTCAGTCTAAATGTCTCTAAATGTCTCGTACAATA
ATCTGGGAGGGAATATTCCAACAGGCAATAATTTCTCTAGATTTTACCAGACAGCTTCATAGGAAATCCAGATC
TGTGTGGGTATTGGCTCACTTCTCCTTGTCTGTCATCTCATCCAGCAGAGCGAGTTTCAATTTCTAAAGCTGCTA
TACTTGGTATTGCTCTGGGTGGCTCGGTGATTCTTCTGATGATACTAGTAGCAGCATGCCGGCCACAGAATCCTG
CACCTTTCATGGAAGGATCTATTGATAAACCAGTTTATTACTCATCTCCAAAGCTTGTGATCCTTCATATGAACA
TGGCACTTCATGTTTACGAGGACATTATGAGGATGACTGAGAACCTGAGTGAGAAGTATATAATTGGTTGTGGAG
CATCAAGTACGGTATATAAATGTGTTTTGAAAAATTGCAAGCCTGTAGCTATCAAGAAATTGTACTCTCACAACC
CGCAATACTTGAAGGAATTTGAGACTGAACTTGAGACAGTTGGGAGTATTAAGCATCGTAATCTTGTCTGCCTCC
AAGGATATTCTCTTTCTCCATCTGGCCATCTTCTTTTCTATGACTACATGGAAAATGGTAGCCTTTGGGATTTGC
TTCATGGTCTCTACAACAAGAAGAAAAAGCTTGATTGGGTTACTCGCCTTCGAATTGCATTGGGATCAGCTCAAG
GGCTTGCAATCTTACCATGATTGTAGCCCTCGAATTATCCACCGTGATGTTAAATCATCAAATATCTTGTGG
ACAAAGACTTTGAGGCTCATCTGACTGATTTTGGCATTGCCAAAAGCTTATGCATATCAAAGACCTATACGTCCA
CATACTTATGGGAACCATTTGGTTACATTGATCCAGAGTATGCTCGCACTTCTCGCTTGACAGAGAAGTCTGATG
TTTACAGCTATGGAATTGTTCTATTGGAATTGCTCACTGGAAGGAAGCTGTAGATAATGAGTCTAATCTACACC
ATATGATTCTAACTAAGGTAGCAACAATGCTGTAATTGGAACAGTGGATCCTGAGATCAGGCACATGCAAAAG
ATCTTGCAAGATGTGAAGAAGGTTTTTTCAGCTTGCCCTTCTATGTTCCAAAAGACAGCCTGCTGAGAGACCAACA
TGCATGAAGTGGCAAGAGTACTTGAAAGCCTAATACCCGTCAGTGAATGAAACAGCCAAATCCAACGCTCTCAC
TTGCATTACTTCCATCTGCTAAGGTACCTTGTTACATGGATGAATATGTCAACCTCAAGACACCCCATCTAGTGA
ATTGTTTCATCCATGAGCATTTGAGATGCTCAACTTTTCTGAAAGTTTGGAGAGGTATATCCAGAATAGTGGCT
GAAAATAACATGAGTAGATTTCTTGGGATTGTGTAAAAAATGTAGTGCCATTATAATATTATTATTGTAGGTAG
TTGTTGTAAGATGATGCATGCAATAGTGGTCCAGTCTACTTTTTCCACTACATAGGTCTAGTGTGTGTAAAAATA
TTTCACTTTTTTACCATGATGAAATTGGAAGAGGTAGCACTTGGTAGAGTATTGTAATATTGGTTTTTGGGACTGA
TGCTGAGTATGGACTATACTGTCTGTAGGATTTTTTGGCACACACTTTGAGGTGGCCTTAGCA

>StCLV1 (From clv1 clone 11-1 041710; (SEQ ID NO:10))

AGACTAACTAACAGTGAATAATGTCACCTCCCCAAAAAATATCCCTTTTCTCCAAATTTTCATTTTTTTTGT
TTTCTCCATTAATGCAAACCTCTGATCTTGAAACCCTTTTGAAGCTCAAAGAATCCATGGTTGCTCCTGGAACCTC
TGCACCTCTTGATTGGAACAACAACAATAATACCCTTTTTCCCATGTTCTTTTTCTGGTGTTACATGTAACAA
TAACCCTCATGTTATATCTATAACATCACTAATGTTCTCTATTTGGTACTATTCCACCTGAAATTGGTCTTTT
ACAAAATCTTGAAAATCTTATTATTTTTTGGTGATAATATTACTGGTACACTCCCTTTAGAAAATGTCACAACCTTTC
TTCTATTAAACATGTTAATCTTTCTTACAACAACCTTTTCTGGTCCTTTTCTAGAGAAATCTTGTGGGGTTAAT
AAAGCTTGAATCTTTTGACATTTATAACAACAATTTCACTGGTGAACCTTCTACTGAGTTTGTAAGTTGAAAAA

GTTGGAACTTTACATCTTGGTGGAACTATTTTCATGGTGAAATACCAGAAGTTTATTCTCATATTGTAAGTTT
 AAAGTGGTTGGGTTTAGAGGGAAATTCATACTGGGAAAATACCAAAGAGTTTGGTTTTGTACCAAATCTTGA
 AGAAGTTAGATTGGGCTATTATAATAGTTATGAAGGGGGTATTCCATCTGAGTTTGGTAATATTAGTACACTTAA
 ACTTCTTGATCTTGGAAATTGTAATCTTGATGGTGAAGTTCTCCAAAGTCTTGGAAATTTGAAGAAGTTGCATAC
 TTTGTTTCTACAAGTGAACAGACTTACAGGTGCGATACCTTCTGAACTATCTGGTTTAGAGAGTTTGATGTCGTT
 TGATTTGTCTTTTAATCAACTGACCGGAGAAATACCAGAGAGTTTGTGAAGTTGCAGAAATTTGACATTGATTAA
 CTTGTTTAGAAACAATTTGCATGGTCCAATTTCCCCCTTTTATTGGTGACCTTCCAAATCTTGAAGTGTGTCAGAT
 TTGGGGAAACAATTTTACTCTTGAATTGCCGAAAATCTTGGGCGTAACGGGAGGTTTGTGTTTCTTGATATTTT
 TATTAATCATTTTACTGGAAGGATACCACTGATTTGTGTAGAGGAGGGGAAGTTAAAGACACTGATTCTAATGGA
 AAATTACTTCTTTGGTCCAATTCCTGAACAATTTGGTGAGTGCAAAATCGCTTGCTCGAATTCGCGTTAGGAAGAA
 TTACTTAAATGGTACTATTCCAGCTGGTTTTTTCAAGTTACCTGCATTGGATATGCTTGAACCTTGACAACAATA
 TTTCACTGGTGAGCTGCCAACGGAGATAAACCGCAATAATCTCACTAACTTGTACTTTCCAACAACCTGGATCAC
 GGGGAACATTCTCCATCATTAGGGAACTTGAAGAATCTAGTCACTCTATCACTTGATATGAACAGGTTATCTGG
 TGAAATTCCTCAAGAAATTGCGAGTTTGAATAAACTCGTGACCATCAACTTGAGTGGAACAATTTAACAGGTGA
 AATCCCAAGTTCAATTGCGCTTTGTTTCAAGAGCTTGAACGCTTGAACCTTGTCAAGAAACCAACTGAGTGGCGCCATTCC
 TGGAGAAGTCGGAGTGATGAATGGCTTGACAGTTTGTAGATCTTTCTTACAATGATCTTTCTGGAAGGAGACCGAC
 CAACGGACAATAAGTTCTTCAATGACACTTATTTTGTAGGAAATCCAAAACCTCTGTTTACCTCATGCTACTTT
 TTGCCGCTCAGCCTCCAATTCACCACAAAACGCGCTCAAAATCCATGCTGGGAAGTTCACAACCTATCCAATTGGT
 GATTACAATAATCATCTTAGTCACTGTTGCATTGCTGTTGGCAGTTACCGTGTGTTTCATCAAGAAGGAAAAGTT
 CAAGAATTCGAACTTTGGAAGTTAACAGCATTCCAGAACTTGATTTTCAAGAGCTGAGGATGTTTTGGAGTGT
 AAAAGAGGAGAACATAATTGGGAAAGGTGGAGCTGGCGTTGTGTACCGAGGGTCTATGTCAAATGGCATCGACGT
 TGCAATTAAGAACTTGTAGGCCGAGGAACTGGACACCATGATCATGGATTCTCAGCTGAAATCCAAACACTAGG
 AAGGATCAGGCACAGAAACATCGTACGATTACTAGGATATGTCTCAAACAAAGACACAACTTGTGTTGTACGA
 ATACGTGTCAATGGGAGCTTAGGTGAAATGTTACATGGTGCCAAAGGAGCACATTTGAAATGGGAGACGAGGTA
 CCGTATTGCTGTGGAAGCTGCAAGGGATTGTGTTATTTGCACCATGATTGTTTCGCTTCGATTATTCATAGAGA
 TGTCAAGTCCAATAATATTCCGCTGGATTCCGATTACGAGGCTCATGTTGCTGATTTTGGCCTAGCCAAATCTT
 GCAGGATGCTGGTGCATCAGAGTGCATGTCTCTATTGCTGGCTCATATGGTTACATTGCTCCAGAGTATGCATA
 CACATTGAAAGTTGACCAAAAGAGTGATGTATACAGTTTTTGGAGTTGTACTGTTGGAACCTTATCACAGGTCACAA
 GCCAGTTGGTGAATTCGGGGACGGTGTAGATATAGTCAGATGGGTAAATAAAACAATGTCCGAATTTATCTCAGCC
 GTCTGATGCAGCCTCAGTTTTAGCAGTCGTTGACTCGAGGCTACATAGTTACCCTCTTGCAAGTGTGTTGTAATTT
 GTTCAAGATTGCTATAATGTGTGTTGAAGAAGAGAGTTGTGCTAGGCCTACTATGAGGGAAAGTTGTTTACATGCT
 TACAAATCTTCTCAGTCTACTACTACTACTACTCTCTTGGCCCTTGAAATTGCAACGATATCAAGTG
 TCTGTTGAAACTCGTGGAGTTTGGAGCCGGGAACACGAGTCTCATGAGTCTATTTGGGTACGGGGAAACAA

>StCLV2 (From clv2-7; (SEQ ID NO:11))

ATGGCAGAATCAGTTCTTGAACCTTGTAACCTCTTATTCTTCAAAGTTTCAATCTTTATCCTATTCTTCTTG
 ATTTTCCCTTTCTTGAAACCAATTTTATCTGCAATTTCTCTTTCTTTTGATACTAATGCAACTGAGGCTGTCAAT
 CTTGAAACAGAAGGAGGACATGGGTTTGTCTTCTTCAAGTTTACAGTTTTCGAGAAACCCCTTTACCAAGCTGG
 GATGTCATGTTTCTCTATCAAACTGGACTGGTGTACCCGGTCTAACCAGACCGGAGGTCAGTGGACTTAAC
 CTCACAAGGTTTAACTTGTGAGGACAGGTTTCTCTTGTGTTTGTGTAATCTTACTTTTCTTGAACCCCTTGTGTTG
 TCTCATAATAGCTTTAACAATTCAATACCTTCTTGTGTTTATGGAAGTTGTGGAGCCTTAAGACCTTAGATCTTAGC
 TATAATATGCTTACTCTTCTTATTCTTAGTACATTTGCAACAACATATGAGTAAGTTAATTGAGCTTGACCTTAGT
 CATAACATGTTGAGTGATGAAATCCCAATGTGGATAGGGAATGTCTCAATGTCACTTGAAAACTTAACTTAGGG
 TTTAATAGTTTTTATGAGGATATACCTAAGAGCTTGTGAAATTTGATGTCTTTGAAGTATCTTGACTTGTCTCAC
 AATAGTTTGTAGGGAAATGTGGGTGATTTTAACCAAGAATTGGTCTCACTTAATCTTGAGTCTAATTTATTATCG
 GGTACTTTGCCTTGTGTTTATATTCTGCAAGGGAATCACTTACACTTCTTAATTTAGCAAACAATTGATTTCTTGA
 GGTATACCAACGTGTATCTCGAGTCTTGGGGGTTTGACACAGCTCAACTTGTACGTAATGAATTACGATATGGT
 ATCTCGCTAGACTGGTTTTTTTCAAGAGAGTTATGTTTGTGAGCTTGAGTTATAATGAGCTATCAGGGAAGATT
 CCAAGTAGGATTGTTGAGGCATCGGACAAGTCTGGACTTCTACTTCTTGACCTGTCTCACAATCAGTTCTCTGGT
 AATATTCTGTAAACGATAACAGAATTGAAGAGCTTGCAAGCATTGTTTCTGTCTTATAATCTTCTGTGGGCGAA
 ATACCAGAAAGGATTGGTAATTTGACCTATCTACAGGTGATTGATCTCTCACATAACTTCTCACCAGGCTCGATT
 CCTTTGAACATCGTAGGATGTTTCCAACCTACTGGTGCTGATACTAAACAGTAATAATCTTTCTGGGGAATTCAG
 CCAGTGCTTGATGCGTTGGATAGTCTTAAGATATTTGATATAGGAAACAACAAGATTTCTGGTGAGATCCCACTG
 ACATTTGCCAGGCTGCAAGTCTGTTGAAGTTGTTGACTTGAGCTCTAACAATCTCTCAGGCTCTCTAAATGTTGCA
 ATAACCAATGGTGAACCTCAAAATCTCTCTCTGCTCGGAACAAGTTCAAGTGGATCTCTGCCAAGTTGGTTG
 TTTACAAATTCAGGCTATTCTAGTCTGATTTTCTGGAACAAGTTCTCGGGATATATACCAGATGGTAACCTTT
 AACACTAGTCCAAATTTCTACAACGGCGACATTAGGAAAAACCTTCTGTCAGTACCATCAATTTTCACTCGAAGC
 CTGGATATCAAACTTTCACTCATTTGCTGATGAAACTAGTTTGGAGCTTCAACTATAACCTGACAACCACAATTGGA

ATTGATCTGTCTGACAATTTGCTTCATGGTGAAATTCCAGAGGGTCTGTTTCGGATTACATGGTTTTGGAGTACCTT
 AATTTGTCATACAATTTTCTTAATGGTCCAGTTCCAGGGAGTTTAGGGAGTTGCAGAAGCTAAAAGCACCTTGAT
 TTATCACATAATTCTTTATCTGGCCACATCCCTGAAAAATTACTGTCTCAGAAAATTTGACAGTTTTAAATCTG
 TCTTATAATTGTTTTCTCTGGTGTATTCCGACAAAGCGAGGTATTGGAAAATTTCTGGAGCATTTGCTGGGAAT
 CCAGACTTATGTATGGAATCATCTGGTAATGTCTGTCAAAGAACTTTGCCTGTAGAGCCAGGGAAGAAATTTGAA
 GAGGAAATGGAAGAGGGACCATTATCAGTTTGGATTTTCTGTATAAGTGCTTTAGTTAGCTTCTATGTTGGCATT
 GTTGTTTTATTTTGTTCATCTCGAACAAGAAGCTGTATTCTGCAACAAAAAGTTTAGCAGGTTGA

>StACR4 (From ACR4-3; SEQ ID NO:12)

ATGTCTTCAATTGCTATTTTCATATGGTGAATATGGTTCTGTTTTTTGTGGGTGAAGTCAGATGGATCTCATTTG
 GTCAGCTGCTATGGCTCTACTTCTTCTATAATATATTCAACTCCAGCTCATTTCCCTTTTTATTGGTCTTACTGCT
 GGAAATGGCTTTGTATGTGGACTTTTGATGGATTCTTACCAGCCTTATTGTTGGGGGAAAAGTAATTTTGTACAA
 ATGGGAGTGCCTCAGCCTATGATCAAAGGGTCTCAATACTTGGAAAATATCTGCAGGTGAAAATCATTTGTGTGGA
 CTAAGGCAACCTTTAATGGGGAAGCATAGGAACACTTCACTTGTGATTGCTGGGGTTATAACATGACCACAAAT
 AATGAGTTTGAAGGTGAGATCCACTCTATTTAGCTGGTCTGAGTTTAATTGTGCTTTGTTTTCTGTCAATAAA
 AGTGTTTTATGTTGGGGGGATGAACTAGTAGCCAGGTATTACCTAGCACCAAAAGATTTGAGATTTATTAAG
 ATTGCAGCTGGGGGATATCATGTTTGTGGGATCCTAGAAGGGGTGAATTCTCAAGTGATTGCTGGGGAAGGAGC
 ATGAACCTTGAAGAAGAATTCTCTGTTGCTCAACTCAATGTTGAATTGGCAGCCCTAGTGATCCAATTATATCT
 GTTGTGGTGGTGAAGTTTTCATGCTTGTGGGATAGGAGCTATGACCGTCATGTCGTTTGCTGGGGTTACAGAGTT
 GAGAAAAGCACACCACCTCCTAGTGGAGTTAGGCTTTATGAGATAGCAGCTGGTGACTTCACTTGTGGTATC
 CTTGCGGAAATTTCACTTTTGCCTGTTTGTGGGGGTTTGGTTTTCCCTCATCGCTACCCTCGCTGTTTCTCCT
 GGAGTCTGCAAGCCTAGACCCTGTGCATCTGGCTTCTATGAGTTTAACAACGGAAGTGCAACTTGCAAGTCTCCT
 GATTCTCGCATTTGCCTTCCCTGCACCAATGGCTGCCCTGCTGAAATGTATCAACAGGTTCAATGCACCTTCATCT
 ACGGACAGTCAGTGCACGTATAATTGTTCAAGTTGTACCTCTGTTGACTGCCTAACAGCTGTTCTACTGCTATT
 TCTGGGAAGAAGAACGCTAAATTTTGGTCACTCCAGTTACCAGTAATTGTTGCTGAGGTTGCATTTGCAGTATTC
 TTGGTGAGTGTTGTATCTCTAACTTCGATCGTATATGTTTCGTACAAAATTAAGGAAGTGTAGATGTTTCAGGGAAA
 GGTCTAGTCTTAGGAAGAATGGTACTTTCCCAAAGGAAATTGCTAAAGATAGGGCTGATTTGGATGATCTTAAA
 ATAAGGAGAGCTCAGATGTTTACTTATGAAGATCTTGAGAGAGCAACTGAGGGATTCAAAGAAGAATCACAAGTT
 GGAAAGGGTAGCTTTTTCGTGTGTTTTCAAGGGCGTTTGAAGGACGGTACTGTGGTTGCTGTCAAGAGGGCTATA
 ATGTCATCTGACATGAAGAAGAATTCAAAGGAGTTCCACAATGAGCTAGACTTGCTGTCCAGGTTGAATCATGCT
 CATTTGCTCAATTTGCTAGGTTATTGTGAAGAAGGTGGAGAGAGACTTCTAGTTTATGAGTACATGGCTAATGAC
 TCGTTGCATGAACATCTACATGGGAAAAAGAAGGAGCAATTGGATTGGATAAGAAGGGTAACCATTCAGTCCAA
 GCTGCTCGGGGAATCGAATATTTGCATGGTTATGCATGTCCACCTGTGATTACAGAGACATCAAGTCTCACAAC
 ATCCTTATAGATGAAGAACACAATGCTCGAGTAGCTGATTTTGGGCTTTCCTTGCTTGGACCTGCTAATAGCAGT
 TCCCCATTAGCTGAGTTACCAGCAGGGACACTTGGGTACCTTGATCCCGAGTACTACAGACTACATTATCTTACA
 ACCAATCTGATGTCTATAGCTTTGGTGTTTTGTCTTTTGGAAATTTCTAGTGGTTCGGAAAGCTATTGACATGCAA
 TACGATGAAGGGAACATAGTGAATGGGCAGTCCCATTAATCAAAGCTGGTGAAATAGAGGCAATACTGGATCCA
 GTTTTGAATACCTTCTGATGCTGAAGCTCTTAGAAGAATCGCTAATATAGCCAGCAAATGCGTGAGGATGAGA
 GGGAAAGAGAGGCCGTCAATGGATAAAGTAACAACAGCTTTGGAGAGAGCACTTGCTCAATTGATGGGTAGTCCA
 AGCAATGACCAGCCTATCTTGCCAACAGAGGTTGTTCTAGGAAGCAGCAGAATGCACAAGAAGTCTCATCAAAT
 CGATCAACATCAGAAACAACAGATGTTGCAGAACTGAGGATCAGTGGTATGTCGAATTCAGAGCTCCTTCGTGG
 ATTACATTCCCAAGTGTAGCATCATCTCAGAGAAGAAAGTCTTCAAGTATCGGACGCAGATGTTGAAGCAAAGAAT
 TTAGAAAGTAGGAACTGTGGAATGGAAGTGTGAGATTGAGAAGTTTGAAGAAGAATTTGGACCAGCTTCTCCT
 CATGAACATTTGTTCTTGAAACACAACCTCTAA

StERL2 (SEQ ID NO:13)

ATGGAGGTGAGCGTGAAGATGAAATTCCTCCACAGCACTACTGTTGGCTCTATTGCTT
 GTTTTACCGATCGTTTTAGCTCTCACCGAAGAAGGCAAAGCATTAATGTCGATCAAGGCA
 TCGTTTAGCAACGTGGCAAACGTGTTGCTAGATTGGGATGATGTCCACGACGAGGATTTT
 TGCTCATGGCGAGGCGTGTGTGTGGAATTTCTCCATTTCCGTCGTTGCCCTTGATTTG
 TCTGATAACTTGCTCTATGGAGATATACCTTTCTCAATTTCTAAGCTCAAGCAGCTAGAG
 TTATTGAACCTGAAAAACAACAGTTGTCTGGCCCAATCCCATCCACATTAACCTCAAATC
 CCTAATCTAAAGACGCTTGGCTTAAGAGGCAACATGTTGACAGGAACATTGTCCCCCTGAT
 ATGTGCCAGTTGACTGGTTTTGTGTGATGTGCGGGGCAATAACCTCAGTGGAAATAGTTCCA
 GATAATATTGGGAATTGTACAAGTTTTGAGATACTGGATATCTCATACAATCAGATAACT
 GGAGAAATTCCTACAATATTGGATTTTTACAAGTGGCTACCTTGTCTTTGCAAGGAAAT
 AGGCTAACTGGGAAGATCCCAGAAGTGATTGGTCTAATGCAAGCTCTTGCTGTTCTGGAC
 TTGAGTGAAAATGAGTTGGTGGGACCAATTCCTCCAATCTTTGGCAATTTATCCTACACT
 GGGAACTGTACCTGCACGGCAACAACTTACAGGGCCAATACCACCGAGCTAGGAAAT

ATGTCTAAACTTAGTTACTTGCAATTAAATGACAATCAGCTAATGGGGCGAATTCCCTCC
 GAACTTGGCAAACCTGGACCAGTTATTTGAATTGAATCTTGCAAATAACAAGTTGGAGGGA
 CCAATTCCTGAAAATATCAGCTCCTGCTCGGCATTGAATCAACTTAATGTTTCATGGCAAC
 AACTTAAACGGGTCCATTCTTCAGGGTTTAAGAATCTTGAGAGCCTGACATATCTGGAT
 CTCTCTGGCAATGAATTTTCTGGGTCTATCCCTGGTTCTATTGGAGATTGGAGCATCTC
 CTCACACTGAATCTGAGCAGCAATCATCTTGATGGACAAATTCCTGTAGAATTGGCAAT
 CTGAAAAGTATACAGACCATTGATATGTCATGCAACAAGATTCTGGTGCCATCCCAAAA
 GAGCTGGGACAGCTGCAGACCATTGATAACTCTGAATATATCTACAACAATTTTAGTGGT
 GTTGTTCCTCTTTACGGAATTTCTCGCGGTTTGACCTGACAGCTTTTGGGGAACCCA
 TTTCTTTGTGGCAACTGGAAAGGCTCAATATGTGACCCCTATGCACCAAGGTCTAACGCC
 TTGTTCTCTAGAACAGCTGTTGTTTGCACAGCATTGGGTTTCATAGCACTCTTATCCATG
 GTTATAGTGGCAGTGTACAAGTCCAACCAACCACACCAGTTTCTGAAGGGGCCTAAGACC
 AATCAAGGTTCCCCCAAACCTTGTGGTTCTTCACATGGATATGGCCATCCATACATATGAT
 GACATTATGAGGATTACTGAGAACTTCAATGAGAAATTCATCATAGGATATGGTGCTTCC
 AGCACTGTATATAAATGTGTTTTGAAAGATTCCCGACCGATTGCCGTTAAGCGACTTTAC
 ACTACACATCCGCACAGCTTGCAGAGATTTGAGACTGAACTGGAGACCATTGGAAGCATC
 AGGCATAGAAACCTTGTTAGCTTGCATGGTTACTCCCTTTCCCTCATGGGAATCTCCTT
 TGTTACGACTACTTGGAGAATGGTTCACTCTGGGATCTACTTCATGGGCCTTCCAAAAAG
 GTGAAGCTTGACTGGGAAACACGTCTGAGGATTGCTGTTGGTGCTGCTCAGGGTCTTGCT
 TATCTTCACCACGATTGCAACCCAAGAATCATCCACAGAGATGTGAAATCTTCAAACATT
 CTTGTTGATGAAAATTTTGGAGCTCATCTTTCTGATTTTGGGGTTGCAAAATGCATCCCT
 TCTGCAAAAACCTCATGCATCAACTTTGGTGTGGGCACCATAGGTTACATTGACCCTGAG
 TATGCCAGGACTTCCAGGTAACTGAAAAATCAGACGTCTACAGCTTGGCATTGTTCTC
 CTAGAGCTTTTGACAGGAAAGAAACCGGTTGATAATGACTTGAACCTGCATCAGCTGATA
 ATGTCAAAGGCGGATGATAACACCGTGATGGATGCTGTTGATCCTGAGGTATCTGTTACA
 TGTATGGACTTAACACATGTGAGGAAAACCTTTTTCAGCTTGCCTGCTGTGCACAAAAAGA
 TTTCCATGTGAGAGGCCAACGATGCATGAGGTTGCTAGGGTACTTGTTCCTTGCTTCCT
 CCCCCGCCAACCAAACCTTGTGTTAGACCCACCTCCCAAATCCATTGATTATACAAAGTTT
 GTGATTGGGAAAGGACTACCGCAAGTTCAGCAGGGTGATGATTCTCCGAAGCACAGTGG
 CTTTTTCTTAGATATTTAGCTGCTGCACTGGTTCAATGGAACGAGTTTGAAGATGGTGAA
 GAATTGCATCTATGTTGA

Example 5. Inhibition of Plant Responses to Nematode CLE Peptides and Inhibition of Nematode Infections by Inhibition of a Plant CLV2, CRN1, and /or BAM1 Gene

[00147] Mutant *Arabidopsis* plants i) homozygous for the recessive *bam1-3* mutation; ii) homozygous for the recessive *clv2-6* mutation; iii) homozygous for the recessive *crn-1* mutation; iv) homozygous for both the recessive *clv2-6* and *bam1-3* mutations; and v) homozygous for both the recessive *crn-1* and *bam1-3* mutations were exposed to the cyst nematode *Heterodera schachtii* and assayed for a response as described in Example 1. More specifically, sterilized receptor mutants were plated in 12-well Falcon tissue culture plates (BD Biosciences) containing modified Knop's medium with 0.8% Daishin agar in a randomized block design. Plants were grown at 24°C with a 12 hour photoperiod. Fourteen days after germination, seedlings were inoculated with 200 surface-sterilized BCN (Beet Cyst Nematodes; i.e. *Heterodera schachtii*) J2. J4 females were counted at 14 days post-inoculation (dpi) and adult females were counted at 30 dpi. The average values were calculated and significant differences were determined by using Student's *t* test ($P < 0.05$).

To measure syncytia size, receptor mutants were germinated on modified Knop's medium in vertical square plates and inoculated at 10 days after germination with 10 surface-sterilized BCN J2. At 14 dpi (days post infection) and 30 dpi, syncytia that were transparent and only fed upon by only one nematode were visualized with a Nikon Eclipse TS100 inverted microscope. Area of syncytia was measured using Adobe Photoshop CS5 and significant differences were determined by using Student's *t* test ($P < 0.05$). In these experiments, the *bam1-3* mutant exhibited a 25% reduction in nematode infection that was similar to reductions obtained with *clv2-6* mutants. The *clv2-6*, *bam1-3* double mutant and the *crn-1*, *bam1-3* double mutant showed a 35% and 50% reduction in nematode infection respectively (Figure 15).

Example 6. Use of a pCLV1 promoter to drive expression of heterologous genes in nematode infected roots.

[00148] The promoter for the *Arabidopsis* CLV1 gene was operably linked to a beta-glucuronidase gene (GUS) and introduced into transgenic *Arabidopsis* plants. The transgenic plants were then infected with BCN and expression of the GUS observed. It was determined that the pCLV1 promoter can provide for expression in the root vasculature uninfected plants as well as upregulation of expression at sites of BCN infection in plant roots (Figure 16). The sequence of the pCLV1 promoter is provided in Table 4.

[00149] Table 4.

Arabidopsis thaliana Clv1 promoter and 5'UTR (SEQ ID NO: 14)	gaagaccaaggcccaacgacactactggtcca ggttgactatgaacaaaagaactagattttttcc cctacatttaagaaaatacttgatgaagatgtg gtgccttttcataagatctaaaaagttcaaacttta cgatggaacaaaaagtgaagggtgaagtaagg gtcatttgggattgagaagttcttcgtccaaaatca ttgcatgagttgaatagatttgggattaaagctgcc aatacaagaggattcggtaatgactgaagcaaaa agcccagcagggccattaggcaaacaccagttt ccaagacggatttgtgaagaccacttatgacac aagttgtcttactatcatcatcttcttctacttcta ctactactttttagccttgcgttttatcattaacatg attgacaagactatgacctatatacttattattatca ttgctctctattgtttatattgattattacttttgagat tttcaatggtttatcttaactaaacattataaattag gaaacaagcttagtagaagtaaaagtattattcta tgctaaagtacattgattagtagagtgtgaattgtg tatacagataatctataaacaattgggtgcatctgtat ataaaactttatgattttattgtatttaataagtata tgaattgggtacctaacttctaaacagttccaaatt tattcttaaatcaaattgcatatgatttttaaatatttg agacgattttattataacgcaacaacagagtaa
---	---

aagaagcatatgttgcaaattgtactatggcaagt
tcaaatacgaacattttgtgaaaatcaaacatgtg
aaccaagcttctacagtttaattcccttctgtataatt
taattcaacaaatttattgatatccatctagaaattg
gtccaaagttcttccacccttgagtcatttagtgata
aagatgacatgatttttggtgataaatttccatcggt
gctatatgtcgttatattattctctatatgtatattata
ctattacatcagaaaataatccaaagtttagagat
tctttttacaataataaaattcccacttactaaaaa
gagctcctttctgctgaagagaacctaaccctta
ttcccaaagttcattgagtttagagcatttccagcga
atcacataagagatgctctcttctcatcactaattg
acatctcattgttttaagggtgcactgtacctgttg
atctgattctcaatccacttaagttaaaccaaatag
acacgagaaaaaagcacatttattgttgtaagt
atgcataatttccagcgttacttcttaataatgtata
tcataagataatatctaaaagagaatgcacaaa
agattattaatatgagaaattcgctgccatttagga
aggacctttataccaatataccgcaataataatag
aacattggtccccaagtgatgtcaacccaagtg
tatagatttcttaagattaaaatccctttgttgcta
aagcacctgatataattttctatcaaactaaaaaaaa
ttgttagcgggatgaagatatattcgccaagaacc
atagtgtgtataacggcagaccattaattcaca
actattatttttattgttagattgtgatagaatcgat
ttgatgtggcagaatcgatctgtaaaaactgcttt
aagggtgcttactataattaagaaagattcactat
gtaagttaagcatattaatcatatcattcggcctaatt
tcattaggaatatattgtctattcgtttgccatcattaa
caacaaaattgacacgttttcagccaaaagtatta
acaactaaacctaataaactcaaacattaaatagtt
tttagtatcttttagttcaaacctagtgattgtcctaata
tcaacactacgaacgaattatatacattgaactttt
ttctgaatcaccgattacaaaacgaatataatttgg
tatcggcagttgctattaattgatcggttggactttg
gactaatcacgatcaaacttaaatggaccgaag
tgaataaatccctaattgtttcaagagagtcacac
gaacgaaacaaaggtaaaatatgaacatagag
cgtggggacctgaagcagaaggctgtatggtg
acagaccggtgagtgagtgatgaatgaacga
gaagtgagaagacaaaatacaagaaagagcg
ttgacttgaagttaaagccaaaaaaaccacaa
ggggcaaatgtctcttttaggaaaaggacacag
acagactttctatacgggccaattagaaaaatag
gccctacttctaattaaagcccatttacttctctctt
gtcttctattctcttttctcccatcacgtgacgac
gatgtataaaacgccgtcggtattatataactggtg
ccgttgacaagacggcgacagaagaaagaaa
gaagaaaccacaggctctagggaacgtaacgtt
atgtcctgtctatagcattataacggtcagatcaa
cgccgttagataaagatctgtcaatgttaaagaa
gagatgcatctctacacggttaaatttaaaacgcc
gtgaacctcttatctattgattttgttgatgaagcca
aaacaaatcggtgcagaagacttatcagagaag

	aagaaaacgacgacgttcccgtttctccatgtcta ataagtgtagtagtgcggtactaaaaactctaa agtttgactccagtaaaactgcctttctagtgaatt ccagtgattttagagtttgaatagtggtgaccaaa tttgaaagtacaatctcagcaatattattgatcactc gttataaaagaatcgaatgtaaaaatagccaatg agagactgagacgtatgtgttgaccataagtcgt atagttgtatctatctacctgcaagatcagcagat ggttctctgatcaattgtacctaattatctttatttctg taaaatttctctattcacaatgataaactacttaa gacagtaaccataacaagatttacaagataattg aaaaatgaacacataaaagtatttggcgattat ttttaataataacaatattatgtaaagtcacataaa agtatatattcgctcacaagtcctacggtatttaga acagtagtaccacatcgattctctcatcttcttctc ataatatgccattgttcattgtctgtgtcctatcgca taacactcacgctatcttattttctctcgtctttct cactgagaggacactaaaaaa
--	--

Example 7. Nematode-Inducible Expression of the Potato CRN and CLV2 Promoters

[00150] The promoter for the *Solanum tuberosum* CRN and CLV2 genes was operably linked to a beta-glucuronidase gene (GUS) and introduced into transgenic *Arabidopsis* plants. The transgenic plants were then infected with BCN and expression of the GUS observed. It was determined that the StCRN and StCLV2 promoters can provide for expression in the root vasculature uninfected plants as well as upregulation of expression at sites of BCN infection in plant roots (Figures 17 and 18, respectively). The sequence of these and other nematode inducible potato promoters that can be used in the methods of this invention are provided in Table 5.

[00151] Table 5

Promoter	Sequence
<i>Solanum tuberosum</i> >StACR4 (clone 3) promoter sequence; (SEQ ID NO:15)	CTCCGAGCGTGAAATGAAATTAATTCCTTTAGGAGAACATAAATGTCTGCA GAACTATTCTTGAAACCTGGCGCAGAGGATAAAATAAATATTCAATCTATC TAATAATAGTTGTTCACTCGCGCATTTCTTATGAACTATAAATAGAATGA TAATTTACTATATCACCTTTTGAATATACTCTCTGTCCCTAATTACTTG TCCATTTTGATAAATCAAGAAAGAACAATTTTTTTTTTATCTATTATACCC TCAATAAATTACTTTGAAACTGTAGAGCTTCTTGAAAATCTCAAGTTTTTA ATTTATCCACTTCATAATTAATAGGGGTAAAATGGTAAACTACTATGCCAA TAATTGTTTTCTTAATATGTGTGTCAATTCAAAAGTGACAAATAATTAGG GACATAGAAAGTAAGAGATACAATATCTTGAAAATGTAATAGGGAAATAA CTATAATTAATGATGAGTAAATTATGAACTAAGTGTAATAATTATTATTGA TGTCATAAAGTAGACAAATACTCTCTGTGCCAATAATAGTTGTCCACTAT TGACCTGACACACCCCTTAAAAATAATAAATATGTAATACTACTTTATT ATCCTTTGACTTTATTAAATTTAATGTTTTGAAAAATGTTTTAGATGATAA ATAATACCCTCTATCCCTAATTACTTGTCCACATTTTCTTTTTTAATTGTC CCTAATTACTTGTTCATTTTAAATAATTAAGAAAGGACAATTTTTTTTAC

	CTATTATACCTCAATTAATTATTTAAAAAAGTAGAACTTCTTGAACT ATTAAGTTTTTAAATTCACCTTCATAATTAATATGGGCAAAATGGTAA ACTCATTATGTCAATTATTGATTTCTTAATAGGTGTGTCAATTCAAAAGTG AACAAATAATTAGGAACAAAGAGAGTATTTAATAGCAAGAGTAAACAAAC ACAAAGGTAAATTATATCTCTTAATTTCTAGATTGGACAAATATTGATG GACAACTATTTTAGTATAGTGGATAACTATTGTTAGACAAATAAAGTATT GTTGAATATCCCAAAATAATATAATGGACAACATAAATTAGGCGGAGGGAG AATTATTGTTGGACGGAGGAAGTAGAAACAAAATTTTAAAGCTAGCAATT TTAGGATGATTAGGGGGGATTATGATAATGATTGTACTAAGTAGGTACAAT TATAATGGAAATTTTAGTTAATTATGGTGTACTCTGTAAGAAGAGAGAAAA TTTGAATAAAATTAAGTAGTAGTTATTGTAGAAAGTAAGGGAGGACATGT GTGCAGGTATCCAGGCATTGAAATATCAATTTTGCAATAAATTTTCATTA AATGCTTTCACCTACACTGCTCTTATTTTGAGAAGATGTAGTTTGAAGCA TTTAATGCTCACTTTCTCTCTCTATTCTCTATGCTTCTTTTACCACCT TCATTCTTGAGGGCACCAGATAACTTTGACACAAAAGGGGCTAAAAAATG TCATTATGTTCTCTTTTGTGTTTCTTGAAGTAAATATGCAGCTTCTTG GCTACAAATTTTGTAAATTGTATTGATAACGAGGGTATTATAATTATTTG GGAGGAAGGAAAGTTGTGAATTTTGATCTCATCTACCCACCCATGGTATGT TTGAAGTATTTTCTCGTGTGTTTCATAAATTAAGTCAGCTACTATTGG AGAAGGAGGAGTGGTATTTGGTTCTATCAAAAAGGATAAAGGTGAAGAA AGCACTGACTTTCTGTTTGTGTACTTTGTTAATTTTAAATTTGTGTAATG GACGTGTTTAATAAGTGGTGTGTGGTGTATGTGGAATGTAGATACTTTGTA AGAGCTTTTATGCTTCTGTAGTATTTTCAAAAGTATCAGGGTTTGATCA ATG
Solanum tuberosum >StCLV1 (clone 5) promoter sequence; (SEQ ID NO:16)	CGATGAATAATGCTCCCTATCAATATTTTATATACTGAGAATCCAAAA CAATTATAATGACCATGCTGAATTTTCAAAAAATGGTGGGACAGTTATGAAA AAGATGTTGAGATTGGTTGGATCGGAAGAAGAGAACAAGAGTTGAGACTT TTTACGCAATGCCAAATTACAGAGTGTCTCTTACCCAAGGACACATACAG ACTTTGCCAATGGGCCCCAGAACCCCATTAACCCCCCCCCCACAATAAT ATGGGCCTTCTTACCATACCAAGAAAAAAGAAAAAATTTACGAAATA ATTATAAGATCGATAATGTTATATGATAATGAATATTGGAGCGTAAACTC TAATAATTCATAATGGGAGGTTTGAAGCAAAAATGAGTCTAATAATATAG AAATACACACAAGATAGATGCGCAGAGATTCGACTGTTAAATAATCATGT GGTGAAATTATATACTAGATAAAATTTAAATGACTAAATACATCATGATA TCAATCGTTGCATTGATCAATAGATACACTAATTATCATAGCTATAAAAT ATAATAAGTAAATACTGTAAACAAAATAGCTCCTTCAAATCATATAAAAT CTACACTAACACAATAAATAGATTTAAAAAATATAGCCTAAACAACAA ATACCACACTCTAAATATGAGTTACGACCATTTTTTTTTTATGGTTTTGT AAGGAATTAGGGTGCAAATCATTAAAAACGAAGATAAGATGTAAGTAACCA AACGTCATGCTATTAGGATGCAATCACAACCTACTCAAATTTACTATTA GAAGTGCTCATTTTAATAAATTTAGAGGACCAAAGTGACAAAGAGTTATAC TTAATAAACTAGTTTGAATAACCCAAAGATAAAGATATTATTTTGTAT TTTCTAGTATAAATCTTAGCTGACAGACTCAGAAGCGTCAATCATCAAAAG AAGTTCACAAAAGCCGTCAGTAATTTACTCTGTTTCTCATCTAACCATTG CTTCTAAAGTCTGCTGTACAATCATTTTACTTGCATCTATACATATCACC ATGACTTTTTTTACCAATAAATATGAGATTTAACCGTAAGTTATTGAGTTC GATTGAATCTTACGTAAACATAGTAATTAATATGAAATATACCATGATT TAAAGCTAATTAATATGAGATGGAATTATCGAAAATTTATGATGAAGTAGT CAATACTTTTTCATCTTAACAAGAGATTTGAATTTAAATTTGAATTTTGG ATGAAGTTACTTTTGATAAATAATGTTTAAACCTTAACTAGAAAAGGTTG ATTCGTTCAATTAATATATTCTTTCAATCTCAATTTATGTAACACTGTTT GACCTAATATAGATTTTAAAGTAAGATAGAAAAGGAAATTTTATAAATTTAT GATCTAACTCCTCATTTTGGTGATTATAAATCATTGTATTAGTAAGAGTT TTTGAAGTTACTCTTTTAAAAATATTATAAAAAATGATAATTTTAAATAAAT AAAAGAAAATTATATATTTTGTGGGTCTTTTAGTATCCAATATCCATATT TAACTCGATTAGTTCTAAATTAGCGCTGAAAAGTGTACAGTAGTTGTAC AAAATTCTTAATAAAAGTGATTCCGTATCGTATTTAAATTTGAAAGCTTT GATTATGAATGATTAAGAATGGAGGAACAAAATTTGTTACCTTATTATTAT TTGGTAGAGATGAAGTATTTACCACTCCCTGTGGTATCTTCACTTTGTTTC CTNACACACATATATTCAAAGCCAAAAGTTAATTTTGATTTCTCTCTCCAC TTTGGCCAAATGCAACAGTACTAAATACTCAACACTTCAAATACCCTTGAA CCTATCCCAAATTTGTACAAACAGACTAAACTAACAGTGAATA
Solanum tuberosum >StCLV2 (clone 7) promoter sequence; (SEQ ID NO:17)	CTCACTGCCTCTCTCATCCCTCTCACCTTTTCTCCCTTTCCCATCTC ACTCGCCAGATATACAAATACATATGTATACTAGTTACATACAGAATGATA TACATACACAATTCACAAATATACAAATTCATTTACCTCTCTTCACTCT ATGCTCTCTCTCCTCCTCTCCCAATCGCTCTCGTCTCTTCTCTCTTTTA AAATATAGCTACAAATCGTAATTATCAAATTATAGCTATGAAGCCTAATTA

	AGTTATTTTAAATGGTTATTTGTGAAATTTCTCTTTTTTAAAAATAGTTTT TAGAAAAACAACTTCAGTAACTTTTAAAGTTAAAAAATAAAAAAGTAAGAGT ACCTACTTTTAACTTTTAAAAATCGTTTTTAAATATTGAAATATTCTTG GCGACTAAAAACTACTTTTAACTTAAGCGAAACACCCTCTGAATCTTAGTA GAGTAAGTTCTCGAGTCATATCATGATTAATTTATTTTCACTCGTGACTT TAGCTTTTCATTTTTCCTTAATTTTGTGTTTACACTACTATAAAATAGTGGG ATGCATCTATATCTTATCGTTTTTTTTATGTTACATTAATTCATCACTTTTA AAATAATAAAAGTATTTAGATATATAGTTTTTGCCAAAGTTTTATGATATT ATAAAACAAATTTGAAAATCAATCGAATCGAACTGACACTTAAATAATCGT GATAATATTTAAATATTATAAAATAGAATAACTATAAAATTAATATTATGT AAATTTAATAAAATAATCGATTGAAGCGTACCATTGAAAACCTCGAAAGTGA AAGGAAGAAGAGCATAATTGTTGATATGGGTTACACGCTCACTTACATAC ATATAATAAAGGCTCTCTTTAAAGAGAATTTGAAAAAGAAAAGAAAGTGA AGTTGTCTACTTTACTTTAGTTTTTACACTTCTCCAGGCACGCCAAACCTT TTTGCCCTCTCTTTTTTTTTTTTTTTTTTTCATTGGGACTGTTTTTTTTTTTA GTTTGTTTTTCTTTTCTTTCATCAAAGAGGTATTTTTCGTTTCTATAATAT TGGGAGTAGCAAAAATGCTACTAGTATATGAAATGGCAATTAGTACTTTTA TTTATCATCAAATGATATATGGTGCAGTGATACAATATTCAAATTCGGAA TATGAAAAAATTCATAATAGAAAGTACTTTTCCATAAGAGATCATACAATG AGAAAAATATTCAAATTAATCAAACCTCCAATACAGATACATCAAAAATCAA ATGAATGAGAAAATAATAAAAAAATATTACCCCCATTTGATCACTCAACTT TTCTCTCCATTATTTAATACAAAAATATCAGGTGATTTTTCATATTTGTTT TAACTTTAGTATATAGAGTTATCTAGTACTCCCTTCAATTACTTTTGATAC TAATGCAACTAGGCTTGTCATAAAATATTTTCATTAGCTATTACTGATGAG AGATAACAAATATTTCAAAAATTAGTTGAAGTGCGCAAAAGACCAACCTC AAACACACAATCATAAAAAAAAGTGAGGAAATATAGAGTGTGTGCTCTCT CAATAAAATAAGTACTAAAAAAGAAAACAAGAAACAAGAAAGAAATGTTGTT TCTTTAGTGGTGACTCTCAATGAAGTACCTACTTTCAGCTTACTCTCTCTA TACTCACTACTACTGCTACTCAGTACTGATTCTTTTACACATACTGTGCC TGTAACCCCTGTCCAGGACCCCCATTTCCCCTTTCCCCTTTCCCCTTTCT CCTTCCTTCCTTAGCTATCTCTCACACAAACACTAATCTTTTTTCACCTCT ACCTTACCTCC
>StCRN promoter sequence; (SEQ ID NO:18	TCCGTTTGAGGGATTTCTGTAATTATAAACTTTTAAAGGGATAGATTGTAAT TTTGCCCTTCAAAATATGTGATTTCTGTAATTTGCCTTATATATAAACAAT GTGTATTATCCGCATAATTACCACTTATAGTAATTGAATAGGTTTTACCAT CTATAACATAACTTTTTTAACAATTTGTCTCCCTCTCCCATTCACCTCCCC CCCCCCCCCCCCCTCTCTCCTTCTTCTCTTTTCTTTCTGCCGTCTCTCTCT ATAAATTTCAATTATCCTAATTTAAGACTTGATTTTGGATCGAGTATTATT TCCAAACAATTGAGAACATCTTTGAAATTTATATCTTAATGTTTAAAGGATT GTTGATGAAGACATAATTTTATATACTAATATATTTTATTACAATAATA AATCTAACAATGTTTAAAGAGAAAAAATAATAAATAATTATCAGTATATT ATACATATTTATGTTTCAATGCACATGGTGAATATAATTAAAAATATTTTAA AAACAAATGTATTATAAGTATTATGTGTGAATCTCAAACATTTTCAGTACTA TTTAAATTAGTTTACATTTGTTAGAAATGTATTATATTTGTTGGAATAACAA CAATCAAATTCATAACAATGTATAATATTGAATTTGAATGGTATTACAAGT GTCTTCTATATTTAATACAATTGTAATACATAAACTAATTTGAATAACATT TGAATATTTTAAATACAAGTACAATGCATTTTAAACACCATTAATAAGATA GAAAATAACAATTGTAAAAACATTATGAATCCAATATATTATACTTATTAGA GGCATATTTCAAAACACGTGGTGAATATATACTAAACATCTTTAATAAAA AATGTATTATAAGAATTATATGTGAACCTCAAACATTCCTACTACCATTTAA ATTAGTTTACATTGTTAAAACTATATAGAGGTGGCAAATAGTTGGATTGCG ATGGGTTTAAATGATTATAAATAAAATGGGTAATTATCCAATCCGTCCAT ATTCTATATGGGTAAATATGGCTTGGATAATTAATGGACAGATTGGATATG AGTTACCCATATTTTCATCCACATTGATTGAAGAAATAAAAAATGAATTTAT ATTTTTTAAGTTTCTAAAGTAATTTTTTATTCTACTCACTCCCATCCCTAC CTCCAATTCACCCACCCCTAATTTTAGTTGTTTTATTTTTTCTAACCCCC GCCCAGTTTTTATCCCCCTCCACCTCACCCGTCTTCATCCCCCTTACCCCC ACCTGCACCCACCCACCCCACTTTTTTTTTAAAAAAAATTTCTACGCCCCC CTCCCTCAAGAATTTCCAATTTTTTTTTTGTGTTCTCCATTAAAAAATGAG TTTCTTTTTTAAAAATAAAAAATTTACCCCTCCGCTCCCATTTATTTTTT TTTTTTTTTGGTTTTTTTTTAAAAAAGTAACATTTTCAGAAAAGAAAGTTACC CCTGTTATAAACTAAAGTATAACAACCTACTCTTGCTTCTTTCTTTGTTAC AAGAGGGGTATATATAGTTGTATACACTTGTGCCCCAAGTGTGATACACGG ATAACTTCTTGCCATGTATACACTTTGGACACCAAGTATATCAAATGGCTA ATTAGTATACACCACATAGCATTTTGTGTGTGTATTAACTTTACAACACTT AACATATTAGTGTGGACATTCAATTTACAACAACCTGAATTGTATTACAA CTATCATTTATATTTTCATACAACCTTTTCAAAGTTGTAGCTCTTCTTTCCG

	ATGATTCACAATCACCGATTATCAGTAGCTCAAATCAATCCCATTATTAC AAATCACACACAGTCCACCCACAGTCACCAAACCTCTCTTTCCCCATATT TTTGGTCCAAACACCATGACCAAATTTGAATGCCGAAGAGAGTTTTTCAAT TGGATCTAAACATCGATTTTCATGAAGCTCATCGGAGCAACGAACACCATC AAAATTATGTTTCTAGATCTAACAACACCACTGATTTATGTTCTACTCTTCTA CTTAAACAATGAACATAGAACTACAATCTTCTTTGGTTCTTATAATTACA AATTAAAAACAATAACGTAAAAGAAAAAGATGCATAGAGATTGGGCATC GCATGGTTTCATGGAGCTCCATGTTTTTTTGTGGAAATTTGATGATTTTCC AATTTGGTTATTATGTTGTTTATTGTTGTTGTTGAGTCTATTTTGTGGTGG TGCGGAGGTGAGAGCTTTAAATTGGAGTTGGGGTGATTGTTGTTTTGTTTCG CCGGAGAAGCCATCTCCAGTGAGGTTGGTTGGAGAAGGAGAGAGATGAGGA GAGCAATGAGTAATTTCAACTATTAAAGGTAAATTGAATTAATATCTCATA CGATCACTCGACTTTAAATAGTTTATTTAGAAAGTCACTTAACTTTGAATT GTTCACTAAAAAATCACTCAACCTTATTTTATAACTCAAAAGTCACTCAA CTATTGATGTTTTACTTAAAAAGTCACCTAAGTATTGATATATTGCTTAGA AAGTCACTCAATCAATTTAAATAATTTTCCATTAAATTTATTGTAACTA TTTTTTAAAGAAATAATAAGATTTCTATTTTAATTATCTTATTAATCCGCT CCAATTATTTAATTATAATTTTCTGAAAAACGTATAGCAATTGACCCAAA AAAAAACTTTTCCGTTCTAGTAGTTGTTTGATTGGAATTAATATGTTTA AAAAATATCAAAAAAATAGGATGTTGGAATTGATAAGAAGTATAAAAA AACGCACAGTAGCAATCTTTTACTATTTTAAAAAATAAGTATAAAAC AAAAACTACATTTCAACGAAATTCATAAAATAATTTAAATAATCATCTTA TTATTTTAAAAACTAGTTTAATTATTTTGTATTTTACAAATGAAAA AATTTATTTAAATTGATTGAGTGACTTTCTAAGTGAAACACTAATAACTGAG TGAATTTTGAGTTATAAAAAAATTGAGTGACTTTCTAAGTGAACAACCTCAA AATTGAGTGATTTTTTAAGTGAATTTTCAAAATTGAATTACCATATGATA TATTAECTCAAGGTAAATTAGGCTATGGACTATAATAGAAAAAACCCTAAA AAGGATAATAATTAATCTAAAAGAATTCATATATATATAAACTATTTTGT TTAATGATAAATTTTTGACCCATTGGGTCTTTAAAAAAGAGAATACT CCATCTTGTTATTTTGTAGGTATAAAAAAAGTAGTTCTATCTTTAATAG GTTCAATTTCTTTAGTGAGGAAAAAGTGGATTTATCTACTAATCTTGT TGTGAGAGGCAAAGTTGTACATATTTGGAATTTGAACTTTGAATGATTC TATTTCTGTTTATTGTGAAGTTGTATATATTTCTCACTGTTCACTTTTATC TTATTTTATTATTTATATAATTTTAAATTAGCTTTTTCAGCAAAAAGATTT TTGTTCTTGAAGATTCGTTTCAGAAAGAGAAAAAAGAAGAAATGGTCAC ATTGTCGTCTTGTGTAAACATTGAGAGGAGTGAACCTTAACTTGCCGACC CACAGAGAAAAACAACCTTAGTTTCC
>StBAM1(clone 6) promoter sequence; (SEQ ID NO:19	GAAGGCATAATTGCTACTTGGACAACACAGTATAATTAATAGGACAACGA AACTTCGTTTCATAAACTCATTCTCTAGCTTAAGTATAATTAATATGCCC CTAACTATTTGAAAAGGTCTAGATATACCCTCCGTTTAAAGTTTGGCTC ACTCATGCCCTCGCCGTTCAACTTTTTGTCTAAATATGCCCTTATGGGCAT TAGTTGGCCTGCTGGACATATCTAGCTCATTTCCTTTTAAATGCCA CATGGAATTGTCATGTCATTTTGACTTTACCACATGACATTTATATGAAAA TGGAAAGGGATCAATTATGCCCGTAAAAAATTCGAACCCATAAACACCTAA TCCGACCCATAAATCAACCCCCCTCCTTTTAGATAAACTACCCGACCCAT TTTCAATAATTTGTTTAAATTTTTATTTTTTTCGTTAAATCCAGGAAAT AGTAATTGATTATAAAAAAATAGAAAAAATATGGGGAAAAAATTAACGC CAAAAATTCACAAATAAATATTGTAACCTTAAATTCACAAATTTTTTTATT TTTTTCCGGTAAATCCCGAAATGAGTAATTGATTAAAAAATATATGAAA AATATAAAATTAACGCCAAAAAATCACAAAAAATCCATTTTTTCATATAAA TGTCATGTGGTAAAGTCAAAATGACATGGCAATTCATGTGACATTTAAAG AAATGAAAAATGAGTTGGATATGTCCAGCAGACCACTAACTCCCATAGG GCATATTTAGACCAAAAGTTGGACGACGAGGACATGAGTGAGCCAACTTT AAACGAGGATATATCTTAGACCTTTTCAAATAGTTTAGGAACATAATTGA CCCTTTACCCATTGACAAAAATATCATTCAATTTTGAAGTAAAGCAAATC AAAATGACATGGAATTGGAATAGCACTTAAATGATACTCCCTCCTATCCAT TTTAGTTGTCACTGTTTACTAAAAATAACTTGTCAAAAATATTGTATAGA AACTATGAATACATACATTATGTTATGATTGTTTATGATTGGCAGATCA GTCCTGTTTTTATATACATTTCTTTATGTTCACTTGAGCTAAAGGTATCA GAAACGATATTTTTTATTTTTTCAATGTAGGAGTAAATAGAGTTTATTTTC TTTGTCTCATATTAATCATTTTTTATTTTTTACACGCATATTAACAAATCATA CGAAGATAATTTTACTAATTCACCTTCTAAAACTTATTGAAATTTTAAAA ATAAATGTGAACACTTTAATTTTTTTTTTGCAAGGGTAACAATATAAGAAA ATTTTAATTAATGTTTCTTGATTTAGTAAATGGACAACATAATATAAGAC AATTATTTTTTAGTAAATGATCAACTAATATGAGACGGAGAAAGTAATATA TAAAAATGTCATTCTTATTAATAATTTCTTAAGGAATGTGTAAAATAAAAC ACGATAACTAATCTCTCTCTATTGTGGCTTTCTTTGTGCCATACTCTACT

	GTCCAAAAAATATTACTACTCATCAAAAGAAGAAAGGGCTTTCCTTAAGAA TGACATCTTATCAACTACAAACTAACCTAAAGATGAAAAACTACAGACC TTAGTGGAGAATGTTTAAACACCCTAAATTAAGGAGATAAGATAAGTGA AGTGCTTTTGTGACAAACGAATTGAATGGAATTTTATGCCTCCCTCCCAA ATACTCTTTTAGCTAATGAAATCTCTTAACTAGTAAGGACAACATTTCA ACACGAGAAAAAGCAAGACCAATAGTTGTTTTTCTACTCTACTTTTTAT CCGTGAAAAAGATTGTGTAAATGTTAGCAACTTTATTATTTTAAAGGAACAA AAAAGTTGGTTCCCCACGTTACAAAAAGAGTTGGGGCCTCCTCTACTTATC TCACAATTCAAATTTATTCTTTATAATATAATAATCAATCCCCTCCTATTA TATATATTTATTTACTCAAAACAAAAGAATATACACCAACCGGATTACCCA CCCCCTCCTCACTTTTGCCTTTCTCACTCTCACTGAGTGAAACCGCAAACC AAACAGTTGGTGGGCATTAGATTAAGGAAGGAAAA
>StBAM2 (clone 2) promoter sequence; (SEQ ID NO:20)	GCGTCAAAGTATGAAGCAGACAACACATGAACACACAATAATGATCGACTC CCACTTAAAAAATATTATTTATTTTTTTGTTAAAGGGAACGAAAGCATTATT TTTATTCGTTCACTATTTTAAATTAATTCTTATTGTACTTATCACTTTT TAATATATTAAGAAGACTTTACTTTTAAACATCAATTAAATGATATTATGA TAAACATTCTAATCAAATGTTATTTCTTAAATATGTACAAAGTTTAAAG TGGATCAGTAAAAATGTTAATGAAGGTAGTAACTTTTATTGTTGTTTATT TACTTTGTTGATGTGTTTGAATTTATAATCTTAAAGAATAATTATTAGAA TAAATGAAGAAAAATAATTAATCTATTTTAAATTAACAAATAATTTAT AGTAATTTATTTTAAATGACGATAAATAATTTAAACCGGAGGAAGTATT AACTGTATTAATAATTAATATTAATACCACTAATGATAATGAAAGTGTTAG TATCCTACATGAAAAGGACATGATTGACTACTTTCGTATAATTTGACAATG AATTGAATGGAATATTATTTTTTCTACATATTTGTTTGTGTTAATAA TGTCTTAAATTATTAAACAGTTATATAATGCTGAAAAGAGAAAAACAAAA GTATTGAATTCCTCTTCTTCTCTTCCACAAAAATTGNAAAAAA GCAGCTCTTTTATTAATATATATATTTTTCTTTATTTCAAGTATAAAGTT TATTTAATGAAAAAATACTTTTAAATTTATTATTTTAAATATATCATA ATATTTATGTTACTATTAAATATTTATTATGAAAATTAAATTAATTTCAA ATACATAAATGTATCATCTTTTCAAATATCTTTTGACTATGGAAAGAAAT TGTAAGTAAACGATGACTTTTTTATTTTTTGGTACTTAATTGATTTTTG AGGAACAAAAATAATTGTCCCAAAGTATAAAAAATAAAAAAGTTGGGACCTT TTCTCTAGTCTCCATATGAAAAGACAATTCAGTACTCAGTAGATTCAAAA TATCCTTTAAAGCTAGAGCTCTTTAATATACAATAAGAAACAAAATAATC ACAAGACGATAATTATTTCAATTTTAAATGTAAATTTTAAAAAATATACA AGTTCTTTTAAAGTTTCACTCATAGAGCTGTAAACATATTTTAAAGTCCA CATACAACTTCTAACTTCTAAATATTCANTTTCAATCTAAGTTCAAACACT ACANTTTTCAATAATAATCAATTTATGTCCGACGCTTATTTGTTGATAA TTAGGATAGAATATTACTAGTAGATAGTTGAGTGTTATCACATTTTACGTG AATGTGAANNAGAGAGTGAGCTGACCTTCTCTATCCTTCTGTTTAA GTAGTATTATTTAGTTATCACGTAGTTTCTTACCTTCCACGTATATTGTTA CCTATTGTTGTATTTATTTATTATCTTGCCATTTTGTGTTTCTTTTCAA TAATTTTACACGACGTGTGATAAGTGTTCCTTTTGAGTCAATGGCCTTT CAAAAACAATCGTTTTTACTTTATAATCGTGAGATTACATTCAATGTGTTA TCATTACATTGGATATGTTTAAACATTACATAAGGATGAAGAACGAATCAAT CTATTCAAATATTAATATTATTAAACAATAACAATACGATATAACCATC CAAAACAAACAGAGTGTCAATTTTTTTTAAATATTATTAGTTTCAATGT ATATATTCAAAATTTTATATAAATACACATTTATAATATATCTGTTTCGAT AAAGACACGTGAACATTTCTTCTTCTTCCACCATTTCTGCTCTGCTCAC TCTTTCCCTCCACCATTGAAGAAAC
>StER (clone 2) promoter sequence; (SEQ ID NO:21)	CCGAACATCTTTAGGGCATCTCCAACCGAATCCTCTATTTTACTCTTCAAA TATAGAGTTTCTATTTTTTTCAGACAACCAACTCCAATCTCTAT TTTACTCTTAAAAATGAATTTTTTTTCTCTCCTCGATATTATATTATTA TTTCTATTTTATTCTTATTTTCTTATTTTCATGATATAAATCCTTTATTTAT TTTTTTCCAAATAATTACTTTATATAATTTTAAATGTGATATGAAATTATA TTTTATTCTAAATTTTAAATAACATAAAATTCAGGAAAAATAATATAAT ACATAAATTAGGGGACAAATCAAATAAAAGTGATATACAATTACATAAAT ACTCAATTTTTAAATATTACGTTGCTCCCATAAATGCTCTATTAATGCA TTACGGAGTTCAAATGAACATTTTGTCTTAAATTTTTTATGTCTAGCT AAAAATTGTTCAAACCGAAGATTTTCACTAGCTAAAAATTAATCAATCGG GGATTTTCATCTACCATCATTTCTATAGTTGGAGTTGGAGCCTCTACGGCA TCTTGAATTGGTGCAATTGAGATCACATTCATTCTCAATTTTCATGTTGTGC AGTATAATACATGTAGTCATTATATCATGTAGCACCACCTCTTTCTCCAA AAATGTGACGGTCTGCAATAATTGCAAAACGTGATGCAAAAAGTTTCGAG GACAAGGCTCTACTTTGCAATCATCGGAGTCCAAGACGAAACTAAAAATTTT AACGAAAAATTTAGAACTATTAGTGATCCAAATGTTCTGGTTACCTGCA ACGAGAACACAACGAATACTTGAAAAAAGAAATCGACAATCACAACCGCA

49

	CACATAACACACATTCTTGTACTAACTCTGCATCATAAACTCTACCCCACT TTCTTCTTCTTCTCCGGTCATATTGCTCTGAACTCCACTTATTGCTCTCT CCCGGCATTATTTTCTAGTTTCTCAGAAATA

Example 8. Inhibition of Nematode Infection in Transgenic Potato Plants Expressing miRNA directed against the StCLV2 gene

[00152] Transgenic potato plants that expressed an artificial miRNA (amiRNA) directed against the endogenous potato StCLV2 gene (SEQ ID NO:11) were generated and assayed for both expression of StCLV2 and for resistance to *G. rostochiensis* infection. Two independent transgenic potato lines tested exhibited both reductions in expression of the endogenous StCLV2 gene and reductions in the numbers of *G. rostochiensis* (Figure 19 A and B).

Example 9. Soybean nematode CLE Receptor Genes

[00153] Sequences of various candidate soybean nematode CLE receptor genes are provided in Table 5. Inhibition of the expression of such genes is anticipated to be useful in the control of nematode infections in transgenic plants. It is further anticipated that promoter sequences associated with these soybean genes will be useful in providing nematode inducible expression of operably linked sequences. Start and stop codons are underlined in the genomic and cDNA sequences provided. The soybean PNCLEPRG promoters and 5'UT of Table 5 (SEQ ID NO: 23, 26, 29, 32, 35, 38, 41, 44, 47, and 50) thus comprise the nucleic acid sequences located 5' to the start codon of those genomic sequences. Table 5. Soybean Genomic DNA sequences, cDNA sequences, and protein sequences

Sequence Description	DNA OR PROTEIN SEQUENCE
Glyma09g29840 gDNA and about 2.8kb of promoter and 5'UT Sequence (SEQ ID NO:23);Soybean BAM1-like gene; ATG start codon and TGA stop codon underlined	CAGTTCGAATCCAGGTTGCATGGAGATACAGGAAGAAACGTAAAAATTGTGTTGATACCTCAAAA TTAGATCAATCATTTAACTCATAGGTTGTATAATCACCTGAATTGCTTGTAATTACCATGCACAA TTCCTTTAAAAATTAAACAACAAGCAAATGTTACTGTTGGAGAGCAATTCAAATTTCAAAATAAA TGGAACCTGTGAAAATTCAAGGAGATATTTTAGGAATTTGTTATGTTAATTTCAAATCTTTAGA ATTTTATCTAGATTTAAATATTTTATTAATTTGTTAACTTATTTAGGGATTTGTTTCCTTTTT TAAAAGATTAGAATATGATAATATTTAAATTTTGTTAATTGTTATTTAGCTTTATATATAGAGCCAA GAAATACAAATTTTATAATGTGTCCATCTAAGATTTCTTGAACGTGTGATAATTTGTGTGTA GAAAATTTTTTCCAACGGTTAACATTTTATTAGTAGTGCTTTGCTTATAATGCAAAGAGCCTTCT CCTTTATTTTATGCTCTACAATAAGTAATGAATTTATAAGGAATGAAAATAACTCTTAACCTCTCAA GAGAGGAAAGAACCTTTGGTAAACAAGATTTTCATATGTTACAGCCAGACTTACACAGAATATTTCA TTTCACACAGCTCAGATGATTTTTAGAGAAAATGTACCCGATATATATTCTTCTTTTAAAGGCAG AGTTGAAATCTAAATTATATGAGCAAAATATACAACCTATACAGTATAGACAGAATCAGAAATAA AGTTTCATATTTCTTAGATTACGGTATGAGAGTCACTGAGTCAATAACTTTTTACTACGAGAATAA AGAAATGGAATGATTGAATGAGCAAAATATACCCCTGAATTCATTTTCTAGAAAAGAGAAATAG CATGCGATTGAATAAGAGAATGGCACCATCAAGATTGTGAATGAGAAAAGAAGAAATGGAGGAAAC TTGTGAATGGAAGAGAGTGAATGGGAGAGAGCATAGTGTGGACAATGACATTGTGACTGTA AGGAAATTAATGAGTAACTAGAGAACGGAACGGAACCTAACAAGCTTCTTGTGTGTTGTGATT

AAGTGTGGATGGAGTTTTAAGGATTCAATACAATGAAAGCTACGTGACAGTTAAATATATGATA
 GATTCATCCTTTGAGTTCGAAGCAGTATACGTGAACGGAATCAACGTTGATCTTTAGGAAGATCA
 TTCTCTCCGCTCGGAAGATCTTTTATCGTTTAATCGAATCATTTTTTAAAAATTTTCAGTTTTTCAT
 TATCATGGTAAGTTTATTGATTTTTTATAATAATTTTTTTTGAAGTCATATAAAATATAATATTT
 TATTGATTAGAAATGTAAATAATTTACAATAAGGGAAAAATATTTATTGAACATTTTTTATAATAT
 TAGAAATAGATTAAACTAATACAGTATTTCCGTATTGTATTGCATATATGTTTATCTATAACTAT
 TATTTTTAAATTATCTTTAATATATATAACGATTTTTTTTTTATAAACTTTCAAAATGTAGATG
 TTACTATTTTTTCTAAAACAATATTATCACTATTTTTTCATTTTTTTCTTTTGAAAAAAAAG
 AAAATAAGATAAAATATATGAAGTGTCTTTCTTTCAACTGGTCTTATGTAAGAACAAATTACACT
 CTATGCTCAGGACTTATTATACTTATACTTCTTACGTAAAATGTATTTTTTTTATCTCTTCTAA
 AGTAAATTATCATCGTTTAACTTTTGAGAAAAATGTCAAAAAAAATCCATACACTTAACTCTCA
 CAATCTGATTCTTCTCCATCTTTATGGCCTCTTCTTTGTTCATCCACCCTCCCGGTGAGCTAATT
 TTTTGTATATAATATTATTAATATGAAATATTCATCAACTTTATCGATAAAATAATTTTTATTAAA
 ATACTTAATTAAATATTTTTATGATGATATTTTTTCTTTTAATTATATTTTTATTTTTCTTCAC
 AAGATTAAATTTAATATCTTTCTTAACGAGATTAAATAAATATTTTCATCAACATATTTATTTTT
 TATATATATATATTTTTTAACTCATCATATCACTTATCATATCTATATTTATTTTTATGTATCTT
 AATACATCATTTTAGATGGGCAAATTAATATATTTATCCAAAAGTAATGTTCATGAGAATGAGAA
 GAAAAGTTACATCAGCCTCCTTCTGGCCTTCTCTAAATTATCGAGATTAAACCTGTGCGCTG
 TAAATTTGGTAACCAGAAAAAGAAAAATCATGTGAGGTAGAGGATTTTTTCGAATGTGTA AAAA
 TAGATTTCTTGAGTGCCTAAGGTGTTTGCATTGAGCAATGGCACAACAGTGTCAAGTCCCAATC
 TTACAAGAACCTTCTTCTTACCGAAAGTCCCGTCACGACACGTGAGCAGTCACATCCGTACAGT
 GTCACCTTTTTCATCGACCATGGGAAGATCTTTTCGGCACCGCACTTTCTGGTATCTTCACGCGCAA
 TCCCATCCCACCGTCCATTCTCTCACACGCTCGAGCCATCGTAGCCGTGCGCCCCCTCACCCGTC
 CCCAACTCCGCCACGCATCCAAATGACACGTGGCGCTAAAGTAACGGTCAAATCCACAATATTAC
 TTATTGTAACCTTATCCTCTCCTCACCCCTCACCCCCCTTCCCCCTATAAATCCCCCTTTCC
 CTCCTCCAATTTCAACCTCACTCTGCATTGCTAAACCCAAAACACTATTTTATTATCTTCTTC
 GTCTGTTCTTTGCATTGAAGAAAATTTCTTTGAATTGAAGAAAACCTGAAATCGAATTGTGAAAC
 AGAAAAATAACCAAAGGAAATTTTACTGATTGAATTGTAGAGATTGGAAAAATGGCGTTGAGTA
 TGACTCAACAGATCGGGACCTTAGCTGGTGCAGCGGTGCCGGATTCCTCGGCCGAGAAATCGACC
 GCGGCGGTGAGTGTGCGCGGTGTGGAAGTCACCGACGGCGAGTCTGAAGTGCAAGGTAATGAG
 GACGGATGGCTGCGCGGAGGGGCTTTCGCGCGCGTGAAGTCCGTGCAGGTGCGCGGTGCTGCGGG
 CGGATCTGTGCGCGGCGTGTGAGGCATTACGGCGGAGGTGGCGGAGGAGTACGTTGCCGGA
 GGAAGGAGGAGAAGGGGAAGGGGAAGGAGGAGTGCCTGTTTGTGATGATGCCCTTTGGACAG
 CGTGACGGCGGGGAACGCGGTGAACCGGAAAAAGGCGATGAACGCGGCGATGGCTGCGCTGAAGA
 GCGCGGGGTGGAGGGGTGATGATGAGCGTGTGGTGGGGTTTGGTGAGAGAGAGAAGCCTGGG
 GAGTATAATTGGGGAGGGTACGTGGAACATGGAATGGCGAAGAAGCATGGCCTCAAGGTGCA
 GGCTGTTATGTCATTTCAACCAATGTGGCGGTAACGTGCGAGACTTTCACAGTGTGCTTATGCA
 ATCCCTTCTTCTTCTTCTTTTTTTCTTTTTTATTTTGTGATTTTGTGATTTTATTTTACTGGCGA
 AATCTTATTAGATTCTAGATTAATTGGTTTTTAACAATTAGAATTGTTACTAGTATTTTTTTTTAA
 GTTTAATTTCTGCGAATTGGTTTTTGAATCTGAAAACCTAATTGAGTGACACCATGAAAAGATTTT
 ACGTTTTTGATACATTCTTGTGTTTTTTTTTAAACGTTAAGTTTTTGTCTTTAATTCAATTTACC
 ATGAAATTCACATCTTTATCTTTATTGGTAAATATGTGGTGTATTATTATATGGTGTTCGTT
 GATTATGATTGAAAATGAGAGGCGTGCCAGCACGCTGCAGCTCGTTTGTGAAAAATAAAATAAA
 CGTTTTTAAAGGGGTTTTGTGATGGGAAATGAAGCCATGCCATGTGATGTTGGACTTGATCACT
 TTGATTGGAAGTATAGTATTTTCTTTCTATTGAATATTCAACTACGAACCTGGAATAATTGAA
 TCTTGAGAATTGTGATATGATATTGATAATTATTAGCCATTTCTCTTAACTGAAATTTTAAT
 GTTTCATTTTTATTAGTACTTGAAGATTCTGAATTTAATTAAATTTTAATCCTTTTTTTACAGAA
 ATTAATTTTTAATCTTTGTACTATACAGAATGAGTTAACATTCTTTTATAATTAGGGATAATGAC
 AATTTTAATTTAGTATTTTAAACATGATGATTATATTTATTTTATCATAATAACAACATTTTC
 CTGAAAAAAAATAAAAAATAATTTTATAAATCTTTATATTATGATTTAAAGAGGCGTAATGAGCA
 CGGTGATGCTAGTCTTATTTTCTTTCATTTTTTTGTGGTCTTATGTAAAAAGTAAATACAAATA
 CATGAGAAAAGAGTGTGCTTTCGTGATGGGAAGTGCCAAAGTGGGACCACGTGAGGATGGACTTC
 TAGTCTACTGATTCACGTGCGCATCGCCACATACAGTAGACTAATTTTAAAGACACCTTAAAT
 TTAGTGGACCCGATATCTTAATTTATTTTTCGGTCCATTTTTTGAAAAAGTATTCCTCAAATTC
 CTCCATTTTTCTTAAACATGTTATTCGAAACAAATAATCCAGGCATAGTTTCTGTTTATATATT
 TTATGTAAATTATTTTTGACAGTTATAAGATTATCTAATGGTTTCGAATTCGAATCATGGACATG
 TGGTAATGTTGATACTAAACAGTTGGAGGAGAGTTTAGCATCCATAATGATTCTATTGCGTTTTCG
 AGTAGAATTATCTTATTAGAGATACATCTGATCTACTAAAAAATATAAATAGTTAGTGTAATT
 TTAGATATTACTGCCATTAATTTTGTCTATAAGTTAGCACTGTGTTGGAATACCAGTTGTCTTATT

	GGTGGGCTTATCAGATAGTTTGTCTGTGTTTCAGTATTCCTTTGCCCAAATGGGTTGTGGAGGAG ATTGATAATGACCACGATCTTGCATATACTGATCAATGGGGAAGAAGAACTATGAATATATATC ACTTGGATGTGATACTTTGCCGGTGCTCAAGGGACGATCCCCAGTTCAATGTTATGCTGATTTCA TGCGTGCTTTTCAAGACACTTTCAAGCACCTCCTTGGTGATACCATTGTGGTAAATATCATTTCTC AGTGCACCTTTTACATCATGCTGTGATTTGTTGTGCTATTTAAATATAACTTCTCATCTGAACCTC TTTTACTGGCAATATTTTCAAGAAATCCAAGTTGGGATGGGACCAGCAGGTGAGTTGCGTTACCCCT TCGTACCCAGAGCAAAATGGGACATGGAAATCCCAGGAATGGTGCTTTCCAATGCTATGACAA GGTATATATATTTATGTTTTTTTTTCTTCTCCTTGTGTAGTCCTTTATATATAATTGCTTA GGATTTGTTTGGATAAAATAAATTTCTTCATGAACAAAGAGGAGAAAACAAGTAAAATGTGTTCT AAACCTCTAATACTTAATTATGCTATGGTGCAGTATATGTTGAGTAGCTTAAAGCTGCTGCTGA AGCTCACGGTAAGCCTGAATGGGGAAGCACAGGCCCTACTGATGCTGGCCACTATAACAACCTGGC CAGAAGACACTCAATTTTTCCGCAAAGAAGGTGGTGGATGGGATGGTCCATATGGTGAGTTTTTC CTCACTTGGTACTCTCAGATGCTGTTGGAACATGGTGACAGGATTCTCTCATCAGCCACGTCGAT CTTTGACAACACTGGAGTTAAGATCTCAGTGAAGGTTGCCGGCATTCACTGGCACTATGGTACAA GGTCTCACGCCCCAGAACTCACTGCAGGTTATTACAACACCCGATTCCGTGATGGCTACCTCCCC ATTGCTCAAATGCTGGCGCGCCACGGTGCCATCTTTAACTTCACTGTATCGAGATGCGCGATCA CGAGCAGCCACAAGAGGCCCTTTGTGCACCTGAGAAGCTGGTGAAGCAAGTGCTCTGGCAACCC AGAAGGCACAGGTTCCACTTGCCGGCGAAAACGCGCTGCCACGGTACGACGAGTATGCACATGAG CAGATCATAAGGGCATCACAATTGGATGTTGATGGTGAGTCTGGTGATAGAGAGATGTGTGCCTT CACATACCTGAGGATGAATCCGCATTTGTTTGAACCAAATAACTGGAGGAAGTTTGTGGGGTTTG TGAAGAAGATGAAAGAAGGGAAGAGTGACACAAGTGTTGGGAAGAGGTGGAGAGGGAAGCTGAG CATTTTGTGCATGTTACACAGCCTCTTGTGCAAGAGGCTGCAGTGCTGATGCACTGAGAATTGTT GAACATCCTTGTGGTAATAGGGCTTAGGAATAAGTCACAAGGAGGCTGTGTGAAAGTTTGTATGA ACCAACAGCCCAGGTTTGTGGCTTTGAAGATGTAAAATTTTGTATTATATTTGTTTGTATTGTAT GCACCTAAAACCTTCTATTTGTGACCTTTTACATTGTGTACGTAATCATAGACTTTGGGGTACTG TTTCCTTAAAAGTTACTCTACTTTGTACAAGTAGTTACTTAATCTGGTTTAAAAAATGTCATCC CTTAATCTG
Glyma09g29840 cDNA SEQ ID NO:24); Soybean BAM1-like gene; ATG start codon and TGA stop codon underlined	ATGGCGTTGAGTATGACTCAACAGATCGGGACCCCTAGCTGGTGCGACGGTGCCGGATTCTCGGC CGGAGAATCGACCGCGCGCGTGAGTGCTGCCGCGGTGTGGAAAGTACCGACGCGGAGTCTGAAGT GCAAGGTAATGAGGACGGATGGCTGCGCGGAGGGGCTTTCCGCCCGCTGAGTCCGTGCAGGTGCG CCGGTGCTGCGGGCGGATCTGTGCGCGCGGTGTCAGGCATTACGGCGGAGGTGGCGGAGGAGGA GTACGTTGCGGAGGGAAGGAGGAGAAGGGGAAGGGGAAGGAGGGAGTGCCCGTGTGTTGTGATGA TGCCTTTGGACAGCGTGACGGCGGGGAACGCGGTGAACCGGAAAAAGGCGATGAACGCGGCGATG GCTGCGCTGAAGAGCGCGGGGGTGGAGGGGGTGATGATGGACGTGTGGTGGGGTTTGGTGGAGAG AGAGAAGCCTGGGGAGTATAATTGGGGAGGTACGTGGAACCTCATGGAATGGCGAAGAAGCATG GCCTCAAGGTGCAGGCTGTATGTCAATTTACCAATGTGGCGGTAAAGTCCGAGACTCTTGCACT ATTCTTTGCCCAAATGGGTTGTGGAGGAGATTGATAATGACCACGATCTTGCATATACTGATCA ATGGGGAAGAAGAACTATGAATATATATCACTTGGATGTGATACTTTGCCGGTGCTCAAGGGAC GATCCCCAGTTCAATGTTATGCTGATTTTCATGCGTGCTTTTCAAGACACTTTTCAAGCACCTCCTT GGTGATACCATTGTGGAATCCAAGTTGGGATGGGACCAGCAGGTGAGTTGCGTTACCTTCCGTA CCCAGAGCAAAATGGGACATGGAAATCCCAGGAATTGGTGCTTTCCAATGCTATGACAAGTATA TGTTGAGTAGCTTAAAGCTGCTGCTGAAGCTCACGGTAAGCTGAATGGGGAAGCAAGGCCCT ACTGATGCTGGCCACTATAACAACCTGGCCAGAAGACACTCAATTTTTCCGCAAAGAAGGTGGTGG ATGGGATGGTCCATATGGTGAGTTTTTCTCACTTGGTACTCTCAGATGCTGTTGGAACATGGTG ACAGGATCTCTCATCAGCCACGTCGATCTTGACAACACTGGAGTTAAGATCTCAGTGAAGGTT GCCGGCATTCACTGGCACTATGGTACAAGGTCTCACGCCCCAGAACTCACTGCAGGGTATTACAA CACCCGATTCCGTGATGGCTACCTCCCCATTGCTCAAATGCTGGCGCGCCACGGTGCCATCTTTA ACTTCACCTGTATCGAGATGCGCGATCACGAGCAGCCACAAGAGGCCCTTTGTGCACCTGAGAAG CTGGTGAAGCAAGTGGCTCTGGCAACGCAAGGCACAGGTTCCACTTGCCGGCGAAAACGCGCT GCCACGGTACGACGAGTATGCACATGAGCAGATCATAAGGGCATCACAATTGGATGTTGATGGTG AGTCTGGTGATAGAGAGATGTGTGCCTTACATACCTGAGGATGAATCCGCATTTGTTTGAACCA AATAACTGGAGGAAGTTTGTGGGGTTTGTGAAGAAGATGAAAGAAGGGAAGAGTGACACAAGTG TTGGGAAGAGGTGGAGAGGGAAGCTGAGCATTTTGTGCATGTTACACAGCCTCTTGTGCAAGAGG CTGCACTGCTGATGCACTGA
Glyma09g29840p protein SEQ ID NO:25); Soybean BAM1-like gene;	MALSMQTQIGTLGATVPDSSAGESTAASVSAASVWKSPTASLKCKVMRTDCAEGLSPPLSPCRS PVLRADLSAACQAFATAEVAEEYVAGGKEEKKGKEGVVFMPLDSVTAGNAVNRKKAMNAAM AALKSAGVEGVMMMDVWGLVEREKPEYNWGGYVELMEMAKKHGLKVQAVMSFHQCGGNVGDSC IPLPKWVVEIDNDHDLAYTDQWGRNRYEYISLGCDTLPVLKGRSPVQCYAFDMRAFRTDFKHL GDTIVEIQVGMGPAGELRYPSPYEQNGTWKFPPIGAFQCYDKYMLSSSLKAAAEAHGKPEWGSGT TDAGHYNNWPEDTQFFRKEGGWDGPYGEFFLTWYSQMLLEHGDRISSATSI FDNITGVKISVKV AGIHWHYGTRSHAPELTAGYNTFRFRDGYLP I AQMLARHGAI FNFTCIEMRDHEQPQEALCAPEK LVKQVALATQKAQVPLAGENALPRYDEYAHEQIIRASQLDVGESGDREMCFTYLRMNPFLFEP

Glyma16g34360 gDNA + about 2.7kb promoter and 5'UT sequence (SEQ ID NO:26) Soybean BAM1-like gene; ATG start codon and TGA stop codon underlined	NNWRKFVGFVKMKMEGKSAHKCWEEVEREAEHFVHVTQPLVQEAAVLMH TATTAGCTAAACTTTGTTCATAGGTTGTACGATTATAAAATATCTTTGATAGTTTCACTTATTTCC ATGTACAAATGTTTCCTTCTAAAAGGCATGTATTAAGCGTCAAGAACTTAATTAATAAATTGAGAA TTGGATAACTCGCCAGAACGAGCCATGAATTTTAACATGAATCAGATGAGCAAGTTCCATTTCTT ACTTCCCCTACATAATTGGTCCAACAAAATACATAAGAACAATAAACATAGAAGTATTGTTGAGG AATCAGGAAGACAAACAATGACCATCTAATATCCTTTTAGAGTAGTAGTTGAAGATGCCAATGGC AGTTGACAACCTAGAAGAACATGTTGAAAAGCAAACGAATAGTTCTTAATTGAGAACAAGCATCAA AGCACCCCTCACATGATTTTTAGAGAAAATGTACCCGATATTTATTCTTCTTTTAAAGGAAGGGTT AAAATTTAAATTATATGAGCAAAATATAACTGTTGTTTTTTTAAATAAGAGTAGGCAGAAATATTA AACAAATAAAGGGAGCATAAAGAAAAAATAATTGAGATTGCAAAGGTTTATTTTAAAGCAGAG AAAAGATAGTAAGTGTAAACAAAAGATAACATCACTCACTAAACAATCATGCCCTAGAGAATAGG ATCAAACTGTTTTATCCTATCAGTCAAATGACTTTTATTTTCTTAAAAAATAGCATAAAAAGT CTTATCTACTGTAGTTTCAACAGTCAAATCTTAACAATAACCTTAAATTTAAGGTGGATGATGAC ATTTCATCCTTTGAGCTCGCAGTATAATATACCTCAACACAAGTTATTATTAAGTCAATCTTATGCC TTCGGAGTTTCGCACTCCTAATAATTATACGCTAACGGATTCAATTTATCCATCATATTTTAAATT TCAATTTTCTAATGAAAAATACTATACTACTCACTTTTATTTTACTGTGATTTAATAATAA ATTAATAAATATTTTTTTAGATCATCATCAATATAATTTTTTAAATGTATAATAAATTTGTTGA CTTTCATGATACTTATTTTAAAAAATTATTAATATTGAATTTCTGATTAGATGATATTAACTCA AATAAATTATCATTTATGTTTAAATTTATGATTTTTATAATAATTATATTTAAAAATTACATAAAA TATAAATTTTATTGATTAAAAAGTGTAAGCTTTTTTACAGAAATGGTGGATATCTATTAACT CTTTTATAATAGAATCAAACATAATTTTAGTACGTGAATTGAATAGAGTAAATGTTTATCTTAT AAACTATCCTTTATAATAATAATAAAGGCATGCCGATATTATTATTACTATTATTGAAGGA ATATATAAGCATACGCATTTAAAAAATAACCAATATACTAGTTTAAATTTGTAATCACAATTTT TAATCTCTAATCATCTTCAATCTAGGAATAAGTCTCTAGCTATCATATTTAACTGAGTTTAAAA TATTTACATATTTTGTAAATGTCAAATGACAATGTTTATTTGTTATGAAGTAATCAAACCCAG AAACAACAAAACCAATCTAGCTCTATATTAATCACAAAAAAGTATTATTAATAAATATCTCA AAATAAATATTATATTATTTTCAATGTAATATTAAATTTTCTATATTAAGTCAATCTTATGAAGT ATCACTTTAAATTTCAATGTAATACTAAAAGTTAGATTTATAAAATTATTATTCTCTTTTATTG TTTATTAATTTTGTAAATAATTTATGTCAACATTTTTTAAACAAAAAGAGTAGCTATTATATT ATACTATTTTAAACATCTACTTTAAAAAAGTATATCATCTATTTATTACTGGTTTAAATCATGA TTGAATCACAATTGAATCATTAATAATTTAAATAAGTATCATCACTTTTTTTGTCTACCTATTAT AGTCTGCAACTCATATTAAGTTGAATAGCTAATTTTGGGATGTGAAAAATAGATTTTCATGACCA TTGGCCGATGACATGACACTTGCCGTGTTCCCAATCTCAAGATCCTTCCCTCCCATTTTCT TCTTGGCTCCTACATCGACACGTGACACACATCTCTCAGTGTCACTTTCCATGGACCATCAC CTTCACGCGCAATCCCCATCCCACCGTCCATTCTCCCAATGACACGTGGCGCAAACTAACGGT CATACCCAAAATATTAAATTACTTATTGTAACCTTATCCTCACCACCCCTTCCCCCTATAAAT ATCCTTCCCCCTCACTGCATTGCTAAACCCAATAAATTGTTATTTTCTGTCTTTGCAATTTGAA TCAAAGCAAATTTTGATTGATTGATTAGAAAATGGCGTTGAATATGACTCACCAGATCGGGACCC TGGCTGCTGCGACGGTGCCGGTGCCGAATTGCTGTCGCGGAGAATCAACCGCGGCGATGAGTGCC GCCACTCTGTGGAAGCGCGCGGTGAGTCTGAAGTGCAAGGTCAAGGACGAGGAGGGCGCGC TGAGGGGCTGTGCGCGCGCTGAGCCCGTGACGGTGCCTGCTACGGGCGGATCTGTGCGCAG CGTGTGAGGCGTTTACGGCGGAGGTGGCGCGGAGGAGTACATTGCCGAGGGAAGGAGAAAGGA GAGGGGAAGGAGGAGTGCCGCTGTTTGTGATGATGCCGTGAGACAGCGTAAAGACGGGAACGC GGTGAACCGGAAGAAGCGCATGAACGCGCGCATGGCGCGCTGAAGAGTGCAGGGGTGGAGGGGG TAATGATGGACGTGTGGTGGGGTTTGGTGGAGAGAGAGAAGCCTGGGGAGTATAATTGGGGAGGG TACGTTGAACCTCATGGAGATGGCGAAGAAGCATGGCCTGAAGGTGACGGCGGTATGTCAATTCA CCAATGTGGCGGTAACGTGCGGAGACTCTGACAGTGAATATTATTGCAATCTCTCTCAATCTT TTTTGTCAATTGCTGATTGAATGTTATTAGATTCTGGATCAATTGGTTTTAAACAATTAGAATTGTT ACTATTAGATTCTGGAGTACTTTAAAGGTTTCTTTTAGGTTTAAATTTCTGTGAATTCGTATTGAA ATCTGAAAATCAATTGAGTGACACCATGAAATTTTTTTACGTTTGGAAACATTCTTATTTAAAA AAATTTTAACGTCGTGTTTTGCTTTTAAATATATTGTAGTTTTTAAATAAGCAATTATATT TTATTAGTATTAAATTTGCTGGACACGTGAAACAAAACGGCTGGATACATCTTATTAATAAAT TTAACGTCAAGTTTAGATACCTAAATATTGTTATACGATATATCTATAATGTTTGGATAATGA AATTGGTCGGACAAGCAATTTGGATGAAAATTCATGCAGTGTGAAAATGTTAATTTTTTGTGAAA GTAATTCGTTTAAATTTATATTTTAAATTTTATAGTTTAAATTAATATTTTAGTCTTTATAAAT TACATTTTAAATATTAAATATATTTTAAATTAATTTTATATATTTTATAGGAAAATATGT GGTTATTAATTTATATGGAGTTTTCGATGATTATGATTGAAAATGGGAGGCGTGCCAGCACGATG CAGCCTGTTTGTGAAAAATAAATAAACGGATAAAAGGGTTTTGTGATGGGAAATGAAGCCAAT ACTGCCATGTGAATGATGTGATATTGGACTTGTATCACTTTGCTTCTAAGTGTAGTATTAGTTTT CTCTATTGAATGAAC TAGGAACCTGGAATAATTGAATCTTGAGAATTGTGTATATTATTAAT TTAGCCATTTCCCTTTTACTGAAATTTTAGTGTTTCAATTTTATTACTACTATTTTGATCGAAGA TTATGAAGTTAATTAATTTTAAATCCTTGTGCTATTACGAATGAGCTGGCATTCTCTTAAATTA GGGATAACAACAATATTAATTTAGTATTTTAAAGCATGATTATTATGCTTATTAATAAACATAA TTATTATATCTATTTTAAACATAATAACAATGATTAAAAATAATTTTATAAATGTTTATATTTTGA TATGATTTAAAGAGGCGTAATGAGCACGGTGACAGTCTTATTTCTTTCATCTTTCGTTGGTCTCT TGTGTGTAGTAAATACAAAATACGTGAGAAAAGAGTGTGCTTTCGTGATGGAAAGTGCCAAAGTG GGACCAGTGAGGTAGCACTTGTAGTTTCTACTGATTACAGTCTGGTATCGCCACAAACAGTAGACT
--	--

	AACTTTTAAAGATCTACTACCTTTAATCAAGTGGACCCGAGATCTTAATTTGTTTTTCAGTCTA TTTTTTGAAAATGTATTTGTAAATATTTTCATTTGTTTAAATGTTATTTGAAACAAATAATCC AGATATATTTTCTGTTTATATATTTTCATGTAAATTATTTCAACGGCTATCAATTATAGTAACTA GTTTTCATTTATCAGTGATCGCATAAATCAACTATTGATTTTCGAATTTGAGTCTTGGACATGCGG TAGTTAAATAGTTGGAGGAGGGTTTAAATTCACAGTGATTCTATCTGGTTCCAGTAAGAGATAA TCCAGTAGAATTATCTCTTACAGGAGATAGCTGTGGTTTATTAACAAAAAAGTCTAGTTCATA TTTTTATGATTTTAGATATTATTGGCATCAGTTTTGCTGTAAGTTAGCATAGTGTGGAAATACCA GTTGTCTTATTGGTTGGCTTATCAGATTGTTTGTCTTGTGTGCAGTATTCCTTTACCCAAATGGG TTGTGGAGGAGATTGATAATGACCCCGATCTTGCATATACTGATCAATGGGAAGAAGAACTAT GAATATATATCACTTGGATGTGATACCTCGCCAGTGCTCAAGGGCCGAACCCAGTTCAATGTTA TGCTGATTTTCATGCGTGCTTTTCAGAGACACTTTCAAGCACCTCCTTGGTGACACCATTGTGGTAA ATATCTTTCTCAGTGCACTTTTACATCATGGTGTGATTTTGTGTCTATATAACTTCTCATCTAA ACTCCTTTTACTGGCATATTTTCAGGAAATTCAGTTGGGATGGGACCGGCAGGTGCACTGCGTTA CCCTTCTTACCCAGAGCAAAATGGGACATGGAATTTCCAGGAATTTCCAGTCTTCCATCTTATG ACAAGGTATATATATTTACGTTTTTTTTTCTCTCTCTTCTGTACTCTTTATATATAATTGTT TTAGGATTTGTTTGGATAAATTTCTTGATGAACGAAGAGGAGAAAATTAGGTAAATGTGTTCTA ATACTTAAATTATGCTACGGTGCAGTATATGTTGAGTAGCTTAAAGCTGCTGCTGAAGCTGAGG GTAAGCCTGAATGGGAAGCACAGGCCCTACTGATGCTGGACACTATAACAACTGGCCAGAAGAC ACTCAATTTTTCCGCAAGAAGGTGGAGGCTGGGATGGTCCATATGGTGAGTTTTTCTCACCTG GTACTCTCAGATGCTGTTGGACACGGTGACAGGATTCTCTCATAGCCACAGCTCAATCTTGGACA ACACTGGAGTGAAGATCTCAGTGAAGTTGCTGGCATTCTCATGGCACTATGGCTCAAGGTCTCAC GCCCCAGAACTCACAGCAGGGTATTACAACACCCGGTTCCTGTATGGCTACATCCCCATTGCTCA AATGTTGGCAGCCACGGTGCCATCTTCAACTTCACCTGTATTGAGATGCGCGATCACGAGCAGC CACAAGATGCCCTTTGTGCACCCGAGAAGCTTGTGAAGCAAGTGGCTCTGGCAACGCAGAAGCA CAGGTTCCACTTGCTGGTGAAAATGCGCTGCCACGGTACGATGAGTATGCTCATGAGCAGATCAT AAGGGCATCACAGTTGGATGTTGATGGTGACTCTGGTGGAGAGAGATGTGTGCATTCACTTACC TGAGAATGAACCCGCATTGTTTTGAACCAATAACTGGAGGAAGTTGTGGGGTTTGTGAAGAAA ATGAAAGAAGGGAAGAGTGACACAAAGTGTGGGAAGAGGTGGAGAGGGAAGCTGAGCATTGTTGT GCATGTTACACAGCCTCTTGTGCAAGAAGTGCAGTGCTGATGCATGAGAATTGTTGAACAATC TTGTGCTGATAGATGGCTTAGAAAAGGTACAAGTAGGCTGTGTGAAGTTTGTAGTGAACAGCA GCCCAGGTTTGTGGCTTTGAAGATGTAAATTTTGTATTATATTGTTGTTTATATTCTATGCAC CTAAACTTCTATTGTTACCCTTTTATATTGTGTACGTAATCATTGACTTTGGGGTACTATTTT CTTAAAGTTACTCTACTTTGTACAAGTAGTTACTTATTCTGCATCATGAACTGTTACATGGC GTAACAGCAACAAGAGATGCTATTTTCTTATAGGGAATAATGAATTTAAATCAATGATTTTC GTTGTGTTT
Glyma16g34360 cDNA (SEQ ID NO:27) Soybean BAM1-like gene; ATG start codon and TGA stop codon underlined	ATGATGCCGTTGGACAGCGTAAAGACGGGAAACGCGGTGAACCGGAAGAAGCGGATGAACGCGGC GATGGCGCGCTGAAGAGTGCAGGGGGTGGAGGGGGTAATGATGGACGTGTGGTGGGGTTTGGTGG AGAGAGAGAAGCCTGGGGAGTATAATTGGGGAGGGTACGTTGAACTCATGGAGATGGCGAAGAAG CATGGCCTGAAGGTGCAGGCCGCTTATGTCATTTACCAATGTGGCGGTAACTGCGGAGACTCTTG CACTATTCCTTTACCCAAATGGGTTGTGGAGGAGATTGATAATGACCCGATCTTGCATATACCTG ATCAATGGGGAAGAAGAACTATGAATATATATCACTTGGATGTGATACTTCGCCAGTGCTCAAG GGCCGAACCCAGTTCAATGTTATGCTGATTTTCATGCGTGCTTTTCAGAGACACTTTCAAGCACCT CCTTGGTGACACCATTGTGAAATTCAGTTGGGATGGGACCGGCAGGTGAGCTGCGTTACCCTT CTTACCCAGAGCAAAATGGGACATGGAATTTCCAGGAATTTGGTGGTTTCCAATGCTATGACAAG TATATGTTGAGTAGCTTAAAGCTGCTGCTGAAGCTGAGGGTAAGCCTGAATGGGGAAGCACAGG CCCTACTGATGCTGGACACTATAACAACTGGCCAGAAGACACTCAATTTTTCCGCAAGAAGGTG GAGGCTGGGATGGTCCATATGGTGTGATTTTCTCCTCACCTGGTACTCTCATGCTGTGGACAC GGTGACAGGATTCTCTCATCAGCCACGTCAATCTTTGACAACACTGGAGTGAAGATCTCAGTGAA GGTTGCTGGCATTCACTGGCACTATGGCTCAAGGTCTCACGCCCCAGAACTCACAGCAGGGTATT ACAACACCCGTTCCGTGATGGCTACATCCCCATTGCTCAATGTTGGCACGCCACGGTGCCATC TTCAACTTCACCTGTATTGAGATGCGCGATCACGAGCAGCCACAAGATGCCCTTTGTGCACCCGA GAAGCTTGTGAAGCAAGTGGCTCTGGCAACGCAGAAGGCACAGGTTCCACTTGCTGGTGAAAATG CGCTGCCACGGTACGATGAGTATGCTCATGAGCAGATCATAAGGGCAGCACTGGATGTTGAT GGTGACTCTGGTGAAGAGAGATGTGTGCATTCACTTACCTGAGAATGAACCCGCATTTGTTTGA ACCAAATAACTGGAGGAAGTTTGTGGGGTTTGTGAAGAAAATGAAGAAGGGAAGAGTGCACACA AGTGTGGGAAGAGGTGGAGAGGGAAGCTGAGCATTGTTGTGCATGTTACACAGCCTCTTGTGCAA GAAGCTGCAGTGCTGATGCACTGA
Glyma16g34360 protein(SEQ ID NO:28) Soybean BAM1-like gene	MMPLDSVKTGNAVNRKKAMNAAMAALKSAGVEGVMDVWVWLVEREKPGEYNWGGYVELMEMAKK HGLKVQAVMSFHQCGGNVGDSCITPLPKWVVEEIDNDPDLAYTDQWGRNRNYEISLGCDSPLVK GRTPVQCYADFMRAFRDTFKHLLGDTIVEIQVGMGPAGELRYPSPYCATWNNFPNGIGGFCYDK YMLSSLKAAAEAEKGPEWGSTGPTDAGHYNNWPEDTQFFRKEGGGWDGPYGEFFLTWYSQMLLDH GDRILSSATSIFDNTGVKISVKVAGIHWHYGSRSAPLTAAGYNNTRFRDGYIPIAQMLARHGAI FNFTCIEMRDHEQPQDALCAPEKLVKQVALATQKAQVPLAGENALPRYDEYAHEQIIRASQLDVD GDSGGREMCAFTYLRMNPFLFEPNNWRKFVGVFKMKKEGKSAHKCWEEVERAEHFVHVTQPLVQ EAAVLMH
Glyma01g40590 gDNA + about	TTGAGAACTTAACCTACTAAAATTATCTTTGATGTAATGTTAATGATTTTTTATTTATAATTA TTCTAATTTAAATATGCATCTACTAGTATATTCTAATTTTACTCCCCAACATAAAAAAGTCTAAT

5kb upstream
promoter and
5'UT sequence
(start and
stop codons
underlined;
SEQ ID NO:29);
Soybean BAM2-
like gene

TTATCTATTTTCTCTCTCAAATCCCTTTTACAAAACCTAAAATAGTAAATTGCATTAAAAATATAGA
TGTATAACATGCTAAAGAAAAATTAATGTTTCCCATGTTACCCCTAAAACCTTATCATGCAAATG
GATGATCAAGTCATAAGAAATGTAATATTCTATAAATAGATAAGAAGATAAATTACATCAAAAGTA
GTTGACGGTCAAATTTTCAACAAAAAAGGTTTAGCCTCTTATTGTCATGGAGATTTTATAATTGC
AAGAGTAAATATTTAGTAAAGGGGAGAAAATAAAAAAGGGAATAAGGAAATGAATGACTCTCA
ATATTTATTTCTCCTTCTCTAGTCTTTGCCCTCTATAATGAAGTGTATTCTCTCTTAAAAAATTT
TCCTTTGTTTTTTCTTATTCTCTCCTTTTCTTTTATAGATGCATATTAGTGGGCTTCTTGCATTA
AGTCTAAGTCTGTCTTTATTTTCTTAATTAGTCATATTTTCTTAATTAGTTCGCTTTCCTTAA
TTATTCCTCTCTCTTGAATTATCTACTTTTTTTTTTACTCACAAGCATAATAAATTCATCATT
TTTAATATTTGTGCACAAAAATAAAATAATGTTAATTTAACAATATTGCTTAAAAAAATTT
AGAAGAAAAAATTACAAATCTTATATATTTTAAACCTCAAAATATACTTATAATTAGTTGTTA
TTGATTTTAAAGTTAACCTATTTTTTCAAGATATCCATGGTAGGTATTTCAAATTACACACTTC
ACATGTAACTTTGAGGTTGCAAGGGTGAAAACAGGTAAAAAGAATAACAGCTAGCAAAGACATT
TAAAAATAATTTAGCAATATAAGTCCAATCTAAAGCGGATACGTCCAGCAATATTCATCCCTCAC
CAACTCCAACCTCACTCTCAATAAACTGGAATAATAACCAACATGCTGAATCGTGAAGGCAT
CCCTACAATTCCTTCTAGCCAACCAAGCCCAACAATTTTCTTAGCTTTTAGAAATATTATCGTGT
GCAATGTGATACACTGCAGTAAGCATCAACAAGAATAGTAACCTGACCTTTTATGCCATATATGA
TCGAAGTGGTCAAGAATGGCAAGTAGAAGTGAGGTTTATGCTCTTAAATGATTAATCTAATGGGA
TAAAAAGGACAAAGACAAACAGAACTCTTAATAGAAAAGAAAAAACTAAGTGGGTCAACAATGC
ATATTTTGGATTCAAACCAACCACTGTCCAATCGACAACATTGTTCTACAACCGGAATGATTG
TGATTCATCCGGAGGGTATTTGCTCATTGCTGTTTCTTATTGTCGATATGGGCATGCCAAGTAG
CTAAGTACAATTTCTTAAATTTCTATTTTGGCACTTACAATCGTAATTTAAACTGAAATCAGGTT
TATATATATATATATATATATATATATATATATATATATATATATATATATATATATATATAT
GCATTATATATTTAAGGGGTACGGGTAAACGTGTGTACAATATACTCCTTACAAAAGGTTTATATC
TCTGCTCGGCTTCTTATCCCAAAATTAGCAAGCATTAAATGAAGGGTAACGTGTGTTTGTCTT
ATTAAAAAAAACATAGTACAATTTTAAAGTGGAACATGGAATATTTTCACTCTTTTAA
TGATTTTTTTTATAACATAAAATTTAAATATTAATTTCTAAAGTAGCCAATAATATAAATTTTCA
CTAACTATGTATTGTAATGAAAAAAATATTTTTATATTTTACTTTTGGAAATTTTAAATTTAT
TTGTTAGCAAATGATCTGTTGATGATATATTTTATTAATTTTAAATATTATAATTTAAACATA
TATATTTAAATTTAATTTCTGATACAACATTGGAGGATTATATATATAACTGCTCAGATAGACC
CCTCCAATAGTCCAATTGTAATAAGAGTTTGAGAACATAAGAAAAAAATCTTGTAATTACTAAT
CTATATTGTGGCTTTCCTCATACAATTTGATCCATGGAGAGAAGGAGTAATCACAATAATAATAG
TAATTATTAGTATTATAATAAATGTTAATGTTGGTGACTGCTTGGTCATTTTCTCTCCAGAAAA
ACAGATAAGCTGTGACCTGTTAGTAAGGCCATGGTGGGAGGGACCACTGCATGGCATCTTTCTCA
GTGCTACTAGTGCTTCACTTATTACATGATTTTGAAGTTGTGAGTGGGGTAGAAGATGGAGG
CCATGGTCCACACTTTGTTGCCGCAATGCAAGAAAATGGTAAAAATGATATTGAATCTGCAACCC
CCCAATGTAAGGGCTCTTGTAATAATGGAAGCAGCACAGGGGCGAAGTCACACATTGATAATAG
GGTTTATCGAAAACACCACATCACACCATAACCACTTCACTTACCACGCCCTCTCTTTTCGTGT
CAACAATCTTTGACCACCTTTATCCAACCTAACAAAATCATTACTGTTTATTAATTTTATCTCT
TGTTTTACTAGTAATTTCTATATTGATTTTCTGTTTCTTATGCAAGGTGGGAAATGACACAG
ATCAATAAAAGAAAGGAAGAAAAATCTAGCCTTTAGTGATGATATCGGACTTCTTTTTTGT
TCAAAAGGAGGGCTTGCAATTCGACAATACTAAGCAAAATTAACAAAAATTAAGAAACAATAA
TCCATTTTCTGTCATAATTTCTGTGCTTTGATAAATTTAATACTGCAATATTATTGTAGAACCCGT
GATTATGAAGTATAAGAACATAAATCTCATGTGATAAATTTTCACTGCAATAGAAATGCTATAT
GTTTTTCATTTAAGACACACTATTACAAAAACAATCTTTGAACGACGATTCAATTGACACATT
ATAATTTGTTTTAACCCTTATTGAAGTGAATGTAATGAGAAATATTATATTTTACGATAATTT
CTTAATCATCTTAGAAGATCTCATCTTTTAAAGATACTTTTATGTTAAACCGTTGTAGAAGACC
CACCATCCTAAAAGAACATACTAGAAAAAGAAATGGTGGAGAGGGTGAATAGCTACGGGTTC
TTGGCTTAGTGACAGTTTGGCGGGACCTTACTCCTTGGGAAGGCTAGACAGTAGAAGGATACTC
CGAGATCACTTCAAAGAGAATACGACACCCATGATTATCAAAGGTTAGACAAGTTGATGCGCAA
TTTCCTTGTTTTCACTCATAATTTTGGACTAATTAACTCCACACAGAACGACAAGCATGCCAT
TTTCTAGGCTTTTGTCTTGTGTAATCTAGAAGATAAATCTCATAGCTTTAGCCCCATTGCCC
GCTGGATTTTACTCTCTTCTCACAAGATGGTAACAAGTTAGATAATCTAAGATTGTTGACCTTA
TTCGTCTTATGTTTGGGTTAATATTCTGTTGTACCGAGTATCATGTGCTCTAAAACATGCAGTT
TTGGCTTGGCAATGAATTAGAAGTATTCATCAAAGTAATTCATACCATAACCCATTTTTTAAAGC
TCAAAATGAGCAAGATAAAAACTTTAAACGTATCTTAGGGCATTCAATTATTCAAAAAGCCTTTA
TATTCATTAGAATCTTTGTCATGTATAGACCATTTTCTCTTTTTTAAATAAAAAACATATTAA
TATGTATCTCAGGGAATTTATTAACAATTTAAATGAAATATTATATAAAAATATTATCGAC
ATAATATTATTATTATTATTATTATTATTATTATTATTATTATTATTATTATTATTATTATTATT
AAAAAAATTCATTGATACTCTTTAAAGTAGAAACGCTTGTAGTAAAAATGATATTTTGAATTT
AAAAGGTTATACATTTTATATTATTGTTAAAAATTTAAACTTAATAATGAAATTTAAATATTT
TATTTTTATCCTCAAATGACTAGACACTACAACAAAATAAATAAATAAGCAAGGAAAACTA
ACAAAAGAACTAACCGTTGCTTGGACCTTCTTGGAAAAATAAGGCAATAGCATAGGACCTACTT
CAAAAAGACATTGACTACAAAAACATGCAAAATGGACAAAAGATGAACAGAAAACTAAGAAGA
CGTTGCATTTATTTTTCAATTTACGTAATTTTCAATTGAAAAATTATTTTAACTATTTCATTT
ATTTGTTAACAGGCCATTTTAAATTCGAAACCTCGGTATTTTATTAACTCATTTAAATATCT
ACACCATTTTATTAAAAATATAATAATAAATTTTAAATATAGTTTCTTAAATAAAATCTC

TAATAACTGCGAAAAAAGTATTTTTCTAAAAATACCATAATTAAATACGTACAACAACGAAGTAT
 TAAACATATAAACTAAAGAACCACGACACATTATGTCTTTCTATCACAATCATAAGTAATGC
 TTGATTTGTGAGCACACTCTCCATAACCAACAACACACACATAACATTCTTTTATTAATAATCATT
 TTAAATTATGTCACATAATACTACTGTAACAACACACATTAGCATGAAACTGGTATTAGTAGCA
 CATACAATAAATAAATATGATTATTATCTGATGTAATTATGTAAGTATTATGAGTGGTTGATTA
 AAAAAACAAAATAGAGTTGGTAAGGGGGTGGATCCACATCCACCGCTTCTGCACCAAACTCAGCA
 TAGCAGTGGGTCAATGATTGATTGGTAATTGTAATTCTATTCAAAAAGTGAAAAGAGTTGAATGA
 GAATTCGTATATTTCAGAAAATCCCCCTCCTTTAAGATAAGAGAATAGGCCTCACTCTTTCTTTT
 TCTTCCATTCCCAAAATGCGTGTCTCTTTCTTTTCTGTTTTTCCAGTTTCTCCATTTTCTATT
 CCCCCAAACCTTTTCCAGCCCCAATCTCAGAGTACCGTGCCCTTCTCTCTCTCCGTTCCAGCCATTA
 CCGACGCCACCCACCTCTTCTCACTTCGTGGAACCTCTCCACCCCTTACTGTTCTCTGGCTCGGC
 GTCACCTGCGACAACCGCCGCCACGTCACTCTCCCTAGACCTCACCGCCCTCGACCTCTCCGGCCC
 CCTCTCCGCCGACGTCCGCCACCTCCCATTCTCTCCGCTCTCTCCGGCCTCCGCTTCTCAACCTCTCCAACAAT
 CTGCTTCAACGAAACCTTCCCCTCGGAGCTCTCGCGCTCCAGAACCTCGAGGTCTCTGACCTCTA
 CAACAACAACATGACCGGCGTGTCTCCCCTCGCCGTCCGCGCAGATGCAGAATCTTCGTCAATTTGC
 ATCTCGGCGGCACTTCTTCTCCGCCAGATCCCGCCGGAGTATGGACGCTGGCAGCGCTCCAG
 TACCTCGCCGTCTCCGGCAACGAGCTCGAGGGGACTATCCCTCCGGAGATCGGAAACTTGTCCAG
 CCTCCGGGAGCTCTACATCGGCTACTACAACACCTACACCGGGGGCATCCCGCCGGAGATCGGAA
 ATTTGTGCGAGCTGGTGAGGCTCGACGCCGCTACTGTGGTTGTTCCGGCGAGATTCCGGCGGCG
 CTGGGAAAGCTTCAGAAGCTGGACACGCTGTTTCTTCCAGGTGAATGCATTGTGAGGTCTTTGAC
 TCCCGAGCTGGGGAACCTGAAGAGCTGAAATCCATGGATTGTCTAACAACATGCTCTCCGGTG
 AGATTCCGGCGAGATTCCGGCGAGCTGAAGAATATTACTCTTCTGAATCTGTTCCAGGAACAAGCTT
 CACGGAGCTATACAGAGTTTATAGGGGAGCTTCCAGCGTTGGAAGTTGTGCAACTGTGGGAGAA
 TAACTTCACAGGTAGCATTCCAGAGGGTTTGGGCAAAAACGGGAGACTCAACCTTGTGTGATCTTT
 CTTCTAACAAGTTAACTGGGACTTTGCCTACTTATCTCTGTTCTGGGAATACTCTTCAGACTCTG
 ATAACCTTTGGGAATTTTCTTTTTTGGTCCAATTCCCTGAGTCGCTTGGTAGTTGTGAATCCCTTAC
 ACGATTAGAATGGGAGAGAATTTTGAATGGTTCCATTCCGAGAGGGCTTTTGGACTTCCCA
 AACTAACACAGGTTGAGCTTCAGGATAATTATCTCTCTGGAGAGTTTCTGAGGTGGGTCTGTGTT
 GCTGTTAATCTTGGTCAGATTACTCTCTAACAACAGCTTTCTGGGTTCTACCTCCCTCCAT
 TGGTAACTTCTCCAGCGTGCAGAAGCTCCTTCTTGATGGCAACATGTTCCAGGGTCCGATACTC
 CCCAGATTGGGAGGTTGCAACAGCTTTCTAAGATTGATTTTAGTGGCAACAAGTTCTCGGGTCTC
 ATTGTGCTGAGATCAGTCAGTGAAGCTGTTAACTTCTTGGACTTACCGTCAATGAGCTATC
 TGGAGACATCCCAATGAGATAACTGGCATGAGGATATTGAATTACTTGAATCTTTCTAGGAATC
 ATTTAGTGGGTGGCATTCCCTCTTCGATATCATCTATGCAAAGCTTGACTTCTGTTGATTTTCA
 TACAACAACCTGTCTGTTTGGTGCCTGGTACCGGTCAATTCCAGCTACTTCAATTACACGCTTTT
 CTTGGGAAACCTGACCTCTGTGGCCCTATTTGGGTGCTTGCAAGGATGGGGTTGCCAATGGCG
 CACACCAACCTCATGTTAAAGGTCTCTCTCTTTTAAAGCTGCTACTTGTGTTGGGTGCTA
 CTATGTTCCATTGCTTTTGTGTGGCTGCAATATTCAAGGCCGGTCACTGAAGAAGGCCAGTGG
 GGCTCGTGCATGGAAGTTGACTGCGTTCCAACGTTTGGACTTCACTGTGATGATGTTTTGCATT
 GCTTGAAGGAGGATAATATTATAGGGAAGGAGGTGCTGGCATTGTCTACAAGGGGCTATGCCCT
 AATGGGGATCATGTTGCTGTGAAAAGGCTTCCGGCTATGAGTAGAGGCTCTTCCATGATCATGG
 CTTCAATGCTGAGATTCAAACATTGGGGCGAATCCGACACAGGCACATTGTAGGTTGTTGGGCT
 TCTGTTCAAATCATGAGACAAACCTTTTGGTCTATGAGTACATGCCAATGGAAGTTTAGGCGAG
 GTTCTTCATGGAAGAAGGGGGTCAATTGCATTGGGATACAAGGTATAAAATTCGGGTGGAGGC
 TGCCAAGGGGCTTTGCTATCTGCACCATGATTGTTTCGCCACTCATTTGCTGATGTGAAGT
 CAAACAACATCCTTCTTGAATCTAATCATGAAGCCCATGTTGCTGATTTTGGGCTTGCTAAGTTC
 CTGCAAGATTCTGGGACATCTGAATGCATGTCTGCTATTGCTGGTTCAATGGATACATAGCTCC
 AGGTACCGTCCAATTTTCGACATAATTAATGCATTATTTACATGGTTGTGGAAAATTTTCTTTTAC
 CCGCCTGTTCAATAATTGTACGTTTAATCATGTTTCAGAAATTGACTCTTTGACTTATCATCATGT
 TTTAGGTGATGACTGTTGATATTGAGGTGATGTCCCTAAATTAATTAACATTGCTATGTGGTTT
 TCTTGACTTTGGTTTTCTATCATACCCAAATGATCTCTTGATTTCGACCCCTTATTTAGTCTATT
 TCAAGCCAAGTACTGAAAGTAAATGGTAGATAGCTCTGCAACGTTAGAGTCATTACGACCGGAA
 ACTGATGATTATGGGCAAAATATCGGATAAAAAGACCTATTATGTTACTTTTACACTTATTGCCCTT
 TGTTTAACTTATAGTTTCAAATTCAAGTGTCTTCTTTTATTTTAGTTTATGATACATGTTTCGATG
 TTTGATTGCAGAGTATGCCTACACATTGAAAGTTGATGAGAAAAGCGATGTGTACAGTTTGGTG
 TGGTTCTCTTAGAACTTATAACAGGCAGGAAACAGTTGGAGAATTTGGTGATGGCGTGGACATA
 GTGCAATGGGTGAGGAAAATGACGGATTCTAACAAGGAAGGAGTTCTTAAAGTTCTTGATCCTAG
 ACTTCCCTCAGTTCCCTTCCAGAAAGTGATGATGTTTCTATGAGCCATGCTGTGCGTTGAAG
 AACAGGCTGTAGAGAGACCAACTATGCGTGAAGTTGTTCAAATACTGACAGAGCTTCAAAGCCA
 CCTGACTCTAAAGAGGGGAACCTTAAACAATAACGGAATCATCTTGTGTCATCATCAAACGCTTTAGA
 ATCTCCATCCTCAGCCTCTAAGGAAGATCAAATCCTCCTCAATCCCCACCACCGATCTTCTTA
 GCATTTAAAGTGCTCTGTTGGGTGTTTCTCTAGTTCCCTTGGGTTGTGATCGCTTATCCATTT
 ACTTTCTTTTCTGTCTCTCTTCTGGGATTGGTTTTTTTTTTTTTCCCTAACTGAAGGTGTTAAT
 GTTTGGATTTTTTAATGGTTTTGTACAGTAGGATTGATGGGGGTTATTTCTTATAAAGTCACTGT
 CTTTCATCATGTAGTACTGCTTTTAAATTTTTTATTTGCGACCGTTGTTGGGAGGATTCAAGGGAT
 ACAATTAAATTACTCGTTTGTTCCTGAAATTCATTATTCATACTTTTTTAGTTTATG

Glyma01g40590 cDNA(start and stop codons underlined; SEQ ID NO:30); Soybean BAM2-like gene	ATGCGTGTCTCTTTCTTTTCTGTTTTTCCAGTTTCTCCATTTTCATTTCCTCCAAAACCTTTTC AGCCCCAATCTCAGAGTACCGTGGCCTTCTCTCTCTCCGTTCCAGCCATTACCGACGCCACCCAC CTCTTCTCACTTCGTGGAACCTCTCCACCCCTTACTGTTCTGGCTCGGCGTCACCTGCGACAAC CGCCGCCACGTCACTCCCTAGACCTCACCAGGCTCGACCTCTCCGGCCCCCTCTCCGGCGACGT CGCCACCTCCCATTCCTCTCCAACCTCTCCCTCGCCTCGAATAAGTTCTCCGGCCCCATTCTCT CCTCACTCTCCGCTCTCTCCGGCCTCCGCTTCTCAACCTCTCCAACAATGTCTTCAACGAAACC TTCCCTCGGAGCTCTCGCGCCTCCAGAACCTCGAGGTCTCGACCTCTACAACAACAACATGAC CGGCGTGCTTCCCTCGCCGTGCGCGAGATGCAGAATCTTCGTCACTTGCATCTCGGCGGCAACT TCTTCTCCGGCCAGATCCCGCCGAGTATGGACGCTGGCAGCGCCTCCAGTACCTCGCGTCTCC GGCAACGAGCTCGAGGGGACTATCCCTCCGAGATCGGAAACTTGTCCAGCCTCCGGGAGCTCTA CATCGGCTACTACAACACCTACACCGGGGGCATTCGCCCGGAGATCGGAAATTTGTCCGAGCTGG TGAGGCTCGACGCCGCTACTGTGGGTGTCCGGCGAGATTCCGGCGGCGCTGGGAAAGCTTCAG AAGCTGGACACGCTGTTCTTTCAGTGAATGCACTGTGAGGTCTTTCGACTCCCGAGCTGGGGAA CCTGAAGAGCCTGAAATCCATGGATTGTCTAACACATGCTCTCCGGTGAGATTCCGGCGAGAT TCGGCGAGCTGAAGAATATTACTCTTCTGAATCTGTTTCAAGAACAGCTTCACGGAGCTATACCA GAGTTTATAGGGGAGCTTCCAGCGTTGGAAGTTGTGCAACTGTGGGAGAATAAATTACAGGTAG CATTCCAGAGGGTTTGGGCAAAAACGGGAGACTCAACCTTGTGATCTTTCTTCTAACAGTTAA CTGGGACTTTGCCTACTTATCTCTGTTCTGGGAATACTCTTCAGACTCTGATAACTCTTGGGAAT TTTCTTTTGGTCCAATTCCTGAGTCGCTTGGTAGTTGTGAATCCCTTACACGGATAGAGTGGG AGAGAACTTTTGAATGGTTCCATTCGAGAGGGCTTTTGGACTTCCAACTAACACAGAGTTG AGCTTCAGGATAATTATCTCTGAGAGTTTCTGAGGTGGGTCTGTTGCTGTTAATCTTGGT CAGATTACTCTCTTAACAACAGCTTTCTGGGGTTCTACCTCCCTCCATTGGTAACCTCTCCAG CGTGCAGAAGCTCCTTCTTGATGGCAACATGTTTACGGGTGCGATACCTCCCCAGATTGGGAGGT TGCAACAGCTTTCTAAGATTGATTTTAGTGGCAACAAGTTCTCGGGTCTATTGTGCCTGAGATC AGTCAGTGTAAGCTGTTAACTTTCTTACCTTAGCCGCAATGAGCTATCTGGAGACATCCCAA TGAGATAACTGGCATGAGGATATTGAATTACTTGAATCTTTCTAGGAATCATTAGTGGGTGGCA TTCCCTCTTCGATATCATCTATGCAAGCTTGACTTCTGTTGATTTTCTATACAACAACCTGTCT GGTTTGGTGCCTGGTACCGGTCAATTCACTACTTCAATTACACGTCTTTCTGGGAAACCTGTA CCTCTGTGGCCCCCTATTGGGTGCTTGCAAGGATGGGGTGGCAATGGCGCACACCAACCTCATG TTAAAGGTCTCTCCTCTTCTTTAAGCTGCTACTTGTGTTGGGTGCTACTATGTTCCATTGCT TTTGTCTGGCTGCAATATTCAAGGCCGGTCACTGAAGAAGGCCAGTGGGGCTCGTGATGGAA GTTGACTGCGTTCCACGTTTGGACTTCACTGTGATGATGTTTTCATTGCTTGAAGGAGGATA ATATTATAGGAAAGGAGGTGCTGGCATTTGTCTACAAAGGGGCTATGCCCTAATGGGGATCATGTT GCTGTGAAAAGGCTTCCGGCTATGAGTAGAGGCTCTTCAATGATCATGGCTTCAATGCTGAGAT TCAAACATTGGGGCGAATCCGACACAGGCACATTGTTAGGTGTTGGGCTTCTGTTCAATCATG AGACAAACCTTTTGGTCTATGAGTACATGCCAATGGAAGTTTAGGCGAGGTTCTTCATGGAAAG AAAGGGGTCAATTTGCATTGGGATACAAGGTATAAAATTCGGGTGGAGGCTGCCAAGGGGCTTG CTATCTGCACCATGATTGTTCCGCACTCATTTGTCATCGTGATGTGAAGTCAAACAACATCCTTC TTGATTCTAATCATGAAGCCCATGTTGCTGATTTTGGGCTTGCTAAGTCTCTGCAAGATTCTGGG ACATCTGAATGCATGTCTGCTATTGCTGTTTCAATGATGATACATGCTCCAGAGTATGCCTACAC ATTGAAAGTTGATGAGAAAAGCGATGTGTACAGTTTGGTGTGGTCTCTTAGAAGTTATAACAG GCAGGAAACAGTTGGAGAATTTGGTGTGCGGTGGACATAGTGAATGGGTGAGGAAATGACG GATTCTAACAAGGAAGGAGTTCTTAAAGTTCTTGATCCTAGACTTCCCTCAGTTCCCTTACGA AGTGATGCATGTTTTCTATGTAGCCATGCTGTGCGTTGAAGAACAGGCTGTAGAGAGACCACTA TGCGTGAAGTTGTTCAAATACTGACAGAGCTTCAAAGCCACCTGACTCTAAGAGGGGAACTTA ACAATAACGGAATCATCTTGTATCATCAAACGCTTTAGAATCTCATCTCAGCCTCTAAGGA AGATCAAAATCCTCCTCAATCCCCACCACCCGATCTTCTTAGCATTTAA
Glyma01g40590 protein(SEQ ID NO:31); Soybean BAM2-like gene	MRVLFLFLFFQFLHFHFKPILSAPISEYRALLSLRSATDATPPLLTWNSSSTPYCSWLGVTCND RRHVTSLDLTGLDLSGLPSADVAHLPLSLNLSLASNKFSGPIPPSLSALSGRLFLNLSNNVFN FPSELSRLQNLEVLNLYNNMTGVLPPLAVAQMNLRHLHLGNNFFSGQIPPEYGRWQRLQYLAVS GNELEGTIPPEIGNLSSIRELYIGYNTYTGIPPEIGNLSELVRLDAAYCGLSGEIPAALGKLQ KLDTLFLQVNALSGSLTPELGNLKSLSMDLSNNMLSGEIPARFELKNITLLNLFRLNKLHGAIP EFIGELPALEVVQLWENNFTGSIPEGLGKNGRLNLVDLSSNKLGTGLPTLYLCSGNTLQTLITLGN FLFGPIPESLGSCESLTRIRMGENFLNGSIPRGLFGLPKLTQVELQDNYLSGEFPEVGSVAVNLG QITLNNQLSGVLPPSIGNFSSVQKLLLDGNMFTGRIPPQIGRLQQLSKIDFSGNKFSGPIVPEI SQCKLLTFLDLNRNELSGDIPNEITGMRIILNYLNLNRNHLVGGIPSSISSMQSLTSVDFSYNNLS GLVPGTGQFSYFNYTSFLGNPDLGCPYLGAACKDGVANGAHQPHVKGLSSSFKLLLVVGLLLCSIA FAVAIFKARSLKKASGARAWKLTAFQRLDFTVDDVLHCLKEDNIIGKGGAGIVYKGAMPNGDHV AVKRLPAMSRGSSHDHGFNAEIQTLGRIRHRHIVRLLGFCNHNHLLVVEYMPNGSLGEVLHGK KGGHLHWDTRYKIAVEAAKGLCYLHHDCLPLIVHRDVKSNNILLDSNHEAHVADFLAKFLQDSG TSECMSAIGSYGYIAPEYATLKVDEKSDVYSFGVVLLELITGRKPVGEFGDGDIVQVWRKMT DSNKEGVLKVLDPRLPSVPLHEVMHVFYVAMLCVEEQAVERTMREVVQILTELKPPDSKEGNL TITESLSSSNALESPPSSASKEDQNPQSPPPDLLSI
Glyma11g04700 gDNA +about 5kb promoter	GTTGGAGTAAATCCAATAACATCAATCCTTAATATATATTTATTAAATTTTATTGATAAACTG ACTTACTAGTACATATTTAGTTTGTAAATAATATCATTGTTTGGATCCAATATATAAGCCAATT TTTTTTATGGACAAAATATATGGAGCCAAAGCCGAGCTCAAAAACCTATGTAACAAGAGACACT GAAGAGTGAAGAATCAGCAACATGATCAAAGCCTAAAATTTGGGGCAAAAATTCAAACACTTGGCT

and 5'UT
sequence (SEQ
ID
NO:32) Soybean
BAM2-like gene

ATAAATACACCAGATAGTCCATACTTAGCCGCTATTATGTCAAATATAATAGTATTAATATTAC
ATGGCAAAGTATAGGCTATATAATTTAATGTAATTTATTAAATTTTACAAGGTACTGATTCAACT
TTAAACATGTATGCTAATTGGAGTTTAAAATTTGTGAACAAAAGCAAGTGCATTTTGTGCGTG
ATCAAATTTGCTCAACCTTATCATGTAGGAAAACGGATAACCAGAAATTTGTGTGGTCCCAAACGA
CAACAAGACGCATTTATAAGCTTGACTAGTTCTCTTCGTGCTCAACTGACATTTCTCATTTCTCAA
TGATAGTTGCTACTTGATAATATTTTATTGCAATAATCTGTGTTAACCTACCTATAATATATAG
CTGGTGCTATTAATCGAATGTTTAACTCTCATTTTAAAGATTTACAGTGTGTGGATTGATGGTGAAG
ATCCAAAATCATAGTATCTGATTATGATTTAGTTTCCACCGCATCAGAGAGTATAGCTAGCTAG
TTTTAAAGTTAGCATGATTTTTTCAAGATAACCCACCGTAGATTTTTTCAACATAATATAATATA
ATTTTCACTTGTAACTTTGAGGTTGCAAGGAAGAAAAGCAGGTAAAAGAATAACAGGTAGCAA
AGACATTTAAAAATTAAATAGTTCTAACAATATAAGTCCAATCTAAAGGGGATACGTCCAGCAA
TACTCATCCCTCACCAACTCCAACCTCACTCTCAATAAACTGGAATCGTGAAAGCATCATTACAA
TTATCTCCTAGCTAACCAACCAACATTTTTTTTAGCTTTTAGAAATATTATCGCGTGCAATGT
GATGCATGCTGCAGTTAGCATCAACAAGAATAGTAACCTGACCTTCATGCCATTATGATCGAG
GTGGTAAAAAATGGCAAGTAGAAGTGAGGTTTCATGCTCTTTAATGATTAATCTAATGGGATAACA
AGAACCAGAACAAACAGAACTCTTGGTAGAAAAGAAAAAAGTGGGTCAATAATGCATATTT
TGGATTCAAACCAACCACTGTCCAATTGACATCATTTGTTCTACAAAACCGGAATGATTGTGATT
ATCCGGAGGGTATTTGCTCATTGCTTCTTATTATCGATATGGGCATACCTGACTAGCCAAGT
ACAATTTCTTAATTTCAATTTTGGCACTTACAATCGTGATTAAGTGAAGTATGAGTATGAGTTTATATA
TATGCTTGTCTTTTATCCAAAATTAGCATGCATTTCTATATTTATGGGTACGGTGCAATGTG
TACAATATACTCCTTACAAAAGGTTTATATATCTGCTTGGCTTTTAAATCCCAAATTAGCATGCA
TTAAATGAAGGGTAACGTGTGTTTTATTCTTATTTAAATAAATAACATATAGTACAATTTTAAAG
TAGCCAATAATTTTAAATTTTCACTAACTCTGTATCTGTATTGTAATGAAAATATTTTATATT
TTACTTTTGGATCAATTTAAATTTATTTGTAAACAAATGGTTTTACATTTTATTAATTTCTTTTA
TTAAATCTGTCCATAATATCTTTTTTTTTTATAAGTTTAAATTTTATAATTTTAAATTTTAAATTT
CTAATACAACGTAAGAGGATTAATATACTTAGCTAGTTAAAGATTATAAATATTTTCAACTG
CGTTGGAGTTAGCTGGGATGACCACGGATCTTCCCCCATAAATTACCACAAAGCCCACTTT
GTTACACAGAAAGGGACTCTTGCAACAAGAGAATAAGGGACATTAAGTAATTTGCCTATTAATAA
TGTTATAAGCTAATATAAAATTAGTTTGGCGGTTAAATGAAAATTTAAAGATTGAAGGGAGAAA
GAAGAAGAAAAGAGAGTTTAAATTTCAATCTTCCACTGATCTTGGTTGATAAAAAAATGAAACC
GCACACAAAACGCTCTCCATCAATGCAATTGTACTAGTAATACTTAACTTGTGTCTTATATACA
GCGTGGAAATATAAAATAAATAACATAATATCATTTTTTGATAATATTATATATATATATATAT
ATATATATACTATTTTTTATATACGTTTGAGTACATAAGGAAACAATCTTGCTATTACCAATCT
ATATTAGTTGTGGCTTCTCATAGAATTGATCCATGAAACGAAGGAGTAACACTGAATAATAAT
AGTGCTAATGAAAACCCATTATAATAGTAATTACTAATATTATTATGAAATATGAAATGTTAAT
ATTCGGTGACTGCTTGGTCATTTTCTCTCCAGAAAACAGAGCTGTGACCTGTTAGTAAGGCCA
TGGTGGGAGGGACCACTGCATGGCATCTTCTCAGTGCTTCCCTTATTACATGATTTTTGATGGCT
TCAGTTGTGAGAGACCGGTTGGGTGGGTAGAAGATGGAGTATTGTATAGGAAGAAAATGGTAAAA
TCATATTGAATCTTCTGCAATCCCCAATGTACTCTAGTTAGTAAGTGAATGTAAGGGCCTATTG
TAATAATTGAAGCAGCACAGGGCGAAGTCTCACATTCATAATAGGGTTTATCGAATTTAACACACA
CCATACCACTTGCCACGCCCCCTCTCTTTTCGTGACGGTCAACATTTCTTGACCACCTTTATCCA
ACCTAACTAAATCATTACTACTGTTTATTAATTTATACTCTGTTTTAATTTCTATATTGAATT
TCATTCAATTTGTAATATTAATATAGGTGTGAAAATGACCATGATCAATAAAAAGAAAGGAGAGC
AATATCTAGCTTTTAGTGATAACATTGGACTTCTTTTTGTTTTAACAAAATTAAGAAACAAC
AGTCATTTTTCTGTCACTAATCTGATGCCCTTGACAAATTAATTTAATACTGTAAGATTATTGTAGA
ACCCGTGATTATGCAGTAGAAGAACATAAATTTGTATGTTTCTCATCTAAGAAAGGAAAGTAGC
TAGAAAAAGAATGGTAGAGAGGGTGAATAGCGAATGCATGCTATGGCCAACGGGTTCTCTATT
CCTTGCGGAGGCTATACAGTAGAATGGTTGTCTAGATCACTTCAAATAGAATACGACACCCATG
ATTGTCAAAGGCTAAACAAGTTGATGCGCGCAATTTCTTGTTTTTCAGTCATAATTTTGGACTA
AACTCCACACAGAACGACATGTTCTTTTCTAGGCTTTTGTCTTGTGTAATACTAGCGTTGGATT
TACTCTCTTCTCACAGATGGTAACAAGTTAGATAATCTATATAAGATTTCTGACCTTATTCTGT
CTTAATATAATAACATGTTATAGCGAGTATATATCATGTGCTCCAATACATGCAGTTTGGCAA
TGGATTAGAAGTGTTAACGTTCCAGCAGAGTAATTCATACCATCCCCCATTTTAAATGCTCAAAA
TGAGCAAGATGAAAATTTTTTAAACGTATCTTAATTTCTTAGGGCATTCAATTATCAAAAAGCC
TTTATATTCATTAGAATCTTTGCATGTATAGATCATTTTCTCTTTTTTTTATTAAAAAAATTA
ACATATATATATATATATATATATATATATATATATATATATATATATATATATATATATATA
TATATATATCAGGCCATTATTAAGCAATTAACATGAAAATATTTTATACAAAATATTATTATA
TCTATTGTAAGTTTAAATTAATAAATTTTATTGATATTCTTAAACGTTTGTAGTAAAAAATATA
TTTTAAATTTAAAGGTTATATATAGTTATACATTATTATATTCTTAAATTTAAACCTTAA
TAATAATAAATAAATAAATAGTATTCTTAATAACTAGACACGCAACAATAAATAAATAAATA
AGACAAGGAAAACTAACAGAAGATTAGCCGTTTTCTCGACCTTCTTGGAAAATAAGGCAATA
GCATAGGACCTACTTAAAAAAGTTAAACATTCGACTACAAAACATACAAATGGACAAAGAT
AAACACGTAAGAAAACCTAAGAAAACGTTACATTTTTTTCTTTCAATTTACCGTATTGTTATT
GAAAATTTTATTTCAAACATTGTTTCAATTTATTTGTTTTTAAAGAGGTTCAATTCATTGTTATT
AATTTAACAAATATTGTTAACGATCTATTTTAAATTTCAAACGATTTTTTATTAACACTCAT
AAATTATGTGCACCATTTTTTTTATTATAAATAAATAAATAAATAAATAAATAAATTGATGAATG
ACATGATAAAAAGACCGTATTATTGTCATAATTAAGAAGCAGCCATATTTATGTCTTCTCTATC

ACAATCATAAGTAAAACTTGAGTTTACCACCATCCTCCGCTCAATAACCCAGCAACACACATAAC
 ATTCTTTTATTAATGTCAATTTTTAAGTGGCATAATAACTATATAACAACACACATGAGTGCCGCA
 TCATAAATTACACATACGATAAATAAATCTTCATTATTATCTTATGCAATTATATATGATTATG
 AGTGGTTTATTAAAAAATAGTGCAGCAAGTCACCATAGCCGTGGGTGAATGATTGATAGGTAAA
 ATTGTATTTTTCTTTTTTCCCGGGTATTTCAAAAAGTAAAAAGAGTTGAAGGGACGAATTCATA
 TATTCAGAAAATTCCTCTCCTTTAAGTATCGGTTTGTGTTTGGGGGCATCACTCGTTGTTTCTC
 TCTCCATGCCCAAAATGCGTGTCTCTTTGTTTTTCTGTTTTTCCATTTTCTTTCCCTGAAAC
 CCTTCTGCCCCAATCTCAGAGTACCGCGCCTTCTCTCTCTCCGTTTCAGTCATTACCGACGCCA
 CACCACCGTTCTCTCTTCTTGGAACGCCTCCATCCCTTACTGTTCTGGCTCGGCGTCACCTGC
 GACAACCGCCGCGCAGTCACCGCCCTCAACCTCACCGCCTCGACCTCTCCGGCAGCTCTCTGC
 CGACGTGCGCCACCTCCCTTTCTCTCCAACCTCTCCCTCGCCGCAACAAATCTCCGGCCCCA
 TTCTCTCTCTCTCTCCGCCCCTCTCCGGCCTCCGCTACCTCAACCTCTCCAACAATGTCTCAAC
 GAAACCTTCCCCTCGGAGCTTTGGCGCCTCGAGAGCTCGAGGTCCTCGACCTCTACAACAACA
 CATGACCGCGGTGCTCCCTCTTGGCGTCCGCGAGATGCAGAATCTTCGTCATTGTCATCTCGGCG
 GCAACTTCTTCTCCGGCCAGATCCCGCCGAGTACGGACGCTGGCAGCGCTCCAGTACCTCGCC
 GTCTCCGGCAACGAACTCGACGGGACTATCCCGCCGAGATCGGAACTTGACCAGCCTCCGGGA
 GCTCTACATCGGCTACTACAACACCTACACCGCGCGCATTCGCGCCGAGATCGGAACTTGTCGG
 AGCTGGTGAGGCTTGACGTAGCGTACTGTGCGTTGTCCGGGGAGATTCCGGCGCGCTTGGGAAG
 CTTTCAAGCTGGACACGCTGTTCTTTCAGGTGAATGCATTGTGAGGATCACTGACGCGGAGCT
 GGGGAACCTGAAGAGCCTGAAATCCATGGATTGTCTAACAACATGCTCTCCGGTGAGATTCCGG
 CGAGTTTCCGGCGAGCTGAAGAATATTACGCTTCTGAATCTGTTTCCAGGAACAAGCTTCATGGAGCT
 ATACCGGAGTTTATAGGAGAGCTTCCAGCGTTGGAAGTTGTGCAACTGTGGGAAAATAACTTAAC
 AGGTAGCATTCTGAGGGTTTGGGCAAAAATGGGAGACTCAACCTTGTGATCTTTCTTCTAACA
 AGTTAACCAGGACTTTGCTCTCTTATCTCTGTTCTGGGAATACTCTTCAGACTCTGATAACTCTT
 GGGAAATTTCTTTTCCGTTCAATTCCTGAGTCGCTCGGACTTGTGAATCTCTTACACGGATTAG
 AATGGGAGAAAATTTTGAATGGTTCCATTCTTAAGGGCTTTTGGACTTCCCAACTCACCC
 AGGTTGAACCTTCAGGATAATTATCTCTCTGGAGAGTTTCTGAGGTTGGTTCTGTTGCGGTTAAT
 CTTGGTCAGATTACTCTCTAACAACCAGCTTTCTGGGGCTCTGTCTCCCTCCATTGGTAACTT
 CTCCAGCGTGCAGAAGCTCCTTCTTGATGGCAACATGTTACCGGTCCGATACCTACACAGATTG
 GGAGTTGCAACAGCTTCTAAGATTGATTTTAGTGGCAACAAGTTCTCCGGTCTATTGCGCCT
 GAGATCAGTCAGTGTAAGCTGTTAACTTTCTGACCTTAGCCGCAATGAGCTATCTGGAGACAT
 CCCTAATGAGATAACTGGCATGAGGATATTGAATTACTTGAATCTTTCTAAGAATCATTTAGTGG
 GTAGCATTCCTCTTCGATATCATCTATGCAAAAGCTTGACTTCTGTTGATTTTTCATACAACAAC
 CTGTCTGGTTTGGTGCCCTGGTACCGGTCAATTACGCTACTTCAACTACACGCTCTTTCTGGGAAA
 CCCTGACCTGTGTGGCCCTATTGGGTGCTTGCAAGGGTGGGGTTGCCAATGGTGCACACCAAC
 CTCATGTTAAAGGACTCTCTCTTCTTTGAAGCTGCTACTTGTGTTGGGTGCTATTATGTTCC
 ATTGCTTTTGTCTGTGGCTGCAATATTCAAGGCCCGGTCAATAAGAAGGCCAGTGAGGCTCGTGC
 ATGGAAGTTGACTGCGTTCCAGCGTTTGGACTTCACTGTTGATGATGTTTTGCAATGCTTGAAAG
 AGGATAATATTATTGGGAAAGGAGGTGCTGGAATTGTCTACAAGGGGCTATGCCAATGGGGAT
 CATGTTGCTGTGAAAAGGCTTCCAGCTATGAGTAGAGGCTCTTCCATGATCACGGATTCAATGC
 TGAGATTACAGACATTGGGGCGAATCCGACACAGGCACATTGTTAGGTTGTTGGGTTTCTGTTCAA
 ATCATGAGACAAACCTTTTGGTCTATGAGTACATGCCCAATGGAAGTTTAGGTGAGGTTCTTCAT
 GGAAAAAGGGGGGTCAATTGCAATTGGGACACCAGGTATAAATGCGGTGGAGGCTGCCAAGGG
 GCTTTGCTATCTGCACCATGATTGTTCCGCACTCATGTTCCATCGTGATGTGAAGTCAAACAACA
 TCCTTCTTGATTCAAATCATGAAGCCCATGTTGCTGATTTTGGGCTTGCTAAGTTCTCTGCAAGAT
 TCTGGGACATCTGAATGCATGTCTGTATTGCTGGTTTCAATGGATACATAGCTCCAGGTACCGT
 TGAATTTTGACATAAATTAAATGCATCATATGCATGGTTGTGGCAAATTTCTTTTCTCGCCTAAT
 CATAATTGTACGTTTAAGCATTTTGTTCAGAATTTGACTCTTGACTTATGCATGATATTGAGGT
 GATGCCCCATAATTTATTAACATTGCTATGTGGTTTTTCTTGACTTTGGTTTTCTATCATACCCA
 ATTGATTGCCCCCTTATTTGTTTTTTTTTCTAAGCCAAGTACTGAAAGTAAATGGTAGGTATC
 TCTGCACCGTTTGATTTTTTACCCTAACCCCTCTCCCCACCTATGAAGTAGATAATGCTGTAGT
 CGTAGGTTAAGAGTCATTACAATCGGAACTGATGGTTATGGGCAAAAACATCAGATAAAAAAGA
 CCTATTATGTTACTTTTATACGTATTGCCCTTGTGTTAACTTATGTTTTCAAATTAAGTGTCTTGC
 TTTATTATAGTGATGATACCTGTTGGATGTTTGATTGCAGAGTATGCCTACACATTGAAAGTTG
 ATGAGAAAAGCGATGTGTACAGTTTTGGTGTGGTTCTTTTAGAAGTTATAACAGGCAGGAAACCA
 GTTGGTGAATTTGGTGTATGGCGTGACATCGTGCAATGGGTGAGGAAAATGACGGACTCTAACAA
 GGAAGGAGTTCTTAAAGTTCTTGATCCTAGGCTTCCCTCAGTTCCCTTCCAGAGTGATGCATG
 TTTTCTATGTGGCCATGCTGTGTGTTGAAGAACAGGCTGTAGAGAGACCAACAATCGGTGAAGTT
 GTTCAAATACTGACCGAGCTTCCAAAGCCACCTGGCTCTAAAGAGGGAGACTTAACAATACAGA
 ATCCTCTTTGTCAATCATCAACGCTTTAGAATCTCCATCCTCAGCCTCCAAGGAAGATCAAAATC
 CTCCTCAATCCCCACCACCCGACCTTCTTAGTATTTAAAGTGCTCTGTTGGGTGTTTCATCTTAT
 TAGTTCCCTTGGTTGTGATAGCTTATCCATTACTTTCTTTTCTGTCTCTCTCTGGGGTTGGG
 GCTTTTCTTCTTCTTCTAAGGATTAATGCTCTGATTTTTTAATGGTTTTGTACAGTAGG
 ATTGGTGGGGGGGTTATTTCTTATGAAGTCACTTTCTTCATCATGTAGTACTGCTTTTAAAT
 TTTATGTTACGGCCGTTGTTGTGCTTCGCCTAAGCTGGGGAGTGGGGAGGTTCAAGGGAATGGA
 TACTCTTTTATATGCGATCACTGACAGGTAGACACAAAATGACGCAACCGGTTGGGTATTAA
 CAGTGGGTATATTGTATGGTTTAGAATATTATTGATGAATCCTGAGTGGATTGGCACAGTGTGAA

	CTGTGAGCCTGAGCTGTGACTGAGTCTATGAGTCAGGTTTGGATAAAAGCTTATTGGAAGAAGTT AACCTGTTTCGAGAAAATCAGAGTGAATCAGGATTCAGGCGTGTCTTAGCTTT
Glyma11g04700 cDNA (SEQ ID NO:33) Soybean BAM2-like gene	ATGCCCCAAATGCGTGTCTCTTTGTTTTTCTGTTTTTCCATTTTCATTTCCCTGAAACCCCTTTC TGCCCCAATCTCAGAGTACCGCGCCCTTCTCTCTCCGTTCACTCATTACCGACGCCACACCAC CCGTTCTCTCTTCTTGAACGCCTCCATCCCTTACTGTTCCCTGGCTCGGCGTCACCTGCGACAAC CGCCGCCACGTACCGGCCCTCAACCTCACCGGCTCGACCTCTCCGGCACGCTCTCTGCCGACGT CGCCACCTCCCTTTCTCTCCAACCTCTCCCTCGCCGCAAAACAATCTCCGCCCCATTCTCTC CTCTCTCTCCGCCCTCTCCGCCCTCCGCTACCTCAACCTCTCCAACAATGTCTTCAACGAAACC TTCCCTCGGAGCTTTGGCGCCTCCAGAGCCTCGAGGTCTCGACCTCTACAACAACAACATGAC CGGCGTGCTCCCTCTTGCCGTGCGCGAGATGCAGAATCTTCGTCAATTTGCATCTCGGCGGCAACT TCTTCTCCGGCCAGATCCCGCCGGAGTACGGACGCTGGCAGCGCCTCCAGTACCTCGCCGTCTCC GGCAACGAACCTCGACGGGACTATCCCGCCGGAGATCGGAACTTGACCAGCCTCCGGGAGCTCTA CATCGGCTACTACAACACCTACACCGCGGCATTCGCGCGGAGATCGGAACTTGTCGGAGCTGG TGAGGCTTGACGTAGCTACTGTGCGTTGTCCGGGAGATTCCGCGCGCGCTTGGAAGCTTCAG AAGCTGGACACGCTGTTCTTCAAGGTGAATGCATTGTGAGGATCACTGACGCCGAGCTGGGGAA CCTGAAGAGCCTGAAATCCATGGATTTGTCTAAACAACATGCTCTCCGTGAGATTCCGGCGAGTT TCGGCGAGCTGAAGAATATTACGCTTCTGAATCTGTTCAAGGAACAAGCTTCATGGAGCTATACCG GAGTTTATAGGAGAGCTTCCAGCGTTGGAAGTTGTGCAACTGTGGGAAAATAACTTAACAGGTAG CATTCCTGAGGGTTTGGGCAAAAATGGGAGACTCAACCTTGTGATCTTTCTTCTAACAAGTTAA CCGGGACTTTTGCTCCTTATCTCTGTTCTGGGAATACTCTTCACTCTGATAACTCTTGGAAT TTCTTTTTCGGTCCAATTCTGAGTCGCTCGGACTTGTGAATCTCTTACACGGATTAGAATGGG AGAAAACCTTTTGAATGGTTCCATTCTTAAAGGCTTTTGGACTTCCCAAACCTCACCCAGGTTG AACTTCAGGATAATTATCTCTCTGAGAGTTTCTGAGGTTGGTTCTGTTGCGGTTAATCTTGGT CAGATTACTCTCTAACAACAGCTTTCTGGGCTCTGTCTCCCTCCATTGGTAACTTCTCCAG CGTGCAAGCTCCTTCTTGATGGCAACATGTTCAACGGTCCGATACCTACACAGATTGGGAGGT TGCAACAGCTTTCTAAGATTGATTTTAGTGGCAACAAGTTCTCGGCTCCTATTGCGCCTGAGATC AGTCAGTGTAAGCTGTTAACTTTCTGGACCTTAGCCGCAATGAGCTATCTGGAGACATCCCTAA TGAGATAACTGGCATGAGGATATTGAATTACTTGAATCTTTCTAAGAATCATTTAGTGGGTAGCA TTCCCTCTTCGATATCATCTATGCAAAGCTTGACTTCTGTTGATTTTTCATACAACAACCTGTCT GGTTTGGTGCCCTGGTACCGGTCAATTGAGCTACTTCAACTACACGCTTTCTTGGGAAACCCTGA CCTGTGTGGCCCCATTGTTGGTGTCTGCAAGGTTGGGTTGCCAATGGTGCACACCAACCTCATG TTAAAGGACTCTCCTCTTCTTGAAGCTGCTACTTGTGTTGGGTTGCTATTATGTTCCATTGCT TTTGCTGTGGCTGCAATATTCAAGGCCCGGTCAATAAGAAGGCCAGTGGGCTCGTGATGGAA GTTGACTGCGTTCCAGCGTTTGGACTTCACTGTTGATGATGTTTTGCAATTGCTTGAAGAGGATA ATATTATTGGGAAAGGAGGTGCTGGAATTGTCTACAAAGGGCTATGCCTAATGGGGATCATGTT GCTGTGAAAAGGCTTCCAGCTATGAGTAGAGGCTCTTCCCATGATCAGGATTCAATGCTGAGAT TCAGACATTGGGGCAATCCGACACAGGCACATTGTTAGGTTGTTGGGTTTCTGTTCAAATCATG AGACAAACCTTTTGGTCTATGAGTACATGCCAATGGAAGTTTAGGTGAGGTTCTTCATGGAAAA AAGGGGGGTCAATTGCAATTGGGACACCAGGTATAAAATTGCGGTGGAGGCTGCCAAGGGGCTTG CTATCTGCACCATGATTGTTGCGCACTCATTGTCCATCGTGATGTGAAGTCAAAACAACATCCTTC TTGATTCAAATCATGAAGCCCATGTTGCTGATTTTGGGCTTGCTAAGTTCTGCAAGATTCTGGG ACATCTGAATGCATGTCTGCTATTGCTGGTTTCATATGGATACATAGCTCCAGAGTATGCCTACAC ATTGAAAGTTGATGAGAAAAGCGATGTGTACAGTTTGGTGTGGTTCTTTAGAATTATAACAG GCAGGAAACAGTTGGTGAATTTGGTGATGGCGTGACATCGTGCAATGGGTGAGGAAATGACG GACTCTAACAAGGAAGGAGTTCTTAAAGTTCTTGATCCTAGGCTTCCCTCAGTTCCCTTCACGA AGTGATGCATGTTTTCTATGTGGCCATGCTGTGTGTTGAAGAACAGGCTGTAGAGAGACCAACA TGCGTGAAGTTGTTCAAATACTGACCGAGCTTCCAAAGCCACCTGGCTCTAAAGAGGGAGACTTA ACAATAACAGAATCCTCTTTGTCTCATCAACGCTTTAGAATCTCCATCCTCAGCCTCCAAGGA AGATCAAAATCCTCCTCAATCCCCACCACCCGACCTTCTTAGTATTTAA
Glyma11g04700 protein (SEQ ID NO:34) Soybean BAM2-like gene	MPKMRVLFVFLFFHFFPETLSAPISEYRALLSLRSVITDTPPVLSSWNASIPYCSWLGVTCND RRHVTALNLTGLDLSGTLSDVAHLPLFLSNLSLAANKFSGPIPPSLSALSGLRYLNLNNVFNET FPSELWRLQSLVLDLYNNNMTGVLPLAVAQMQLRHLHLGGNFFSGQIPPEYGRWQRLQYLAVS GNELDGTIPPEIGNLTSLRELYIGYNTYTGGIPPEIGNLSELVRLDVAYCALSGEIPAALGKLQ KLDTLFLQVNALSGSLTPELGNLKSLSMDLSNNMLSGEIPASFGELKNITLLNLFNRKLHGAIP EFIGELPALEVQWENNLTSIPEGLGKNRNLNLDLSSNKLTTGLPPYLCSGNTLQTLITLGN FLFGPIPELGTCELSLTRIRMGENFLNGSIPKGLFGLPKLTQVELQDNYLSGEFPEVGSVAVNLG QITLSNNQLSGALSPSIGNFSSVQKLLLDGNMFTGRIPTQIGRLQQLSKIDFSGNKFSGPIAPEI SQCKLLTFLDLNRNELSGDIPNEITGMRIILNYLNLKSNHLVGSIPSSISSMSLTSVDFSYNNLS GLVPGTGQFSYFNYSFLGNPDLGCPYLGAACKGGVANGAHQPHVKLSSSLKLLLVVGLLLCSIA FAVAEIFKARSLKKASEARAWKLTAQRLDFTVDDVLHCLKEDNIIKGAGAGIVYKAMPNGDHV AVKRLPAMSRGSSSHDHGFNAEIQTLGRIRHRHIVRLGFCSNHETNLLVYEMPNGSLGEVLHGK KGGHLHWDTRYKIAVEAAKGLCYLHHDCLPLIVHRDVKSNNILLDSNHEAHVADFLAKFLQDSG TSECMSAIAGSYGYIAPEYATLKVDEKSDVYSFGVVLLELITGRKPVGEFGDGVDIVQWVRKMT DSNKEGVCLKVLDPRPLPSVPLHEVMHVFYVAMLCVEEQAVERPTMREVQILTELKPPGSKEGDL

	TITESSLSSSNALESPSSASKEDQNPPQSPPPDLLSI
Glyma09g38720 gDNA + about 1kb of promoter and 5'UT sequence (SEQ ID NO:35) Soybean CLV2-like gene	CACGTGGTACACGAACACCGACGCCATCAGAATCCAAAAGGGTATCAGGAATCACAATCAAAAAAC GAATTTTGTCTAGTTTTTATATCCTTAAAAAATTCGAAACCAGAGAGAGAAAAAATGGTTGG GTTTTTTTACTCTTGTGCGGTGAGAGCTATAAGAGGGTGTGGAGGAAGATGAGGAGAAGATCGAG GGCGGTGATGGGATGGCGGTGGAGGATCACAGCAGAGAAATAGTTTGCCATTGCCATGGAGGGAG AGCGAAGAGGTTGAGGCCATTCAATTGAATTGGATCAGAGAGAGTTAACTGAAGAATCGGTAC TGAGAAAAGGGCGCGTAGCTTAGCATTGATATGTGGCGATTGGTTTGGGTACGTCTTTCGGG GACAGAAGAAGATGGATCAAAGACGCTTAATGCGGTGGGACCTGAGAATGAATGAGAGAGACAC TCACTACACTCACAAAAGGAGGTTCAATTTATCAAATAAAAAAGAGAGACACAGGGGATGGATGT GTCATGTGTGTGCCATGTGTGGTGAGCTCCATCATATAGAGAATCTTTTACCTTAATTATTTT TTAAGGCTATTCTTAATCAGTAATCTTAGACATTGATTAATAAATTAATAAGAAAATATAAATA AGTTGTAGAGCACTATAATTTAATATTTAATATAAAAGTATTTAGAGAATGATAAATATATC TAGCTTCTTAATATATAAAATTAATATAAATTAGTATAATATCACAAATATTTTATTAAACCAA ACAATTAACATTTTAAAAATTTTATATTTGATTTTTACTGTGTCTAAAAATTTTGGGTCTGCTGA TAACCACAAATTACAAACAAATTAATCTCCCATTTGAATTAATAAATAACATAATCTATAACCTA TCAAAAAGAAAAAGAAAAAGAATCTGGACCTATTTCTACCCCGATGCACATGAGAACTTAAAA AGGGGTGAAGTGTATGTAGTATAGAGAGAAAGCGAGGGAAGGCAAGCAAGCACACAGAACA AAGCCACTTTATTTTTTGTATCTAACCTAAACCATCCTTTCCCTGTTGCACTCTCACTTTATC AACGTGACACAAGCAACTTATGACCAATGTGTAAGATGTTGTTCTCTTTCCCTTCTCTCTGTCT CATTTTCATCAAGTTTCCATTCTAATCTCCAAATCTTTGCCACCCAGTTCTCTTTTGCTTCAAA CTTCTCTTCCCTCCCTAAAAATTTGCACCTTTACTCTCATGGTGATGGGACACACCACACCCCTC ACACTCCTCTGTATGATTCTTTTGTCAACCCCTTCTCTCTCAATTGATGTTTACCCACAAGA CAGAACTCTCACTCTCACTGTTTCAAGTCATCTCTGCCAAACCCCAACCAGAGTTTGCCAGCTGGG TAGGCTCCAACCTGCATTCATGGAGTGAATCACCTGCGACAGCAGAACTGGGAGAGTGCTTCC ATCAACCTAACTAGCATGAACCTTTCAAGCAAAATCCACCCAGTTTGTGCCACCTTTCATACCT CAACAAGTTGGGGTGTGCACACAACAACCTTCAAGCCCCACTTCTGAGTGTTTTGGAACTTGC TTAACCTAAGAGCCATTGATCTCAGCCACAACAGGTTTTCATGGTGAATACCAGACTCTTTCATG AGGCTCAGGCACCTCACTGAGCTTGTCTTTCAGTGGGAACCTGGTTTGGGGGTCCACTTCTGTC TTGGATTGGTAACCTCTCTGCAAATCTGGAAGTTACATCTTGGTTTCTGTTTCAATTCAGTGGTG GCATACCTGAGAGCTTGTCTTACATGAAGTCCCTCAAGTATTTGGACCTTGAAGAACAATCTCTTG TTTGGTAATTTGGTTGATTTTCAACAGCCTTTGGTTTTGTCTCAATCTTGTCTCAATCAGTTTGC TGGTACTTTGCCTTGTCTTGCAGCTTCAGTTCAGTCTCTAAGTGTGTGAATTTGTCCAACAATT CTATTGCGGGGGGATTGCCTGCTTGTATGCTTCTTTTCAAGCTTTGACTCATTTGAACCTTTCA GGGAACCATTTGAAGTATAGAATATATCTAGGCTTGTGTTCTCAGAGAACTTCTTGTTTTGA CTTGAGTAATAATGCTTTATCTGGTCTTATCTCCAGTAAATTGCTGAGACTACTGACAACTTG GCCTTGTCTTCTTGACCTTTCTCACAATCAGTTCTCTGGTGAAATACCTGTGAAATTAAGTGA TTGAAAAGCTTGCAGGCTTGTCTCTCTCACAATCTTCTCTCAGGAGAAATTCCTGCTAGAAT TGGAATTTGACTTATCTGCAGGTCATTGATCTCTCACACAACCTCTTGTCTGGAACCATTCAT TCAGTATTTGTTGGGTGCTTTCAGCTGTATGCTCTGATACTTAACAACAACATCTTCTGGTGTA ATTCAACCGGAGTTTGTATGCGTTGGATATCTTGAGGATACTGGATATAAGCAACAACAGGTTTTC CGGGGCTATCCCACTCACTTTGGCTGGATGCAAATCTTTGGAGATTGTAGACTTTAGTTCCAATG AGCTTTCTGGATCGTTGAATGATGCAATAACCAATGGACAAACCTCAGGTATTTGTCTCTTGCT CAGAACAAGTTCAGTGAAAATCTGCCTAGTTGGTTGTTTACATTTAACGCAATAGAAATGATGGA TTTCTCGCATAACAAGTTTACTGGCTTCATACCGGATATTAATTTTAAAGGGTAGCTTAATATTTA ACACTAGGAATGTCACTGTTAAAGAGCCATTGGTTGCAGCAAGAAAGGTTCAACTCAGAGTTTTCG GCGGTTGTTTCTGATAGCAATCAACTCAGTTTCACTTATGATCTTCTCTCAATGGTTGGAATTGA TCTATCCAGCAACTCGCTTCATGGGAAATTCAGGGGCTTATTTGGTCTATCTGGCCTAGAAT ATCTGAATTTGTGATGCAACTTTCTTTACGGACAGCTTCCGGGGTTCAGAAAATGCAGAGTTTG AAAGCCTTGGATTTGTACATAATTCCTTGTGAGGACATATCCAGGAAACATCTCTATCCTTCA AGATCTGTCTATTTTGAATCTTCTTACAACTGCTTTTCTGGATGTGTTCCCAAGCAAGGGT ATGGGAGATTTCTGGTGCATTTGCTGGAATCCAGATCTGTGCATGGAATCTTCCAGTGGATTA TGTGATGATGGAAGGACTCAATCTGCGCAAGGAAGTACTTTTAGGGAAGATAGGATGGATGACCC AATTTCTGTGGGATTTTCTTATCAGTGCATTTGTTAGTTTGGATTTGGTGTGTGGTTCTCT TCTGTTCCGCACGGGCAAGAAATTACATTTCCAAACAAAAGTTTGGATTTGATGCTTGTGACACA TACAAATCTCTGTAAATTCATTTTGTAAATGTGGTACCTGTCTCTCAGTTTCAAGTAAACATA CACTTACGTGACTGGGAATACTATCTGGCCATCAGCTTCAACAAGTGTTTTCTCGTGATTACTGAA CAAGTGTCTCGGAATTGCAGGATCAAAATGCCATGATATGAGTAACACAAGGTTTAAAGAACACT CATAACGCTGGCTTTAATCTATCTGAGTGAAGACTAGTCTGCATCATTAGCCCAAGAAAAAATG

	GATGGTTATGATGAAAATTGATCCAAGTAAAGACGAGTCCCTCATCATTCTGATGGTTGTTCTC TTTTGCTGGAACCTGGTTGCATCAAGTTTATTATGCATCATCACATGCATTATTTCATAATCAGGT GGGTGAAGGGTCAGCAAGGAACATGCCTGATTGATATCTGGTCTAGTTATGGTGAAATTTTGATC TTGGGACATCAAATTGCAGATTTGCAAGCATGTTTACGTGAAGAGAACTTGTATCATTCTAGATT AACCAGCTCTTTCTTGAGGTGGGGAACCAAGTTTCCCTGTAAGTGTTTTACCTTAAGAATGTG AGTTGATGAGTAGTGGGGAGTGGTAAGTGCAGACAAAATAAATGGAGTAGTTCTCATAAATCTAA GATTTGTATTTGTATTACTGTCTTCATGCCCTTCATCTTAGTGCTGTGATTTTAAATGAAATCTC ACGAAATCTTTTCATTGAGAACAGAAAAGAGGTAATTGAGCACCTTAGCTTTGTTATCAAATGCC AAGCATGCTCAACAAAATTAGAAAAATTATCTAGTTTACCAA
Glyma09g38720 cDNA (SEQ ID NO:36) Soybean CLV2-like gene	ATGGTGATGGGACACACCACACCCCTCACACTCCTCTGTATGATTCTTCTTTTGCAACCCCTTC TCTCTCAATTGATGTTCAACCAACAAGACAGAATCTCACTCTCACTGTTCAAGTCATCTCTGCCAA ACCCCAACCAGAGTTTGCCAGCTGGGTAGGCTCCAAGTGCATTCATGGAGTGGAATCACCTGC GACAGCAGAACTGGGAGAGTGCTTTCCATCAACCTAAGTGCATGAACCTTTAGGCAAAATCCA CCCCAGTTTGTGCCACCTTTATACCTCAACAAGTTGGGGTGTGCACACAACAACCTTCACAGCCC CACTTCTGAGTGTTTTGGAACTTGCTTAACCTAAGAGCCATTGATCTCAGCCACAACAGGTTT CATGGTGGAATACCAGACTCTTTCATGAGGCTCAGGCACCTCACTGAGCTTGTTTTAGTGGGAA CCCTGGTTTGGGGGGTCCACTTCTGCTTGGATTGGTAACCTCTCTGCAAATCTGGAAAAGTTAC ATCTTGGTTTCTGTTCAATCAGTGGTGGCATACCTGAGAGCTTGCTTTACATGAAGTCCCTCAAG TATTTGGACCTTGAGAACATCTCTTGTGTTGGTAATTTGGTTGATTTTCAACAGCCTTTGGTTTT GCTCAATCTTGCTTCCAATCAGTTTGCTGGTACTTTGCCTTGCTTTGCAGCTTCAGTTCAGTCTC TAACTGTGTTGAATTTGTCCAACAATTCTATTGCGGGGGGATTGCCTGCTGTATTGCTTCTTTT CAAGCTTTGACTCATTGAACTTTTCAAGGAACCATTTGAAGTATAGAATATATCCTAGGCTTGT GTTCTCAGAGAACTTCTTGTGTTTGGACTTGAGTAATAATGCTTTATCTGGTCTTATCCAGTA AAATTGCTGAGACTACTGACAACTTGCCCTTGTCTTCTTGACCTTTCTCACAATCAGTTCCTCT GGTGAAATACCTGTGAAAATTACTGAGTTGAAAAGCTTGCAAGCCTTGTTTTCTCTCACAATCT TCTCTCAGGAGAAATCTGCTAGAATTGGAATTTGACTTATCTGCAGGTCATTGATCTCTCAC ACAACCTCTTGTCTGGAACCATTCATTCACTGATTTGTTGGTGCTTTCAGCTGTATGCTCTGATA CTTAACAACAACAATCTTCTGGTGTAATTTCAACCGGAGTTTGATGCGTTGGATATCTTGAGGAT ACTGGATATAAGCAACAACAGGTTTCCGGGGCTATCCCACTCACTTTGGCTGGATGCAAAATCTT TGGAGATTGTAGACTTTAGTTCCAATGAGCTTTCTGGATCGTTGAATGATGCAATAACCAATGG ACAAACCTCAGGTATTTGTCTCTTGCTCAGAACAGTTTCAAGTGAATGATGCAATAACCAATGG CACATTTAAGCAATAGAAATGATGGATTTCTCGCATAACAAGTTTACTGGCTTCATACCGGATA TTAATTTTAAGGGTAGCTTAATATTTAACACTAGGAATGTCACTGTTAAAGAGCCATTGGTTGCA GCAAGAAAGGTTCAACTCAGAGTTTTCGGCGGTTGTTTCTGATAGCAATCAACTCAGTTTCACTTA TGATCTTTCTCAATGGTTGGAATTGATCTATCCAGCAACTCGCTTCATGGGGAAATCCAAGGG GCTTATTTGGTCTATCTGGCTAGAATATCTGAATTTGTATGCAACTTTCTTTACGGACAGCTT CCGGGGTTGCAGAAAATGCAGAGTTTGAAAGCCTTGGAATTTGTACATAATCTCTGTGAGGACA TATCCCAGGAAACATCTCTATCTTCAAGATCTGTCTATTTTGAATCTTCTTCAACTGCTTTT CTGGATGTGTTCCCCAGAAGCAAGGGTATGGGAGATTTCTGGTGCAATTTGCTGGAAATCCAGAT CTGTGCATGGAATCTTCCAGTGGATTATGTGATGATGGAAGGACTCAATCTGCGCAAGGAAGTAC TTTAGGGAAGATAGGATGGATGACCAATTTCTGTGGGGATTTTCTTATCAGTGCATTTGTTA GTTTTGATTTTGGTGTGTGGTTCTCTTCTGTTCCGCACGGGCAAGAAATTACATTCTCCAACA AAAGTTTGA
Glyma09g38720 protein (SEQ ID NO:37) Soybean CLV2-like gene	MVMGHTTPTLLCMILLFATPSLSIDVHPQDRISLSLFRSSLNPNQSLPSWVGSNCTSWSGITC DSRTGRVLSINLTSMNLSGKIHPSLCHLSYLNKLGLSHNNFTAPLPECFGNLLNLRAIDLSHNRF HGGIPDSFMRLRHLTELVSFSGNPGLGGPLPAWIGNFSALEKLHLGFCFSFGGIPESLLYMKSLK YLDLENNLLFGNLVDFQQPLVLLNLASNQFAGTLPFAASVQSLTVLNLNNSIAGGLPACIASF QALTHLNLSGNHLKYRIYPRLVFSEKLLVLDLSNNALSGPIPSKIAETTDKLGVLVLDLSHNQFS GEIPVKITELKSLQALFLSHNLLSGEIPARIGNLTYLQVIDLSHNSLSGTIPFSIVGCFQLYALI LNNNNLSGVIQPEFDALDILRILDISNNRFSGAIPLTLAGCKSLEIVDFSSNELSGSLNDAITKW TNLRYLSLAQNKFSLENLPSWLTFTNAIEMMDFSHNKFTGFIPDINFKGLIFNTRNVTVKEPLVA ARKVQLRVSAVSDSNQSLFTYDLSSVMGIDLSSNSLHGEIPRGLFGLSGLEYLNLSCNFLYGQL PGLQKMQSLKALDLSHNSLSGHIPGNISILQDLSILNLSYNCFSGCVPQKQGYGRFPAGAFAGNPD LCMESSGLCDDGRTQSAQGSTFREDRMDPISVGIFFIISAFVSFDFGVVVLFC SARARNYILQT KV
GmNARK :	GCACCCACTGGGTAAGTTGGTAACTACTATGTATCTATATATCGTCAGGTCATTGTCTGTTTCAT

Glyma12g04390
gDNA + 5kb
promoter and
5'UT (SEQ ID
NO:38) Soybean
CLV1-like gene

TCTCTTCTCACAAGAACAAAATGGTAATTTACATTTAACTTAGAAATGTTTGGGACAGAACCCTCT
AGCTTGCGATGATTCTCTTCTCACAAGAACAAAATGGTAATTTACATTTAACTTTAGAAATGTTT
GGGACCGAACCTCTAGCTTGCGATGATTCTCTTCTCACAAGAACAAAATGGTAATTTACATTTAA
CTTTAGAAATGTTTGGGACCGAACCTAGCTTGCGATGATTCCCTTCTCACAAGAACAAAATGG
TAATTTACATTTAACTTAGAAATGTTTGGGACAGAACCCTGGCTTGCGATGATTCTCTTCTCAC
AAGAACAAAATGGTAATTTGCATTTAACTTAGAAATGATTGGGACAGAACCCTAGCTTCGATGA
ATAATTTGCTTTAATTTTTTATTAATGCATAATACCCTTTTATTGTACACATAGAATCCGATTCT
GCAATAACTAGTGCTTGATCCTAATTGACAGAACAAATTAACAGAGAATTGATGCTTTGGCTT
TTCCATGGGCAATAATTATCCCAATGATATACTAAAGCATAGTAAGTAGGAAGACTTCCATGTAA
AGAACTTTCTTTTATTCTCTTTTAAATTTGGTGAATCACTTAAACCCTTTTGTTCATTC
CAAGGTTAGGCTCATGGAAAGCTTAAACCTACTTAAGTGGTCACGAAGAGATTGCATCTTTGTTT
TCACAAAAGTCTAACTCCAAGTTCGTGTAGCTAGTATTGCATGCTACCATGGTGAAGTGTATGA
CATGCATATATGATATTCAATTTAATTTGCTACTATAATATAAAGGTGTATATATAAATAGAGAG
TGCATGAGGTGTGTGGTGTCAACATATAAGGACGCGAGCAAGGTATAATAGCGACTACTGCGAAG
CAAGATCAGAGACTAGAGAGACATGATAAGAAGTTGTTAATTTGTTTTCTCATATGGCTGCGCG
TGGCAACGTGCTCTTCGTTCACTGACATGGATGCGCTGCTGAAGCTGAAGACTCCATGACTGGA
AGTTTTCCACGTGCTTTCTGCACACTGTTTCTTTTTCAGGCGTAACTGCGACCAAGAACCTCGA
GTCGTTGCTATCAATGTCTGTTTGTCTCTTTTTCGGCTACCTTCCGCCGGAGATCGGACAATT
GGACAACTCGAGAACCTCACTTCCCTCAAGCTCCTCGACATCTCTCACAACGTCTTCTCCGGCC
AAATTATTCTTCCGATGACGAACTGGAGGTCTCTGACGTCTACGACAACAACTTCCGGCAGCAT
ACCGGAGATTTACTCGGAGTTTAAGAGCTTGGAGTTTTTAAGCTTAAGCACCAATAACTTATCGG
GGAAGATTCCGAAGAGTTTGTCTAAGTTGAAGACGCTGAGGTATCTCAAACCTCGGATACAACAAC
GCTTACGAAGGTGAAATTTCCACCGGAGTTTGGCAGCATAAAATCTGAGATACCTTGACCTCATCG
GCGAGATTCCACCTACTCTAAACAATAATAAGAAAACTTATCACATTTCTTGAACTTTTAAAG
ACCGATAAAAAATAAAGGAGGAAATGCCACTACAATATTTTAAATTTATTTTTTACTTATTTT
ATTTGAATCTTTAATACATATGCTATTTTAGCATTATAAAAAATACCTGGGCTATACAAAATATAC
TTGCTAGTAGTATTATGTGTGTGTGAAAGTTAAATGAGTCTTTAAGTATTTGTAAATGTTTAAATA
AGTTTCGAGGTTTATCTTGATTCCAACAATGAATTCCTGAAATCTAATTTATCTAACTTTTTTTT
AACCAAAATGTTAAATGGTCTAGTTAAGAGAAACAAATCCTTATGTGTTCATTTTTTCAACAGACC
TAAATCTAAAATTTCACTTTAAAAGAAACAAATACTTGCTACTTGAACATAACATCATTAGTA
CATTTTTTTAGTAATGATATACAAACATCTAAAACCTCTATACAAACACACATAGAAGACAAT
AAAAATATCAATATGATAAATAAAAAATGAGAAATAGATGAATTATTTAAATAATGAAATGTTT
ATTTATCATTACTTTTTTTTACTTTAACAGTTTATACATCTCCTACAAGGTAAGATGTGTAATGC
AAGTAAGTTGCAACATGGTTTTAAATTTTGACAATAAGAACCATGCAATGTTAATTAGTCTAATCA
CAGAGCGTTCGGGATACGCCATTAGTGGTCTATAGTAGTCACTCCGGGATAAATACAGATCCA
CATTTTCATAGGTGTTTTCCACCATGTCAACATCGAACTAAAAGGAAAAATATGTAATGGGTAAAA
ATGATTAAAAATATTTGTAATAAATTTATTTGAATTTATTTAAACAAATATGCAAGTTGTTTATAG
GTTGAGTATATTTCAATGGTTTTTTGAAAAATCTATGTAAATAAAAAAATACAATTATTTATATA
AAATAAAATAATCTTTTTTTTATTATTATGACATTGATGAGAGTATCTAATAATTTGACCCATAA
CTAATTTGGATAAAAAAAATCTGATTGACCCTTTTAAATTTAATGTATCACTAAACTAAATACC
CTTTTTTAAAAATAGTCTAAACATGAATTTAAATATTCAAAGAAATATTTTACTTGAGATTATTAC
CTAATATTAATGATAATTTCACTCAACTCCAATAAAATTAATTTTATGTAAGATATATCTAAAA
GAAAAGATATATATAAATTTTATTTTCACTAGTAAAAAAAGTTGATCTAGTTAGTGAAAAACCA
ACTCATATCCTATAAGAATATGAATTTGATTTTTTTTGTAAAGGTGAGAATTTTATTGATCAATA
ATTTATAAATATCTATATAAATAATCTTTAGCCTTATGAGTCTTAGGTCAATCAACTCACCTA
AATTTTTTATTATGAAAAAAATTTGTATCTTCAAGATAAATGTGTTGGATTCAATCACTCC
TTATTAGCTTAATTAGATTATAATTGTAGTCCCCTATATATATATATGTATCATCTTGTCAAATA
ATAATGAAATATAGAATTTATTTAGACTTAGAGAATAAAATTAACACTGTCTGCCATGAAAAAA
GACGAAGTTAAGAAAAGGGCCAATCATAGAAGATTTTTTATGGGCACTTCACGGACACTAATCAC
TGTCACAATCATCACTGGGGTTGACAAAAGGACAATATGAAACACTTTTGAGAAGCATGTACCAC
TCATCCATTTATCAGTGGCTCCCAATCCAGAGGCCAGAACTATATATGAAAGAATTGTTGAAC
GCACGGGCATGAACCATTTCTGAAGCATCATTGTGTGAGAATATCTTGACCTTGTAAGATGCAA
CACCTTTTTAAGCCTTAAATTTAAAAAAGGAAAAAAGAAAAATCTTGTCTCTACTTTCTTTTAGC
ACAAGTGTATAGAAATCTTAAATATATACACTCTCCTTTATATTGTAGTATCAGTGGCGCAAT
CATTATATTTCAATTTTTAATAATAAATTAAGAGCATTAAATTTATAGTTAAATTTGAAATAAA
GATAATTTACAGAACTCAATTTGACTTAACTTGACAAAATATATATATATATATATATATATAT
ATATATATATTGTGAGATGAACATGTTACTTTTTTAACATGCAAAAAGGAGAATATATTTTACAT
GCATGCACCCATGATAACTTCTATGTATATATCCATACAATACATCGTTCGTATATCGTCTCGTT
TGTCTTTATTCTCTCTCAAAATACGACAATAGCAATTTACATTTTTTTTTTATAAGCAAATAGTA

ATTTACATTAACTTAGTAATGTAGGGATCGAACATAACCACTTGCGATGAATAATTTGCTTTAA
 ATTTTTGTTGATGCGTACCCTTTAACTGTCACTCATGGAATACGATTCTTCAATATCTAGTGCTT
 GATCGTTGACAGAACACTTAAAAACAGAGAATTGATGTTTTGGCTTTTCCATGGATAATAATTAT
 CCCAGTGACATACCAAAGCATAGTAGCTAAGAAGACTTTCACGTAAAAAAAGTTTCTTTTATTC
 CCTTTTTTAATTTGGTGAATCACAAAAAACCACTTTTGGTTGGTTCCAAAGTTAGGCTCATGGAA
 AGTTTAAACCTCCATAGAATGGTCACGAAGAGATTGCATCTTTGTCTTCACAAAAGCTAACTCCA
 CGTTGAGTAGACTTAACAGCCAGTGGCGAATAGCAAGGATATTTCAATTAATTATACGCCACCGGC
 CAAATGTTAAACCAATCGTATTATAATTAAGTTCCATCATCATCAAACAATTTAGTAAAGTGCATG
 ACCCAAATTTCTACGATACATATTTATTTATTTAAAAATGTAAGAATATTTCACTCATATTTAAAA
 ATATATATATCAAGAATAATTAACCTTGTACACACGCACTGAATAAAAGATTTGTGACAGACAAG
 GCTTGACATAAAAAATTTCTCCTCTAACTAATTGCTGTAGGACCTCTCCACCACTATAGAATCA
 ATATAATTAATCCGATTAGAAAGTTATATTGTATACAATTTTCTGAAACATAATTATACTTCA
 TGTTTCACAGACTTATAGTGGATCTGTGTGGCTAGCTACTGATGAATATTGTTTTTTTTTTTTC
 CTAAGCATCCACTTTGAACAACCTTTCCATTTATACAAACAGAAATTAATTAGTATTGCGTGCC
 ACCATATGGTACAGTGTGTACATGCATATAAGCTATTTAATTTAATAATATACAAACATAACGG
 TGTATATAAATAGAGGCAGCATGTGGTGTGTGGTGTAAAAATAAGGACGCAGGCAATGTATGCA
 TTTGGCATAAGTATATAAGAGAGAGGGAGTAGTACTACTGCAAAGCAAATCAGAGAGACATGAG
 AAGCTGTGTGTGTACACGCTATTATTGTTTTATTTCTTCATATGGCTGCGCGTGGCAACGTGCT
 CTTCGTTCACTGACATGGAATCGCTTCTGAAGCTGAAGGACTCCATGAAAGGAGATAAAGCCAAA
 GACGACGCTCTCCATGACTGGAAGTTTTTCCCCTCGCTTTCTGCACACTGTTTCTTTTCAGGCGT
 AAAATGCGACCGAGAACCTCGAGTCGTTGCTATCAACGTCTCGTTTGTTCCTCTCTTCGGTCACC
 TTCCGCCGGAGATCGGACAATTGGACAACTCGAGAACCTCACCCTCTCGCAGAACAACTCACC
 GGCGTACTTCCCAAGGAGCTCGCCGCCCTCACTTCCCTCAAGCACCTCAACATCTCTCAACGT
 CTTCTCCGGCCATTTCCCGGCCAAATTATCCTTCCGATGACGAACTGGAGGTCTTCGACGTCT
 ACGACAACAACCTTCAACGGACCGCTTCCCGTAGAGTTGGTGAACCTGGAGAAATTAATAACCTG
 AAGCTCGACGGAACTATTTCTCCGGCAGCATACCGGAGAGTTACTCGAGTTTAAGAGCTTGGA
 GTTTTTAAGCTTAAGCACCAATAGCTTATCGGGGAAGATTCCCAAGAGTTTGTGCAAGTTGAAGA
 CGCTGAGGTACCTAAACTCGGATACAACAACGCTTACGAAGGTGGAATTCACCGGAGTTTGGC
 AGCATGAAATCTCTGAGATACCTTGACCTCTCTAGCTGCAACCTCAGCGGCGAGATTCCACCGAG
 CCTTGCAAATCTGACAAACCTTGACACGTTGTTCTCTGCAAATTAACAACCTCACCGBAACCATTC
 CGTCGGAGCTCTCCGCTATGGTGAGCCTCATGTCACTTGATCTCTCCATCAACGACCTCACCCT
 GAGATACCGATGAGCTTCTCACAGCTTAGAAACCTCACTCTCATGAACCTCTTCCAAAACATCT
 TCGCGGCTCAGTTCCGTCTTCTCGTCGGCGAGCTTCCGAATCTGGAAACGCTGACGCTCTGGGATA
 ACAACTTCTCCTTCGTGCTACCTCCGAACCTTGGGCAAAACGGCAAGTTAAAGTTCTTCGACGTC
 ATCAAGAATCACTTCAACGGGTGATCCCTCGAGATTTGTGTAAGAGTTGGGAGTTTCAAAACGAT
 CATGATCACAGATAACTTCTTCCGCGGTCCAATCCCTAACGAGATTGGTAACGCAAGTCTCTCA
 CCAAGATCCGAGCTCCAATAACTACCTTAACGCGCTGGTTCCGTGAGGATTTTCAAACCTACCT
 TCTGTACGATAAATCGAGCTGGCCAATAACCGTTTAAACGGCGAAGTGCCTCCTGAGATTTCCGG
 CGAATCCCTGGGGATTCTCACTCTTTCCAACAACCTTATTAGTGGGAAAATCCCCAGCGTTGA
 AGAACTTGAGGGCACTGCAGACTCTCTCACTTGACGCAACGAGTTCTGTTGGAGAAATACCGGGA
 GAGGTTTTTGACCTACCGATGCTGACTGTGGTCAACATAAGCGGCAACAATCTAACCGACCAAT
 CCAACGACGTTGACTCGCTGCGTTTCACTCACCGCGTGGACCTCAGCCGGAACATGCTTGAAG
 GGAAGATTCCGAAGGGAATCAAAAACCTCACGGACTTGAGCATTTTCAATGTGTGATAAAACAA
 ATTTAGGGCCAGTCCCTGAGGAGATTGCTTCATGTTGAGTCTCACCACATTGGATCTATCCAA
 CAACAATTTATCGGCAAGGTCCCAACCGGGGGTCACTTCCGCGTCTTCAAGGAGAAATCCTTTG
 CAGGGAACCCCAACCTCTGTACCTCCCACTCTTGCCCGAATTCTCGTTGTACCTGACGACGCC
 TTGAAGAAGAGGCGCGGCCCTTGAGTTTGAATCCACGAGGGTGATGTCATCGTGATTGCACT
 GGGCACAGCCGCTGCTGGTGGCGGTGACGGTGTACATGATGAGGAGGGAAGATGAACCTTG
 CGAAGACGTGGAAGCTGACGGCGTTCAGCGGCTGAACCTCAAAGCCGAGGACGTGGTGGAGTGT
 CTGAAGGAGGAGAACATAATAGGAAAAGGAGGGGAGGGATCGTGTACCGCGGTCCATGCCAAA
 CGGAACAGACGTGGCGATAAAGCGGTGGTTGGGGCGGGAGTGAAGGAACGATTACGGATTCA
 AAGCGGAGATAGAAACGCTGGGGAAGATAAGGCACAGGAACATAATGAGGCTTTTAGGTTACGTG
 TCGAACAAGGAGACGAACCTGCTGCTGTATGAGTACATGCCAATGGGAGCTTAGGGGAATGGCT
 GCATGGTGCCAAAGGAGGGCACTTGAAGTGGGAAATGAGGTACAAGATTGCGGTGGAAGCTGCTA
 AGGACTGTGCTATTTGCACCATGATTGTTCCCTCTTATCATTACAGGGATGTCAAGTCTAAT
 AATATATTGCTGGATGGGGACTTGAGGCCCCATGTTGCTGATTTTGGCCTTGCCAAGTTCTTGTA
 CGACCCTGGCGCCTCTCAGTCCATGCTCCTCATTTGCTGGCTCCTACGGCTACATTGCTCCAGGTT
 CCATTCATTATTATTTCTCTTTTCTTCTTCTTATTAATATACCATGCAGATAACGTACAA
 CATGCATACTTATACATATAATTTTATCCTTTCAACATATAATCAAATATTTATATCTAATAAT

	ACCAACTTCATATTATAAACATCACCTAATAATAATCAACATGACTTGATAAATAAGACATATAAG TTCAATATTAACTCATGTGTCTGAAAAACATTAATTGAAAAAGTCACTCTTAAAAATATTG ATAATATATCAATATGACCATATGATTCCAATTACGATCACAACTCTGTTAAAAATTCTTGCTG AAGATATTAGTCCCTGAATACTAATAAGAATATCTGGGTTAGAAAAGTTACTATTTTACTGT TAATTCCCGTTTACTTTAGATGGGTGGAAGTTGAAAAGTTGAGTGATTTAATTTGTTTCTGGTG GTTGCGCAGAGTATGCATACACTTTGAAAGTGACGAGAAAAGTGATGTGTACAGCTTTGGCGTT GTGCTGCTGGAGCTGATAATAGGGAGGAAGCCAGTGGGAGAGTTGGAGACGGGTGGACATCGT TGGATGGGTCAACAAAACGAGATTGGAGCTCGCTCAGCCGTCGGATGCAGCGTTGGTGTGGCAG TGGTGGACCCAAGGTTGAGTGGGTATCCATTGACAAGTGTCAATTACATGTTCAACATAGCTATG ATGTGTGTTAAAGAAATGGGGCCCGCTAGGCCTACCATGAGGGAAGTCGTTTCATATGCTCTCAGA GCCTCCTCACTCTGCTACTCACACTCACACCTAATTAATCTCTAGTTAATTAAGTTATTTGCTC ATCGATCCAGAATCACTTCTTTCAAATAAAATTAACACAGACGAAAAGTGTAGGAATAACTTTC ATCTGTTGTTTGTGCGAAGTGAAACAACGAATCAAATGTGAAGTATGTATCAAATGTAAGATAGG TTTTAATTAATTTTGTAAATATGGTGTCAACTGTCAAGTAATTCGAAGGATTTTCCCATTTGTGC ATGTATCAAGA
GmNARK: Glyma12g04390 cDNA (SEQ ID NO:39) Soybean CLV1-like gene	ATGAGAAGCTGTGTGTGCTACACGCTATTATTGTTTATTTTCTTCATATGGCTGCGCGTGGCAAC GTGCTCTTCGTTCACTGACATGGAATCGCTTCTGAAGCTGAAGGACTCCATGAAAGGAGATAAAG CCAAAGACGACGCTCTCCATGACTGGAAGTTTTCCTCGCTTCTGACACTGTTTCTTTTCA GCGGTAAAATGCGACCGAGAACTTCGAGTCGTTGCTATCAACGTCCTGTTGTTCTCTCTCGG TCACCTTCCGCCGGAGATCGGACAATTGGACAACTCGAGAACCCTACCGTCTCGCAGAACACC TCACCGGCGTACTTCCCAAGGAGCTCGCCGCCCTCACTTCCCTCAAGCACCTCAACATCTCTCAC AACGTCCTTCCCGCCATTTCCCCGGCCAAATTATCCTTCCGATGACGAACTGGAGGTCTCGA CGTCTACGACAACAACCTTACCGGACCGCTTCCCGTAGAGTTGGTGAACTGGAGAAATTAAAT ACCTGAAGCTCGACGGAACATTTCTCCGGCAGCATACCGGAGAGTTACTCGGAGTTTAAGAGC TTGGAGTTTAAAGCTTAAGCACCAATAGCTTATCGGGGAAGATTCCCAAGAGTTGTGCAAGTT GAAGACGCTGAGGTACCTAAACTCGGATACAACAACGCTTACGAAGGTGGAATTCCACCGGAGT TTGGCAGCATGAAATCTCTGAGATACCTTGACCTCTCTAGCTGCAACCTCAGCGGCGAGATTCCA CCGAGCCTTGCAAATCTGACAAACCTTGACAGCTTGTTCCTGCAAATTAACAACCTCACCAGAAC CATTCCGTCGGAGCTCTCCGCTATGGTGAGCCTCATGTCACTTGATCTCTCCATCAACGACCTCA CCGGTGAGATACCGATGAGCTTCTCACAGCTTAGAAACCTCACTCTCACTGAACCTCTTCCAAAC AATCTTCCGGGCTCAGTTCCGTCTTCTGTCGGCGAGCTTCCGAATCTGGAACGCTGCGAGCTG GGATAACAACCTTCTCCTTCTGTGCTACCTCCGAACCTTGGGCAAAACGGCAAGTTAAAGTTCTTCG ACGTCATCAAGAATCACTTACCAGGTTGATCCCTCGAGATTGTGTAAGAGTGGGAGGTTACAA ACGATCATGATCACAGATACTTCTTCCCGGTTCAATCCCTAACGAGATTGGTAAGTGAAGTC TCTACCAAGATCCGAGCCTCCAATAACTACCTTAACGGCGTGGTTCCGTGAGGATTTTCAAAC TACCTTCTGTACGATAATCGAGCTGGCCAATAACCGTTTTAACGGCGAAGTGCCTCCTGAGATT TCCGGCGAATCCCTGGGATTCTCACTCTTTCCAACAACCTATTTCAGTGGGAAAATTCCCCAGC GTTGAAGAACTTGAGGGCACTGCAGACTCTCTCACTTGACGCAACGAGTTCGTTGGAGAAATAC CGGGAGAGGTTTGTGACCTACCGATGCTGACTGTGGTCAACATAAGCGGCAACAATCAACCGGA CCAATCCCAACGACGTTGACTCGCTGCGTTTCACTCACCGCCGTGGACCTCAGCCGGAACATGCT TGAAGGGAAGATTCCGAAGGGAATCAAAAACCTCACGGACTTGAGCATTTTCAATGTGTGATAA ACCAAATTTCAAGGCCAGTCCCTGAGGAGATTGCTTTCATGTTGAGTCTCACCACATTGGATCTA TCCAACAACAATTTTCATCGGCAAGGTCCCAACCGGGGTCAGTTGCGGGTCTTACGCGAGAAATC CTTTGCAGGGAACCCCAACCTCTGTACCTCCCACTCTTGCCCGAATTCCTCGTTGTACCCTGACG ACGCCTTGAAGAAGAGGCGCGGCCCTTGGAGTTTGAAATCCACGAGGGTGATAGTCATCGTGATT GCACTGGGCACAGCCGCGTGTGGTGGCGGTGACGGTGATGATGAGGAGGAGGAAGATGAA CCTTGCGAAGACGTGGAAGCTGACGGCGTTCCAGCGGCTGAACCTCAAAGCCGAGGACGTGGTGG AGTGTCTGAAGGAGGAGAACATAATAGGAAAAGGAGGGGAGGGATCGTGTACCGCGGTCCATG CCAAACGGAACAGACGTGGCGATAAAGCGGTTGGTTGGGGCGGGGAGTGAAGGAACGATTACGG ATTCAAAGCGGAGATAGAAACGCTGGGGAAGATAAGGCACAGGAACATAATGAGGCTTTTAGGTT ACGTGTGCAACAAGGAGACGAACCTTGCTGCTGTATGAGTACATGCCAAATGGGAGCTTAGGGGAA TGGCTGCATGTTGCCAAAGGAGGGCACTGAAGTGGGAAATGAGGTACAAGATTGCGGTGGAAGC TGCTAAGGGACTGTGCTATTGTCACCATGATTGTTCCCTCTTATCATTACAGGGATGTCAAGT CTAATAATATATTGCTGGATGGGACTTGGAGGCCATGTTGCTGATTTTGGCCTTGCCAAGTTC TTGTACGACCCTGGCGCCTCTCAGTCCATGTCTCCATTGCTGGCTCCTACGGCTACATTGCTCC AGAGTATGCATACACTTTGAAAGTGACGAGAAAAGTGATGTGTACAGCTTTGGCGTTGTGCTGC TGGAGCTGATAATAGGGAGGAAGCCAGTGGGAGAGTTTGGAGACGGGTGGACATCGTTGGATGG GTCAACAAAACGAGATTGGAGCTCGCTCAGCCGTCGGATGCAGCGTTGGTGTGGCAGTGGTGA

	CCCAAGGTTGAGTGGGTATCCATTGACAAGTGTCAATTACATGTTCAACATAGCTATGATGTGTG TTAAAGAAATGGGGCCCGCTAGGCCTACCATGAGGGAAGTCGTTTATATGCTCTCAGAGCCTCCT CACTCTGCTACTCACACTCACAACTAATTAATCTCTAG
GmNARK: Glyma12g04390 protein (SEQ ID NO:40) Soybean CLV1-like gene	MRSCVCYTLFFFIFFIWLRVATCSSFTDMESLLKLKDSMKGDKAKDDALHDWKFFPSLSAHCFFS GVKCDREL RVVAINVSFVPLFGHLPEIGQLDKLENLTVSQNNLTGVLPKELAAALTSKLHNLISH NVFSGHFPGQIILPMTKLEVLVDVYDNNFTGPLVELVKLEKLKYLKLDGNYFSGSIPESYSEFKS LEFLSLSTNSLSGKIPKSLSKLKLTRYLKLGYNNAYEGGIPPEFGSMKSLRYLDLSSCNLSGEIP PSLANLTNLDLTLFLQINNLTGTIPSELSAMVSLMSLDLSINDLTGEIPMSFSQLRNLTLMNFFQN NLRGSVPSFVGELPNLETQLWDNNFSFVLPNNGQNGKLKFFDVIKNHFTGLIPRDLCKSGRLQ TIMITDNFRGPPIPEIGNCKSLTKIRASNNYLNQVVPVSGIFKLPSVTIIELANRNFNGELPPEI SGESLGILTSLNNLFSGKIPPAKLNLRALQTLSDANEFVGEIPGEVFDLPMLTVVNISGNNTLG PIPTTLTRCVSLTAVDLSRNMLEGKIPKGIKNLTDLIFNVSINQISGPVPEEIRFMLSLLTDL SNNNFIGKVPTGGQFAVFSEKSFAGNPNLCTSHSCPNSSLYPDDALKKRRGPWSLKSTRVIVIVI ALGTAALLVAVTVYMMRRRKMNLAKTWKLTAQRLNFKAEDVVECLKEENIIGKGGAGIVYRGS PNGTDVAIKRLVGAGSGRNDYGFKAETLGLKIRHRNIMRLLGVSNNKETNLLLYEYMPNGSLGE WLHGAKGGHLKWEMRYKIAVEAAKGLCYLHHDCEPLIHRDVKSNNILLDGDLEAHVADFLAKF LYDPGASQSMSSIAGSYGYIAPEYAYTLKVDEKSDVYSFGVVLLELIIGRKPVGEFGDGDVIVGW VNKTRLELAQPSDAALVLAVVDPRLSGYPLTSVIYMFNIAMMCVKEMGPAPPTMREVHMLSEPP HSATHTHNLINL
GmCLV1A: Glyma11g12190 gDNA + about 1.6kb promoter and 5'UT sequence (SEQ ID NO:41) Soybean CLV1-like gene	AGCTTCGCATAAGTAACGTGAGTTTAGTTAAGTCGAGCTAGTCGCCTTTTTCTATGGTTGGTTAT GTGCAGTAGTGAATGTTGTGTAGTATCTTGCGAGGCCATGTTTGGTGTGACAAGCCCGAAAGTGA CTTGAGGGGAACAAAATAGCTTTTGTCCAAACATGCTAACTTGTATCATGACATCTACTTCTCT GGTCATGGCAGCTCTGATTAATAATTTAAGTGATCATAATATTAGAAGTTAAAAAATTATAACAT CTTTAATTATTTTTATTATTTTATATAATCTTAAAAATTATTTCAAACCTCTTTTAAACAATGTTG AATAAGATCATGTATTTTTTTTTTTCTTACGTAGTAGTATCTTGGCAGTCACCCAGGAGCAAA TGATGTAGATAAATCCTTTTACTAAAATAGTCTTGGAGCAATATTTAAGAGGGGACCATTTTAT GATCTTTTCTATCTTAATAGTGGCGTTAGAATAACACTTTTTTAACTTTTAAATAAAAAATAAAA AAATATTATCTTTACTTTCTTTTAGCAATTATCTTACGTGTAGAGAAAATCTTTAAATACACTCT CCTTTGTATTGTATAATTTGCAATTGTATCAGTTGTCCAAATTAATCACAGTATATTAGTAATAA AATTATGAACATTAATTTTTATTCTTAAATTTAGTTAAATATTGATAATTCACATAACTCGTGAC TTAATCTAATTATATATAGAAAGATCATGTTAGTATGTTACCTTTTAAATGCAAAATGAAGAAT CTGTTACATGCACCCACTGGGTAAGTTGATAACTATTATGTATCTATATATCGTCTGGATATTGT CTGTTTCATTCTCTTCTCAAAGAAACAAAATGGTAATTTACATTTAACTTAGAAATGTTTGGGAC AGAATCACTAGCTTGCAGATGAATAATTTGTTTAAATCTTATTGATGCATAATACCTCTACT TGTCATCATAGAATACGATTCTGCAATAACTAGTGCTTGATCCTTGACAGAACAAATTAACA GAGAATTGATGCATTGGCTTTTCCATGGACAATAATTATCCCATGATGTACTAAAGCACAGTAA CTAGGTAGGAAGACCTCCACCTAAAGAACTTTCTTTTATTCTCTTTAATTTTAAATTTGGTGA ATCACTTAAACAACCTTTTGTTCATTCCAAAGTTAGGCTCATGGAAAGCTTAAACCTAGTTAAA TAGCCACGAAAGAGATTGCATCTTTGTTTTTCAAAAAGCTAACTGCGCGTTTGTGAAGCTAGTGA TGCATAGTATATATATATTTTTTCTCGGCATCCACTTTGAGAACTACTTTTTTTTTTCAATTTCA TAGAAACAGAATTGAAGTAGTATAACATGCCACCATGAACAGTACAGTGATGTACATGAATAAAT GCATGCTATTCAATATAATGTATAATATAACGGTGATATATAAATAGAGACTGCATGAGGTGTG TGGTGTCAACATATAATAAGGACGCAGCGTAGGTATAATAGTGAGTACCGCGAAGAAAGATAAGA GCCAGAGCCATGAGAAGCTGTGTGCTTTACACGCTATTATTGTTTGTCTTCTGCATATGGGTTC CATGGCAACGTGCTCTTCGTTCACTGACATGGATGCGTTACTAAAGCTGAAGGAGTCCATGAAAG GAGACGAAGCCAAAGACGACGCACTCCATGACTGGAAGTTTTCCACATCGCATTCTGCACACTGT TTCTTTTTCAGGCGTAACATGTGACCAAGACCTTCGAGTCGTTGCTATCAACGTCTCCTTTGTTCC TCTCTTCGGTCACATTCGCGGAGATCGGAACTTGGACAAGCTGGAATAATCTCACAATCGTGA ACAACAATCTAACCGGTGTACTCCCATGGAGCTTGCCGCCCTCACTTCCCTCAAGCACCTCAAC ATATCTCACAACCTCTTCACCGGCGATTTCCCCGGCCAAGCCACTCTTCCGATGACGGAACTTCA AGTCCTCGACGTCTACGACAACAACCTTCACCGGACCGCTTCCGGAAGAATTTCGTGAACTGGAGA AACTAAATACCTGAAACTCGACGGAACTATTTTACCGGCAGCATACCGGAGAGTTACTCGGAG TTTAAGAGCTTGGAGTTTTTGGAGCTTAAACACCAACAGCTTATCGGGGAGGATTCGAAGAGTTT GTCCAAGTTGAAGACTCTGAGGATTCTCAAACCTCGGATACAGCAACGCTTACGAAGGTGGAATTC CTCCGAGTTCCGGCACCATGGAATCTCTGAGATTCTCGACCTCTCAAGCTGCAACCTCAGCGGC GAGATTCCACCGAGTCTTGCAAATCTGACAAACCTAGACAGTTGTTCTTGCAAATGAACTTCCT CACCGGAAGCATTCCGTCTGAACTCTCTTTTGGTGAGGCTCATGGCACTGGATCTCTCTGCA

	ACAGCCTCACCGGGGAGATTCCAGAGAGCTTTTCTCAGCTGAGAAACCTCACTCTCATGAACCTTG TTCCGCAACAATCTTTCACGGCCCTATTCCGTCCTTGCTGAGCGAGCTTCCCAATCTGAATACGCT GCAGCTCTGGGAGAATAACTTCTCCTCTGAGCTCCCGCAGAACCTGGGGCAAACGGGAGGCTGA AGTTCTTCGACGTCACGAAGAATCACTTCAGCGGGTTGATCCCTCGGGATTGTGCAAGAGTGGG AGGTTACAAATCTTCATTATCACAGATAACTTCTTTCATGGCCCAATCCCTAACGAGATTGCTAA CTGCAAGTCTCTAACCAAGATCCGAGCCTCCAATAACTACCTTAACGGCGCAGTTCCGTCGGGGA TTTTCAAGCTACCTTCCGTCACGATAATCGAGTTGGCCAATAACCGTTTTAACGGAGAAGTGCCT CCCGAAATTTCCGGCGATTCACTCGGGATTCTCACTCTTTCCAACAACCTATTCACTGGGAAAAT TCCCCAGCGTTGAAGAACTTAAGGGCACTGCAGACTCTGTCACTTGACACGAACGAGTTCCTTG GAGAAATCCCGGGGGAGGTTTTTGACCTACCAATGCTGACTGTGGTCAACATAAGCGGCAACAAT CTCACCGGACCAATCCCAACGACGTTTACTCGCTGCGTTTCACTCGCCGCCGTTGATCTCAGCCG GAACATGCTAGTTGAGGATATTCTTAAGGGGATTAAGAACCCTCACGGTCTTGAGCTTTTTCAATG TCTCGAGAAACCATTTAACAGGGCCAGTCCCTGACGAGATAAAATTCATGACGAGCCTCACCACG CTGGATCTCTCTACAACAATTTACAGGCAAGGTCCCCAACGAGGGTCAGTTTTTGGTCTTCAA CGACAACCTCGTTTGCAGGGAACCTAACCTCTGTTCCATTACGGATGCACCTTAAGCATTGTGG GGGAGCTGCCCTATCAACATTTTAACATTTGTAAATATAGTATGTACAATTATAGTAATTTAT AAATTGCTTGATAA
GmCLV1A: Glyma11g12190 cDNA (SEQ ID NO:42) Soybean CLV1-like gene	ATGGCAACGTGCTCTTCGTTCACTGACATGGATGCGTTACTAAAGCTGAAGGAGTCCATGAAAGG AGACGAAGCCAAAGACGACGCACTCCATGACTGGAAGTTTTCCACATCGCATTCTGCACACTGTT TCTTTTCAGGCGTAACATGTGACCAAGACCTTCGAGTCGTTGCTATCAACGTCCTTTGTTCTCT CTCTTCGGTCACATTCCGCCGAGATCGGAACTTGGACAAGCTGGAAAATCTCACAATCGTGAA CAACAATCTAACCGGTGTACTCCCCATGGAGCTTGCCGCCCTCACTTCCCTCAAGCACCTCAACA TATCTCACAACCTCTTACCAGCGGATTTCGCCGGCCAAGCCACTCTTCCGATGACGGAACCTCAA GTCCTCGACGTCTACGACAACAACCTTACCAGGACCGCTTCCGGAAGAATTCTGAAACTGGAGAA ACTAAAATACCTGAAACTCGACGGAACCTATTTTACCAGGACGATACCGGAGAGTTACTCGGAGT TTAAGAGCTTGGAGTTTTTGGAGCTTAAACACCAACAGCTTATCGGGGAGGATTCGAAGAGTTTG TCCAAGTTGAAGACTCTGAGGATCTCAAACCTCGGATACAGCAACGCTTACGAAGGTGGAATTC TCCGGAGTTCCGCCACCATGGAATCTCTGAGATTCTCGACCTCTCAAGCTGCAACCTCAGCGGCG AGATTCCACCGAGTCTTGCAAACTGACAAACCTAGACAGTTGTTCTTGCAAAATGAACTTCCTC ACCGGAAGCATTCGCTCTGAACTCTCTTCTTGGTGAGGCTCATGGCACTGGATCTCTCCTGCAA CAGCCTCACCGGGGAGATTCAGAGAGCTTTTCTCAGCTGAGAAACCTCACTCATGAACCTTGT TCCGCAACAATCTTTCAGGCCCTATTCCGTCCTTGCTGAGCGAGCTTCCCAATCTGAATACGCTG CAGCTCTGGGAGAATAACTTCTCCTCTGAGCTCCCGCAGAACCTGGGGCAAACGGGAGGCTGAA GTTCTTCGACGTACGAAGAATCACTTCAGCGGGTTGATCCCTCGGGATTGTGCAAGAGTGGGA GGTTACAAATCTTCATTATCACAGATAACTTCTTTCATGGCCCAATCCCTAACGAGATTGCTAAC TGCAAGTCTCTAACCAAGATCCGAGCCTCCAATAACTACCTTAACGGCGCAGTTCGCTCGGGGAT TTTCAAGCTACCTTCCGTCACGATAATCGAGTTGGCCAATAACCGTTTTAACGGAGAAGTGCCTC CCGAAATTTCCGGCGATTCACTCGGGATTCTCACTCTTTCCAACAACCTATTCACTGGGAAAAT CCCCAGCGTTGAAGAACTTAAGGGCACTGCAGACTCTGTCACTTGACACGAACGAGTTCCTTGG AGAAATCCCGGGGGAGGTTTTTGACCTACCAATGCTGACTGTGGTCAACATAAGCGGCAACAATC TCACCGGACCAATCCCAACGACGTTTACTCGCTGCGTTTCACTCGCCGCCGTTGATCTCAGCCG AACATGCTAGTTGAGGATATTCTTAAGGGGATTAAGAACCCTCACGGTCTTGAGCTTTTTCAATGT CTCGAGAAACCATTTAACAGGGCCAGTCCCTGACGAGATAAAATTCATGACGAGCCTCACCACGC TGGATCTCTCTACAACAATTTACAGGCAAGGTCCCCAACGAGGGTCAGTTTTTGGTCTTCAAC GACAACCTCGTTTGCAGGGAACCTAACCTCTGTTCCATTACGGATGCACCTTAAGCATTGTGGG GGCAGCTGCCCTATCAACATTTTAACATTTGTAAATATAGTATGTACAATTATAGTAATTTATA AATTGCTTGATAA
GmCLV1A: Glyma11g12190 protein (SEQ ID NO:43) Soybean CLV1-like gene	MATCSSFSMDALLKLKESMKGDEAKDDALHDWKFSSTSHSAHCFSGVTCQDLRVVAINVSFVP LFGHIPPEIGNLDKLENLTIVNNLTGVLPMEALALTSCLKHLNISHNLTGDFPGQATLPMTELQ VLDVYDNNFTGELPEEFVKLEKLKLDGNYFTGSIPESEYSEFKSLEFLSLNTNSLSGRIPKSL SKLKTLLRILKLGYSNAYEGGIPPEFGTMESLRFLDLSSCNLSGEIPPSLANLTNLDLFLQMNFL TGSIPSELSSSLVRLMALDLSCNSLTGEIPESFSQRLNLTLMNLFERNLHGPIPSLLSELPNLNTL QLWENNFSSELPQNLGQNGRLKFFDVTKNHFSGLIPRDLCKSGRLQIFIITDNFFHGPPIPEIAN CKSLTKIRASNNYLNAGVPSGIFKLPSVTIIELANRFRNGELPPEISGDSLGIILTSNNLFTGKI PPALKNLRLALQTLSDTNEFLGEIPGEVFDLPMLTVVNISGNNLTGPIPTTFRVCVSLAAVDLSR NMLVEDIPKGIKNLTVLSFFNVSRNHLTGVPVDEIKFMTSLTTLDLSSNNFTGKVPNEGQFLVFN

	DNSFAGNPNLCSIHGCTLSIVGAAAPINILTFVNIVCTIIIVYKLLV
Glyma18g51820 gDNA + about 3.7kb promoter and 5'UT (SEQ ID NO:44) Soybean CRN-like gene	GCCTGCCCCCTTAGTCATGTGCAAAATAGTGCTAAGATCTGTATTGTAAATGGCCACATTGGTCT TAGTAAAAGAGTTATGCATATGCTGCACTGGTAGCACCAGCCTGCACTTCGTAATATGATGATT GTGTATTTTGTCTTACTTTTGAGGTGAAGCTGCGATGCATTAGGCTAGGGATTTGTGTATGTTGT GTACATTGGTTTTTGTGAAGGTGTTGTTGTGGCTGTAATTTACATTTTGTATTTTGGGATTAC TTGGTGGGACATGTGCTGAGGATGCCATGTCCTAGTTCTCTAATGTTCTGATGTATTATTTATT TATATTGATAAAAAAATTATATACTTTCAAAGGCAAAAAGATAAAGAAAACATCAATCACCTG CTATTTTAGAAAATACCCCCCTCCCAAAGAAAAACCAAATTATGTAAATCATATAAAGTTTCGG TGTTGAAAAGACGGCGTGGGGCACCATGTTGAAGGCTTGAGAATTTTTTGGTCAATTGAATCAAA AAGTGAAGTGGTCCATTTGACCCCAAGTTTGCAATGGTAAATTCAGAATTGGGTGGAAGTGTCC ATTGTATTTTTCGTATCCAACAATAAAGAATCACAGTTGTTGCACAGATACAACAATCAAAGGTC TAGATATTTTGTAGTCTTATAATAGGAATTTTCACTGTTTTACACAAACATTTTTTTATCTACAA AACAAACCGTGAGGAATCTTGTAGGTTATAGTGGCCAACACTCATGTTGCGTTAACACAGCTATC AACTAAACTCAACTTTTGTACGGGTGACCTCAACATAATTATGTATATTACTGACAGAGTAAC AACACCTGAAGTGGGCCCTGTTGAAGTGGGTATGACTAATGACGAGACCACAACCTTAGAGGATA GATACATTTCTAATCTTTCAAATAAATACAAGTGATATTAACCTTGGTCTTTGAAAAATATGAACA TCAATTCTGTTTTTAATTATAAAAAACAATAGTAATTTGATTTGATTTACTGAAAAAATTAGCGT CAATTTAAATTTTCAGTATTAATAAATGATACGATTTACCATCTTAAGTATTGCACGCAAAAGAT TATTTTAATATCATTTTTCAATTATTAAGAGAAAAAAGTGACGTTAATATCTTAGGACAAAATT AATATCTCTGGCATTTTAAGAAAAATAAGAGAACTACTATAAAATAAGACCACAATTCACGAAAT CTTATATTAATATGGTCTCGATAATCCAATTTGTATAAACTTATTAATAAATACTTATAGGG AAAAATAGAGAGGCAATAAATAAATAAATAAATAAATAAATAAATAAATAAATAAATAAATAA AGAGAATTTCTAAAACTTGAGTTAGATAAGTTGATTTTAATTTGTGGGAGATTCTTTTTTATTA TATGTCTTTATTTTTTCTCAGTATTTTTTTTTTTTGGAAAAATTTACCTAAACTGAAATTAAGC ATTGTGGAGAATACTTTCAAGGAAAAATGACTCAATGATTTAGCGTGTGATTTAAGCATAAATTTT GGTACAAGAGTTTGATTAACATTAATTAATTAATTTAGAAAGGTCAAGGTCATTTTCACACAA TTCTATTCCTTGCTCGAGACCACTTTTCAAGTATAAATTTATGACTAATGGGTCAAAACATACA ATGCCTTGTTGATAATAGTTATGAACGATATTAATATTTTATGAAAATGATAGTTGCACCAAATA TGTGAAATTCGCAATCTGAATTATCTGTTGCATTTGGCTTGGTTTCATTTTGTAGGTTATTATT ATTATTTTTTTTTTAAAGGAAGTGAAGTGTATCTCAATTAATATATGCTGTTTTTAAATTTGAAAGA AATAGTTTTTAAACCATTTAATATAGCTATAAATAATATATTTAAGTTAATCTTAGCTATATATTG TATTAAATGTATATTTGCTATAAATAAATAAATAAATAAATAAATAAATAAATAAATAAATAA AGGCTTGATTTGGGTTATACAGTAATTTAAATCTACGTAATTTTACGTAATTTTCTGATTTCAAAATG TCTCATGCCACAAATGAACAAAACAATCATGATAATTTATTCATCTATTATTGCTTGCTCATTTC ACTCACCCACAGTGCTAGATCCTCGACTCGAATAAATCATTTATTATGCTTAGATAAATTCGAT TTATTTTTATTCATGCAACACTCATTCAATTGCACTACCCTCCTATTCTATATCACATTAATA TGAAGAGTTAATCTTATCTCTCGATTCAATTTCTTTTTTAAATTTAAGGGGTATAATGAGAAAT AATTTTGACTATTAAATTTTAAAAACAATCCAAAAATGTCATAAAGAATTTTCTATTCCACGA GAGAACTTGAAAGTTAAATTTGATTAAATCTTATTAAGGCGTTCTAATCCTAGCAACTTCC ACCTATCACAGAGAAAAAAAAGGAAAAGAAAGGTAAGATAGAAAAGAAAGGAAAAGTAAAA GCATGCAATATAGAATTATAAATACTAAAAATATTGTTAAGATATTAGTTAAAAAATTATTAA GATACACAAAATTACATTATACACAATTTTTTATAATCTTTAAATAAATATTTTTTATTATT AATATCCTAAAGATATTAGTTAATTAACATTCTATGATTATTATTATTGAAATTGAAACGTAAGTAG TAATTAAGCAAAATTATCTATCGAAAAAGAGATAAATTTATTAATGACACACACCAACATAC CAATCGCTAGAGTTGTTAACCCTCACTCATATAGCATATCACAAATCCCATGCAACCTTAATT CAACGGTCCAGATGCAGTCTGATGAGATCAGACGGTCCGAGACGAAGTGTACATTCTCCCTCTCAC GGATTTCTGATGTTCTCTTTCCGACCAAAATGTGGGGCCACATAGTACTGTGCTCTGAGTGCTGG CTACTCACAAAGGCGGAACCAAGTTTGTGTCGAGAAGAGGTATGGCTCTTTGTTTGTGTGTCATC AGATGAGAGAGAAACAAACAAAGAGACAATCACTGAATCACTCTCACTCACTCTGCATGCTGTG TGCGTGACTCTGTCATTGTGTTTTGTGTTTTAAGCACTTTGCAGTTAGTTTCTGAGGAGCGTTT TTTTTTTTTTCTTTCTTATGAGTGTGTGCTGTTCTTAGTTGCTGTTATTGTTGTTCAAGTTTCG GTTACTACTACTACTACCACATGTCCATGCCCTTCAATTTCTGTTCAACTTTGTGACTTTTTGT TTGGTTTCTAAGGAAAAAGATTGCAACTGTTTCTGGGTCTAGTTTGCTTTTGGTTGGGTTTGT AGTCACCGCTGGCAACTCGGAATAGTGGGTTTTTTTTTGGAGGGTGTTTTTTTTTTCTTCTTTTG GAGGTTCAAATCTTGTTCTGATTCGTGTGAAGGTGGAAATTTATGGGTGCTGAGAGGAGGAAA AAGATGGGATTTGGTGAATAAATGTAAACTATTTCGGCGACAACATGTCTGCTTGTCTTTTGG GACGGCTTTCTGTGAAGATTTGGGTTTAAAGGTTGAGGAAGATGCTTATGCCTTATGCTTAT GCTTGCAACTTTTTTTTTTAAACCCATTTTAGCATCAAGTATAAAGTTTCTTCTTGGTCTTGT

	TCCAAGTGTGTTGAGGTGATGGGGGTTTTGAGCATGTGAGTGATTTCATGCCTCATTGTTGGAGCTTC TGAGATTGGTTTCTGGTTGTGGCTTTGTTTGTGTTTGTGTTGCTTTCATGTTTAGGAAAAGGCA CACCCTTTCTTCTCTTGCAAGGGAATTGTTGGCATTTCAGCCACTTTTCTTCTCTTCTGTTTCA GCTTGCAACCACAACACTATGCAGTGTCAAGGAAGGTTGAGTAAACATGTTTCTTCTGAGCCTCCC TCACCTTCTAGGTCAACACCATCACCACCATCTTCATCAGGATACAAGGATGACCCTAGGAAGAT AATTTTGAGCATGGTTTTAGGAGCAGTCACTGGACTAGTTTCTTCTGCTCTCTTTCAGCTTGTGG TTCGTTGTGTTGTTTCACTATCTGAACCGCACACCAATCCTCAAGGGACCTGTATATTCTCCCCC AAAATTGCCCCCATGACACTCCAATCAGCTTTGGCAAAGGAAAACCACTTGCTCGGTTGAGTCC TAATGGGAAGTACTACAAAACGTGCTTGACAATGGACTCACTATTGCAGTCAAAAGGCTAACAC CCTTTGAGAGTAATTCCCCGGAGGCTAAGAGAAAATCAGTGAAGAGGCAGATACAACTGAGCTT GAGCTTCTTGCAAGCCTTAGGCATAGGAACCTTGATGAGTTTAAGGGCTATGTTCTGAGCCTGA TGGGTTCTCATTGGTTTATGATTATGTTTCCACTGGGAGTCTTGCTGATGTGTTGAGTAAAGTGA GGGAGAATGAGTTGCCCTTTGGTTGGGAAGTTAGGCTCAGGATTGCTGTTGGTGTGGTGAAGGGT CTTCAGTATCTTCATTTCACTTGTGTGCCTCAGATTCTGCACTACAACCTGAAGCCCACAAATGT GATGTTGGATGCTGAGTTTGAACCTAGATTGGCAGATTATGGGTTGGCTAAACTTCTACCCAATT TGGATGGAGGAAGTTCTCTCTACACTCCTCCTGAATGTTTCCATAATGCAGGTAAGACAAATTT CAATCATACTCATTCACTAGTGTGTTTGAACCTGGTCTGTTTCTGTTCTTTCACTTTTTTACACCA ATAGGGTAATTAGGTGGTTGATATTGGGAATTTGTTGATTGCTTACCTTTTCAAAGCTCCACA CCTCATTGGTTTTTTGCCCCCTTTGTAGTACCCTAATGAAAGACTCTGTTTTGAAACGAAATTA CTATTCTGTAATCTGTATTGTCTATTGTATCATTGCTGATTGAATTTGGTATTATTTAATAAGA CTTGCTATTTGTTTTGTAACCTACCCATTACTTCTGATGTCAAGTTTTAGACCTTAGGCAGTT GGCACTAAGTCTGGTCCAAATGAATAATATAGTTTATAGTTTACATGCTGCAAACTACTAAACCT AGATTGGTGAGTGAGACCACAACCTAAATTATAATAATAATTGACAAAGGTTTTTTTTCTAATTT AACTTGAATACTTCTAGTTTTTCACTGGTGTATATTTGGATGCATCAATATCAATAGCAATAAG TAATAACAATAAAAGATTGCTTGATTGATGGCATTGCATATATGGGTATGGTATTGCCAATAAGA TGTTTATTTTAACTTCATTCCATTCTTGTATATGTGGAGCTTCATGGTATTGAGATTGAATGGTG TTTTTTGGCAATTTGAGCAGGTACACTGACAAAAGTGACATCTTTAGTTTTGGCATGATACTAGG TGTTTTGTTAACTGGTAAGGATCCTACAGATCCATTCTTTGGAGAAGCAGCCAGTGGGGGAAGTT TGGGATGTTGGCTGAGACACTTGCAAGCAAGCGGGCAGGCGCACGAAGCTCTAGATAAGAGCATG TTAGGGGAAGAAGGTGAGGAAGATGAGATGCTAATGGCGGTTAGGATTGCTGCTGCATGCCTCTC TGATATGCCTGCAGATAGGCCTTCTAGTGATGAGCTTGTTCACATGCTAACGCAACTGCACAGTT TTTGA
Glyma18g51820 cDNA (SEQ ID NO:45) Soybean CRN-like gene	ATGTTTAGGAAAAGGCACACCCTTTCTTCTCTTGCAAGGGAATTGTTGGCATTTCAGCCACTTTT TCTTCTCTTCTTGTTCAGCTTGCAACCACAACACTATGCAGTGTCAAGGAAGGTTGAGTAAACATG TTTCTTCTGAGCCTCCCTCACCTTCTAGGTCAACACCATCACCACCATCTTCATCAGGATACAAG GATGACCCTAGGAAGATAATTTTGAGCATGGTTTTAGGAGCAGTCACTGGACTAGTTTCTTCTGC TCTCTTTGCATTGTGGTTCTGTTGTGTTGTTTCACTATCTGAACCGCACACCAATCCTCAAGGGAC CTGTCATATTCTCCCCAAAATTGCCCCCATGACACTCCAATCAGCTTTGGCAAAGGAAAACCA TTGCTCGGTTGAGTCTTAATGGGAAGTACTACAAAACCTGTGCTTGACAATGGACTCACTATTGC AGTCAAAAGGCTAACACCCTTTGAGAGTAATCCCCGGAGGCTAAGAGAAAATCAGTGAAGAGGC AGATACAACTGAGCTTGAGCTTCTTGCAAGCCTTAGGCATAGGAACCTGATGAGTTTAAGGGCC TATGTTCTGAGCCTGATGGGTTCTCATTGTTTATGATTATGTTTCCACTGGGAGTCTTGCTGA TGTTTGAAGTAAAGTGAGGGAGAATGAGTTGCCCTTTGGTTGGGAAGTTAGGCTCAGGATTGCTG TTGGTGTGGTGAAGGGTCTTCAGTATCTTCATTTCACTTGTGTGCCTCAGATTCTGCACTACAAC TTGAAGCCCACAAATGTGATGTTGGATGCTGAGTTTGAACCTAGATTGGCAGATTATGGGTGGC TAAACTTCTACCCAATTTGGATGGAGGAAGTTCTCTCTACACTCCTCTGAATGTTTCCATAATT GCAGCAGGTACACTGACAAAAGTGACATCTTTAGTTTTGGCATGATACTAGGTGTTTTGTTAACT GGTAAGGATCCTACAGATCCATTCTTTGGAGAAGCAGCCAGTGGGGGAAGTTTGGGATGTTGGCT GAGACACTTGCAAGCAAGCGGGCAGGCGCACGAAGCTCTAGATAAGAGCATGTTAGGGGAAGAAG GTGAGGAAGATGAGATGCTAATGGCGGTTAGGATTGCTGCTGCATGCCTCTCTGATATGCCTGCA GATAGGCCTTCTAGTGATGAGCTTGTTCACATGCTAACGCAACTGCACAGTTTTTGA
Glyma18g51820 protein (SEQ ID NO:46) Soybean	MFRKRHTLSSLARELLAFQPLFLLFLSLHNTMQCQGRLSKHVSSEPPSPSRSTPSPSSSGYK DDPRKIILSMVLGAVTGLVSSALFALVVRCVVQYLNRTPIILKGPVIFSPKIPMTLQSALENH LLGSSPNGKYYKTVLDNGLTIAVKRLTPFESNSPEAKRKS VKRQIQTELELLASLRHRLMSLRA YVREPDGFSLVYDYVSTGSLADVLSKVRENELPFGWEVRLRIAVGVVKGLOYLHFTCVPIILHYN LKPTNVMLDAEFEPRLADYGLAKLLPNLDGSSSLYTPPECFHNCSTRYTDKSDIFSGMILGVLLT GKDPTDPFFGEAASGSLGCWLRLHQQAGEAHEALDKSMLGEEGEDEMLMAVRIAAACLSDMPA

CRN-like gene	DRPSSDELVHMLTQLHSF
Glyma08g28900 gDNA + about 2.8kb promoter and 5'UT sequence (SEQ ID NO:47) Soybean CRN-like gene	ATTATAAGAAAATAATGGTAATTTGATTACTGAAAAAATTAGCGTCAATTCATCATTTCAATAT TACAAAATGATACTACGATTTAGTATCTTAAGTATTGCACGCAAAAGATTATTTTCATATCATTT TTCAATTATTTAGAGAAAAAAGTGACGTTAATATCTTAGGAAAAAATTAATATCTCTGGCATT AAGAAAATAAAGAGTTACTTATAAAATATGACCACGATTCATGAAATCTTATATTAAATATAGTC CCGATAATTCCAATTTGTATAAACTAAAAGAATACTTATAGGAAAAAATAGTGAGGCAAAATAAA TTAAACTTCTTTTATAAAATAAAAATCAAATATGTATTTTACTTTTGGGAAAAGTTAAATAAGAG AATTTCTTAAATTTGATTAGATAAGTTAATTTTAACTTGTGGGAGATTTTATTTATTTATTTT CATTATACCTCTATTTTCTGAGTATTTTGTAAAATTTATCTAAATTTAAATTAATAAATTTGT GGAGAATACTTTCAAGGAAAATGGCCTAATGGTTTAGCGTGTGTTTAAAGCATAAATTTTGGTAC CCATGTTTGATTAACATTAATAAATAAATTTTAAAGGCCAAGGTCATTTTACACAATCTCT ATTCCCTTGCACTAGACCACTTTTAAAGTATAAATTTATGACTAATGGGTCAAAGCATACAATGC CTTGTTGTAATAGTTGACTATCAACCAAAAATTTGACATTCAATAAGACACCACTGGTCTTTGAG CGACATCAATATTTTATGAAAACGATAGTTGCACCTAATATGTGAAATTCGCAATCTGAATTAT TTATAAACGTTGCATTGCGTTCCAAATAAAAACTCAACCAACAAGGAAAAAATACTGAA CTTATGTCTTGGTTTTGTTTTGTTTGGTTATTAAAAAAGTAAATGGAAGTACTGTATCCAATT ATATGTCTGTTTTAGATTTTGAAGAAATAATTTTAAACCAATAAATATAGTTATGATATATAT TTAAATTAATCTCAGCTATATATTAAATGTATATCACGGTAAAAATAATTAAGTCTAGTAAAT ATCAAAATGGATATTTGCTATAATAATTATTTGTAAATGCCTGATTTAGATTATAGTAATTTAAAA TCTAAGTACTTGTCAATTTTCATTTCAAATGCCTCATGCCATAAATTAACCAACAAACATGAA TTATATCCTTTGATAATTTATTCTACTATTATTGCTTGCACCTGTACATATATGTGTTGCTCAT TCACTCACCCAGACTGAGTGCTAGATCCTCGGACTCGAATAAATCATTTATTATGCTTAAATAA TTCGATTTTATTTTCTACATCACAATAATCTAAAGAGTTAATCTCATACTCTCGATTCTCCT TAAAAATTTAATGGGTGTAATGAGAAATTAATTTTAACTACTATTATTTTAAAAATAAATAG TGAAAAATAATGAGAACTCTAATTAAAAATTAATTTTAACTACTATTATTTTAAAAATAAATAG AACACCCCAATCAATGTCACAACGAATTTTCTATTTTACGAGAGAACTTGAAAGTTAAATTT GGTTAAAGTCGTTTCTAAACGTAGCAGAAGATAAGATAGAAAGATGGAAGTAAAGCATGCAA ATATATAAATTGAAATTTGAAATGTAAGTAGTAGTAATTAACCAATTTTATTTGATGGAAGAGAGA TAACCTTACTAATGACACACCAACATAAGATGTGTTTCTGCTAGAGTTGTTAACCACTCACT CATATACAGCATATCACAATTTCCATGACCCCTCAATTCACGGTCCAGATGCGGTCTGATGAA ATCACACGGTCGATACGAACTGTACATTCTCCCTCTCTATCACGGATTTGATGTTTCTGCTTT CGGACCAATGTGGGGCCCATAGTACTGTGTCTGAGTGCTGGCTACTCACAAGGCGGGAAC CAGTTTTTGTGCGAGAGGTATGGCTCTTTGTTGTATCGGATGAGAGAGAAAGAGTGTAGAGAGA GAAACAAAATAAGAGACAATCACTGAATCACTCTCACTCACTCTACATGCTGTGTGCGTGACTC TGCTCACTGTGTTTTGTGTTTAAAGCACATTGCATTTTAGTTTCAGAGGAGTTTTTTTTTTTTTT TGCTGTTATTGTTATTCAAGTTTTGGTTACTACTACGCCACATGTTCACTGCCCTTCAATTTTT GTTCAACTTTTTGACTTTCTGCTTGGTTTCCAAGGAAAAAGATTGCAATGTTTCTGAGGCTAG TTTGCTTTTGGTTGGGTTTGTGTAGTCCCTGCTGGCACCTCGGAATAGTGGGTTTTTGTGTTTGT TTTTGTTTTTTTCTTTTGGAGGTTCAAATTTCTGTTTCTGATTCTGTTGAGGTTGGAATTT ATGGGTGGTCACCGGAAGAGGAAAAAGATGGGATTCTGTTGAAAAAAGTAAAGTATTCTGGTGAT AACATGTCTGCTTGCTTTTTTGGGACGGCTTTTTTGTAAAGATTTTGGGTTGAAAGGTTGAGGA AGATGCTTATGCTTGCAACTTTTTTTTAAACCCATTTTAGCACCAAGTATAAAAAAGTTGTTCTTG GTCTTGTTCGAAGTGTGAGGTAGGTGATAGGGTTTTTGGCATGTGAGTGATTATGCCTCTC ATTTTGGAGCTTCTGAGATTGGTTTTCTGGTTGTGGCTTCGTTTGTGTTGTTGTTGTTGTTG CTTTTCACTTTAGGAAAAGGCACATCTTTCTTCTCTGCAAGGGAATTTGTTGGCACTCCAGCCA CTTTTTCTTCTCTTCTTGTTCAGCTTGCAACCAACACTGTGCAGTGTCAAGGAAGGTTGAGTAA GCATGTTTCTTCAAGCCTCCCTCACCTTCTAGGCCATCGTCAGCAGCACCATCTTCATCAGGAT ACAAGGATGACCCTAGGAAGATAATTTTGGCATGGTTTTAGGAGCAGTCACTGGGCTAGTTTGT TCTGTTCTGTTTGCACCTGTGGTTCTGTTGTGTTGTTTCACTATCTGAACCGCACCAATCTCAA GGGCTTGTCAATTTCTCCCAAAATTTGCCTCCAAGCACTCCAATCAGCTTTGGCAAAGGAAA ACCACTTGCTTGGCTCGAGTCTTAATGGGAAGTACTATAAACTATGCTTGACAATGGACTCACT ATTGCAGTCAAAGGCTAACACCTTTTGGAGCAATTTCCCGGAGGCCAAGAGGAAATCAGTGAA GAGGCAGATACAACTGAGCTTGAATTTCTGCAAGCCTTAGGAATAGGAACCTGATGAGTTTGA GAGCCTATGTTCTGAGCCTGATGGATTCTCATTGGTTTATGATTATGCGTCCACTGGGAGTCTT GCTGATGTGTTGAATAGAGTGAGGGAATGAGTTGCCCTTTGGTTGGGAAGTTAGGCTCAGGAT TGCTGTTGGTGTGGTGAAGGCTTTCAGTATCTTCACTTCACTTGTGTGCCTCAGATTCTGCAC

	ACAACTTGAAGCCCACTAATGTGATGTTGGATGCTGAGTTTGAACCTAGATTAGCAGATTATGGC TTGGCTAAACTTCTGCCTAAGTGGATAGAGGAAGTTCTCTCTACACCCCTCCTGAATGTTTCCA CAATTGCAGGTAAGACAAATCAATTGCTTTCAATCATACTCACTCACTAGTGTGTTTGAACCTGGT TTGTTTCTGTTTTTCACTTTTACACCAAATGGGTAACTAGTTGGTTGATATTGGGCAGTTGCT TGATTGTTACCTTTTTAAAGCTCCACTCCTCATTGGTTTTTCTCCTTCTTTGGAGTACCTTA ATCAAAGACTCTTAGTGTAACGCTGATTATTGTTCTGTATTGTATGGTGTCAATTGCTATTGT TTAATAATTAAGACTTTGCAAACTAATGTTTTTGTAACTACCCATTACTTGTATAGTTCACATG CTGCAAACTACTAAACCTAGATTGGTGATTGAGACCCCAATTAAAAATATAATAATAATTTACT AAGGTTTTTCTTTTCCAATTTAACTTATTTCTAGTTTTTCATTGTTGTGTATATCTCTGGATACA TCAATCTTAATAGTAATAACTTAAAAATAAGTAATAACAATAAAAAAGATTGCTTGATTGATGCAT TTCATATATGGGTATGGTATTGCCAATAAGATGTTAATTTTAACTTCATTCCATTCTGTATGTG AAACTTCATGGTATTTAGATTGGATGGTGTGTTTTTTCGCAATTTACAGCAGGTACACCGACAAAAGTG ATATCTTCAGTTTTGGCATCATACTAGGTGTTTTATTAACAGTAAGGACCTACAGATCCATTC TTTGAGAAGCAGCCAGTGGGGGAAGTTGGGATGTTGGTTGAGACACTTCAGCAAGCCGGTGA GTCACGTGAAGCTCTAGATAAGAGCATGTTAGGAGAAGAAGGTGAGGAAGATGAGATGCTAATGG CTGTTAGGATTGCTGCTGCATGCCTTTCTGATATGCCTGCAGATAGGCCTTCTAGTGATGAGCTT GTTACATGCTAACGCAACTGCACAGTTTTTGAACAAACCTTGATTCTTCAGTTCCTAGATATT TTTTCTTTCTCTTATCCCTCTTTCTGTAATAAGATGATAGGGGAATTTGGTTAGTGCCCATGA TTCTGGTGAATTGATTGTTTTGGTGAATTGATTGTTTTGCATGATCTTGGTTTTCATGGTGTG GTTTCTAATATTCATTTTCTTCTCTATTCTATTTCTTTTTCTTTGGCTGATTTGTCAGG TTGTGGTGGGTTTAGGTCACACTATTATATTTTGTGTAATGACTAGTCATGTTAACAAGAGT TTCTTTTCTTGCT
Glyma08g28900 cDNA (SEQ ID NO:48) Soybean CRN-like gene	ATGTTTAGGAAAAGGCACATCCTTTCTTCTCTGCAAGGAATTGTTGGCACTCCAGCCACTTTT TCTTCTCTTCTTGTTCAGCTTGCAACCACAACACTGTGCAGTGTCAAGGAAGGTTGAGTAAGCATG TTTCTTCAGAGCCTCCCTCACCTTCTAGGCCATCGTCAGCAGCACCATCTTCATCAGGATACAAG GATGACCCTAGGAAGATAATTTTGGAGCATGGTTTTAGGAGCAGTCACTGGGCTAGTTTGTCTGT TCTGTTTGCACCTGTGGTTCGTTGTGTTGTTTCACTATCTGAACCGCACCAATCCTCAAGGGCC CTGTCATATCTCCCCCAAATTCCTCCAAGACACTCCAATCAGCTTTGGCAAAGGAAAACAC TTGCTTGGCTCGAGTCTAATGGGAAGTACTATAAACTATGCTTGACAATGGACTCACTATTGC AGTCAAAAGGCTAACACCTTTTGGAGCAATCCCCGGAGGCCAAGAGGAAATCAGTGAAGAGGC AGATACAACTGAGCTTGAACCTTCTGCAAGCCTTAGGAATAGGAACCTGATGAGTTTGGAGGCC TATGTTTGTGAGCCTGATGGATTCTCATTGGTTTATGATTATGCGTCCACTGGGAGTCTTGCTGA TGTGTTGAATAGAGTGAGGGAGAATGAGTTGCCCTTTGGTTGGGAAGTTAGGCTCAGGATTGCTG TTGGTGTGGTGAAGGGTCTTCAGTATCTTCACTTCACTTGTGTGCCTCAGATTCTGCCTACAAC TTGAAGCCCACTAATGTGATGTTGGATGCTGAGTTTGAACCTAGATTAGCAGATTATGGCTTGGC TAAACTTCTGCCTAACTTGGATAGAGGAAGTTCTCTCTACACCCCTCCTGAATGTTTCCACAATT GCAGCAGGTACACCGACAAAAGTGATATCTTCAGTTTTGGCATCATACTAGGTGTTTTATTAACC AGTAAGGACCTACAGATCCATTCTTTGGAGAAGCAGCCAGTGGGGGAAGTTTGGGATGTTGGTT GAGACACTTGACGCAAGCCGGTGAGTCACGTGAAGCTCTAGATAAGAGCATGTTAGGAGAAGAAG GTGAGGAAGATGAGATGCTAATGGCTGTTAGGATTGCTGCTGCATGCCTTTCTGATATGCCTGCA GATAGGCCTTCTAGTGATGAGCTTGTTACATGCTAACGCAACTGCACAGTTTTTGA
Glyma08g28900 protein (SEQ ID NO:49) Soybean CRN-like gene	MFRKRHILSSLARELLALQPLFLFLFSLHNTVQCQGRLSKHVSSEPPSPSRPSSAAPSSSGYK DDPRKIILSMVLGAVTGLVCSVLFALVVRCVVQYLNRTPIILKGPVIFSPKIASKTLQSALAKENH LLGSSPNGKYKTMLDNGLTIAVKRLTPFESNSPEAKRKSVKRQIQTELELLASLRNRLMSLRA YVREPDGFSLVYDYASTGSLADVLNRVRENELPFGWEVRLRIAGVVKGQYLHFTCVPIILHYN LKPTNVMLDAEFEPRLADYGLAKLLPNLDRGSSLYTPPECFHNCSTRYTDKSDIFSFGIILGVLLT SKDPTDPFFGEAASGSLGCLWRHLRHLQAGESREALDKSMLGEEGEDEMLMAVRIAAACLSMPA DRPSSDELVHMLTQLHSF
Glyma18g47610 gDNA + about 4kb of promoter and 5'UT sequence	CAAATGGGTATGCTCCCTTCAGGGGACTCCCCAATCGCCCTAATCGCAGACTCCACCGTCTCACT CTCGTGAACTCCGCCAGCTCCGGCTTCCCCACCGTCAGATCGCCACCACGTGGTACACGAACA CCGACGCCATCGGAATCCAAAAGGTATCCGGAACCAATCAAAATCGATTTTTTGTCTGCTTT TTGTATCCTTAAAAAAAACCGAAAACAGAAAGAAAAAAAAGTTGCTTTTTTTGCTTTGTGTC GGGTGAGAGCTATAAGAGGGTATGGAGGAAGATGAGGAGAAGATCGAGGGCGGTGATGGGAGGGC GGTGGAGGATCACGGCAGAGAAAGAGTTAGCCATTGCCATGGAGGGAGAACGAAAAGGTTAAGGC CCATTCAATTGAATCAGATCAGAGAGAGAGAGGGCGTAGCTTTTGGGAAGATATGATATGTAGA

(SEQ ID
NO: 50) Soybean
CLV2-like
sequence

GATTTGGATAAGGTACGTCCTTTTCGGGGACAGCAAGAGATGCAACGACAGAAGAAGATGGATCAG
CGACGCTTGATGCGGTTGGGACCTGAGAATGAATGGGACACCAGACACACACTAAAAGGAGGTTTC
AATTTATCAAATAAAAAAGAGAAAGGCACAGGGGATGTGTCATGTGTCATGTGTCATGTGTCATG
TGTATGGTGAGCTGCATCATATAGAGAACTTTTTACCTTAATTAATTTGTTAGTTTAATACGT
TTTTCTTTCTTGTCATACTCATCTTTGATTTCAATTCTATAGACCTATATATAAGTTAATTTAT
TTAATAAGAGAGGATAAAACAAAGAATGAAAATAGGTAAATGAGAAAAAGGAGAAAAATAATTTAAA
ACAATGCTTGTTTGAATTTAAAGAAACGGAAGAAAAATAAGAAAAATAGATTACTAATATAAAAA
TATCCTTTATATTACATAATTTTTTTTCATATAACATAGTACATACGGACAAAACCTTAGATACATT
ATTTTGGGTGTTATTTTTTTTATTAGAGTTAAAGTTTCATTTCAATGATATATATATAAGTTTAA
ATGTAAAACTTTATTATGCAAATTACTCAAATAAACTCCAATTTTCATTAGAGAATAATACAAA
CCGTGTAACGACTACAAGTTTATCTTAAATTTCCAATCTTGAAATTATGTTATTTGTCCTCCCTT
TCTTAAAAATATAAAATTGATTTAGTGATAAAGAAAAAGAGGAGAAGGGATAAGTTTTAAATAT
AAATTCCTCAGGTTATAGTTCAATAGGTCACCTTTAATTAATGACGTTAATTAACAGATTAATAA
TGACTTCAGAAGCAGTGTCTATGAAGTTTATGCGAGATCACCAATGATATATGTAGTTAATAGCA
ACAAGTTGAGGAAAGAGGTTTGGATGAATGTGTGGCTGTTAATGTTGGGTGGTGGTGTGGTGGC
TATGACTACGAGGTTGGTGTGGAAAATGTTGTCAATTCAATTGGGATTCGGTTTGCAAAGTTGT
GATAACTTTGAGTTGAATGATGGAATATTGAAATTTCTAGGCTTAGTTAGGAATGATTGCTACA
TGTAACAGTGATACCACAACAACAGGGATGAGGGATTGTTGGGGTTTACTTTTAAAAAATGAATG
AATTGAATTACAATGTAAAAGTATACATATAAAACACTATCTTGCTTCTTAAAAAAAACGTGAG
ACAGAGAGAAAAGTGAAGATGATAAGATTATAGCGCACGCGTTGGAGCGTGCATGAGTTTACTAGG
TCTTGTACCATGCAAAAAATTTAGGACCTTAGATATAACAACAAGACAAGAAGATCTTTAAGA
GTGTAACATATGGATAACATACTGTATACCAACTTTTCTTTTAATAGTATTCTTCTCTCTGGT
TATAACATCATTTTAACTAATCTATGTCTGTTAAAAAATATTAATTTAATTAATTATATTTAAAT
ATATCAATTATTTATATTTTTTATTTTTCTATCCACTTAATTTTTTATTAATGTTTTAAAAAAT
AATTAAGAATAAAATAATTAATGTATTTAAAAATTAAAAAATCTTATAAATCAAGACAAATAAAT
TTATGAAAAACATCATATAATTAGTATGGGATTATGGGATGGAGTAGTATTTAACTTGTGGCTTT
TGAAAATTACACCATATTTTCTCTCTCTCTTGACAAAATGAATGCAACTTAAAAACGTGGGATCA
TTCTTCCTCCTGAGTCCAGAATGTTGACCCCCATTGCTACTCTGATCTATGTGTGTTTGTGGTAT
ATCTCCGTGTGCACTTCACCATTCTAGCTTCATCAGAGAAAAGTAATATATATATTTGTAAACCAA
TTATATATATATTTGAGAGGATTTTAATTTCTACTAAAATTGTAAACCAATTAGAAATCATTTTT
CTGTAATTTTTGTGATCTGAAATTTCTGTTGCGGTTGGAAATGACACAAAATCGTTGGGTCTTT
AAATGGGTTGCAACCGGATGAGAATGACCAACTCAAGGTAGGGGATGACCAAAGCATAGCCCTTT
TAATGGGTAATGTTAAACATGATATAAATTTATAACAAATTATTTTTATGGTGTAGTGGTTAACT
CTTTCATTAATAATAATATAGCTGGTTGTTGGTCCATCCCACAATAAGTCAGTTTAGCTTTTAA
TCTTCTAAAGATTTCTGTTTTTCATTTATTTTGGTTTTTTTAAAAAATAAACAATTCGCCCTTGG
AATCGAACTCACGATATAGTGATTAGTTATAAAAAAATAATTATAAATTATTTGGTAATTTTTTT
CTTACATTCACCTCTGTTTTGAATACTCTCTCTTTGTGAAGTTATGAACCTTGTCTCTTACCA
CAAATATGATACATCTTCTATGTTTTTAATTTTAGATTATATTGATAAACTAACCACAAAAG
ATGAAAAATATAGTCTGTTTAAATATTTAAGATCTAAGCTTAACCTGTTACATGTGATAGACTT
TATTTGTAGATTATACCTTGATTTATTTGAAAGTTTAGCTTAACCTATTAGTTTATTTAAAGACCT
ATTTTCATATGAAAGTTTTTATATAAGTCTATTTTTTTTATATGGACAATAAATTTATAAATCGTT
GAGAAAATTCATGTAAACAACTATAATCTATAAAAAAATAAATTTCTTTATTCAAAGCACAA
GATAGGTGAAAATAGATGAACCTAAGTTTTATAAGTGAAATTTAACATGTCATTATGATGTAAGTT
TATCAACTTCAAGATAACTTAGTTAAAAATATAATTTTGTAAATAGTCTCTAATTAACACATAA
ATTTGCACTCAATAATTTTTTTTTTAATCGTGGATCAACACTCATAATATTTAAAAAAGTAAAT
AATGTATTATTTTGATACATTACAATAATTTTAATATTACAAAATATTATAATTTATATTTATTT
AAATAGGTTGATCTATTAGGTTTAAACACTTTTTTAAATAACTTAAACCTAATTTTTTAAATCAA
ATAGACTTTTATTAACCTTAGATATGATTTATTTTTATTTTTTAAAAAATAACCTGACTT
GAGTTTGATATAAATTAGGTGTCAGTTTGTAAATTTATTTATTAATAAATGTTTATTTTAA
TAAATAAGTAATTTTATATTTGTTTAGTATATTTGTGTAAATCTTTTTCTTAAAAAATATTT
TTTTCTTTTTAAAAAATACTTATTTTAAATATTTTTTTTTTAAAAAGAGAACTTGAAAAGG
ATAAGTGTAATGCAGTATAGAGAGAAAGAGGAGGAAGCAAAGCAAACCAAGCACACACAACAA
AGCCACTTTATTTTTTTGATCTAACCTAAACCTCTTTTTCCCTGTTGCTCTCTCACTTTATCA
GCGTGATACAACCAACCAAGACCAATGTGAAGATCTGTTCTCTTTCCCTCTCTCTATGTCC
ATTTTCATCATGTTTTCTATCTAATCTCCAAATCCATGCCACCCAGTTCTCTTTTGCTTCAAA
CTCCTCTCCCCCTTCTTAAAAATTGCACCTTTACTCTCATGGTGATGGGACACACCACACCCCTC
ACACTTCTCTGTGTGATCTTCTTTTTGCAACTCCTTCTCACTCAATTGATGTTCAACCACAAGA
CAGAACTCTCACTTTCAATGTTTCAGGTCTCTCTGCCAAACCCCAACCAGAGTTTGCCAGCTGGG
TGGGCTCCAACCTGCCTTCATGGAGTGAATCACCTGTGACAACAGAAGTGGGAGGGTGCTTTCC

	ATCAACCTAACCAAGTATGAACCTTTTCAGGCAAAATCCACCCAGTTTGTGCTACCTTTTCATATCT GAACAAGTTGGGGTTGTCCCAACAACCTTCACATCCCCTCTTCTGAATGTTTTGGCAACTTGC TTAACCTAAGAGCCATTGATCTCAGCCACAACAGGCTTCATGGGGGAATACCAGACTCTTTTCATG AGGCTTAGGCACCTCACTGAGCTTGTCTTGTAGTGGAACCTGATTTGGGGGGTCCACTGCCTGC TTGGATTGGTAACCTCTCTGCAAATCTGGAAAGGTTACATCTTGGTTTCTGTTTCATTAGTGGTG GCATACCGGAGAGCTTGCTTTACCTGAAGTCCCTCAAGTATTTGGACCTTGAGAAACAACCTCTTG TCTGGTAACCTGGTCAATTTTCAACAGCCTTTGGTTTGTCTCAATCTTGCTTCCAATCAGTTTGC TGGTACTTTGCCTTGCTTTGCAGCTTCAGTTTCAGTCTCTAACTGTGTTGAATTTATCTAACAATT CTATTGTGGGGGACTACCTGCTTGATTGCTTCTTTTCAAGCTTTGACTCATTTGAACCTGTCA GGGAACCACTTGAAGTATAGAATATATCCTAGGCTTGTGTTCTCGGAGAACTTCTTGTTTTGGGA CTTGAGTAATAATGCTTGTCTGGTCTTATCCTTGTAATTTGCTGAGACAACCTGAGAACTTG GCCTTGTCTTCTTGACCTTTCTCACAATCAGTTCTCTGGTGAAATTCCTGTGAAAATCACTGAG TTGAAAAGCTTGCAAGCCTTGTCTCTCTCACAATCTTCTCTGAGAGAAATTCCTGCTAGAAT TGGAAATTTGACTTATCTGCAGGTCATTGATCTCTCACACAACCTCTTGTCTGGAACCATTCAT TCAGTATTGTTGGTGCTTTCAGCTGTATGCTCTAATACTTACTAACAACAATCTTCTGGTGTA ATTCAACCGGAGTTTGATGCGTTGGATATCTTGAGGATTCTGGATATAAGCAACAACAGGTTTTC CGGGGCTATCCCACTCACTCTGGCTGGATGCAAATCTCTGGAGATTGTAGATTTTAGTTCCAATG AGCTTTCTGGATCCTTGAATGATGCAATAACCAAATGGACAACCTCAGTATTTGTCTCTTGCT CAGAACAAGTTTCAGTGGAATCTGCCCTAGTTGGTTGTTTCAATTTAACGCAATAGAAATGATGGA TTTCTCGCATAACAAGTTTACTGGCTTCATACCTGATATTAATTTAAGGGTAGCTTAATATTTA ACACCAGGAATGTCACTGTTAAAGAGCCATTGGTTGCAGCAAGAAAGGTTCAACTGAGAGTTTCG GCGGTTGTTTCTGATAGCAATCAGCTCAGTTTCACTTATGATCTTTCCTCAATGGTTGGAATTGA TCTATCCAGCAATTCGCTTCATGGGGAAATTCGAAGGGGCTTATTTGGTCTAGCTGGCCTAGAAT ATCTGAACTTGTCTATGCAACTTTCTTTACGGACAGCTTCCGGGGTTCAGAAAATGCATAGTTTG AAAGCCTTGGATTTGTACATAATTCCTTGTCTGGACATATCCAGGAAACATTTCTAGCCTTCA AGATCTGTCCATTTTGAATCTTTCCTACAACTGTTTTCTGGATATGTTCCCAAGCAAGGGT ATGGGAGATTTCCCGGTGCATTTGCTGGAAATCCAGATCTGTGCATGGAACTTCCAGTGGAGTA TGTGATGATGGAAGGACTCAATCTGCGCAAGGAAGTTCTTTCAGTGAAGATAGGATGGATGGCCC AATTTCTGTGGGGATTTCTTTATCAGTGCCTTTGTTAGTTTGTGATTTGGTGTGTGGTTCTCT TCTGTTCTGCCCCGGCAAGAAATTACATTCTCCAAACAAAAGTTTGATTTGATGCTTGTGACAGT TACAAATCTCCTGTAAATTCATTTTGTAAATTTGGTACCTGTGTTCTCAGTTTCAAGTAAACAT ACACTTATGTGACTAGGAATACTATCCGGCCATCAACTTCACAAGTGTCTTCTGTGATTCCTGA TCAAGTGTCTCAGATTTACAGGATCAAAATGCCATGACATGAGTAACACAAGGTTTAAAGAACAC TCAACACTGGCTTTATCTATCTGAGTGAAGACTAGCCTGGCATCATTAGCCAAGAAAAGAAATGG ATGATTATGATGAAAATTTGATCCGAGTAAAGACGAGTCCCTCATCATTCTGATGGTTGTTCTCT TTTGCTGGAATTTGGTTGCATCAAGTTTAGAATGCATCATCACATGTATTATTATAATCAGTGG TGGGCGAAGGGTCAGTAGGGAACATGTCTGATATCTGGTCTAGTTGATGAAATTTGATCTTG GGCATCAAATTCAGATTTGCAAGCATGTTTACGTGAAGAGAACCTGTATAATCTTGATTAAAC TAGTTCTTTCTTGAGGTGGGGAACCAAGTTTTCCTGTAGTGGGGAGTAGGTTCTCATAAGTCT AAGATTTGTATTTGTATTACTATCTTCACACCTTCATCATAGTGCTGTGATTTTAAATGATATTC TCACGAAACCTTTTCATTGACAACAGAAAAGAGGTTAATTGA
Glyma18g47610 cDNA (SEQ ID NO:51) Soybean CLV2-like sequence	ATGCCCACCCAGTTCTCTTTTGCTTCAAACCTCTCTCCCCCTTCTTAAAATTCACCTTTACT CTCATGGTCATCTCTGCCAAACCCCAACCAGAGTTTGCCCAGCTGGGTGGGCTCCAACCTGCACCTT CATGGAGTGGAATCACCTGTGACAACAGAACTGGGAGGGTGCTTCCATCAACCTAACCAAGTATG AACCTTTCAAGGCAAAATCCACCCAGTTTGTGCTACCTTTTCATATCTGAACAAGTTGGGGTTGTC CCACAACAACCTTCACATCCCCTCTTCTGAATGTTTTGGCAACTTGCTTAACCTAAGAGCCATTG ATCTCAGCCACAACAGGCTTCATGGGGGAATACCAGACTCTTTCATGAGGCTTAGGCACCTCACT GAGCTTGTCTTGTAGTGGAACCTGATTTGGGGGGTCCACTGCCTGCTTGGATTGGTAACCTCTC TGCAAATCTGGAAGGTTACATCTTGGTTTCTGTTTCATTAGTGGTGGCATACCGGAGAGCTTGC TTTACCTGAAGTCCCTCAAGTATTTGGACCTTGAGAACAACTCTTGTCTGGTAACCTTGGTCAAT TTTCAACAGCCTTTGGTTTGTCTCAATCTGCTTCCAATCAGTTTGTCTGGTACTTTGCCTTGCTT TGCAGCTTCAGTTTCAGTCTCTAACTGTGTTGAATTTATCTAACAATTCATTTGTGGGGGGACTAC CTGCTTGTATTGCTTCTTTTCAAGCTTTGACTCATTTGAACCTGTGAGGGAACCACTTGAAGTAT AGAATATATCCTAGGCTTGTGTTCTCGGAGAACTTCTTGTTTTGGACTTGAGTAATAATGCTTT GTCTGGTCTTATTCCTTGTAATTTGCTGAGACAACCTGAGAACTTGGCCTTGTCTTCTTGACC TTTCTCACAATCAGTTCTCTGGTGAAATTCCTGTGAAAATCACTGAGTTGAAAAGCTTGCAAGCC TTGTTTCTCTCTCACAATCTTCTCTCTGAGGAAATTCCTGCTAGAATTGGAATTTGACTTATCT GCAGGTCATTGATCTCTCACACAACCTTTGTCTGGAACCATTCATTTCAGTATTGTTGGGTGCT

	TTCAGCTGTATGCTCTAATACTTACTAACAACAATCTTTCTGGTGTAATTCAACCGGAGTTTGAT GCGTTGGATATCTTGAGGATTCTGGATATAAGCAACAACAGGTTTTCCGGGGCTATCCCACTCAC TCTGGCTGGATGCAAATCTCTGGAGATTGTAGATTTTAGTTCCAATGAGCTTTCTGGATCCTTGA ATGATGCAATAACCAAATGGACAAACCTCAGGTATTTGTCTCTTGCTCAGAACAAGTTCAGTGGA AATCTGCCCTAGTTGGTTGTTTACATTTAACGCAATAGAAATGATGGATTTCTCGCATAACAAGTT TACTGGCTTCATACCTGATATTAATTTTAAGGGTAGCTTAATATTTAACACCAGGAATGTCCTG TTAAAGAGCCATTGGTTGCAGCAAGAAAGGTTCAACTGAGAGTTTCGGCGGTTGTTTCTGATAGC AATCAGCTCAGTTTCACTTATGATCTTTCTCAATGGTTGGAATTGATCTATCCAGCAATTCGCT TCATGGGGAAATTCCAAGGGGCTTATTTGGTCTAGCTGGCCTAGAATATCTGAACTGTCTATGCA ACTTTCTTTACGGACAGCTTCCGGGGTTCAGAAAATGCATAGTTTGAAAGCCTTGGATTTGTCA CATAATTCCTTGTCTGGACATATCCAGGAAACATTTCTAGCCTTCAAGATCTGTCCATTTTGAA TCTTTCTTACAACGTGTTTTCTGGATATGTTCCCAAGCAAGGGTATGGGAGATTTCCCGGTG CATTTGCTGGAAATCCAGATCTGTGCATGGAACTTCCAGTGGAGTATGTGATGATGGAAGGACT CAATCTGCGCAAGGAAGTCTTTTCACTGAAGATAGGATGGATGGCCCAATTTCTGTGGGGATTTT CTTTATCAGTGCCTTTGTTAGTTTGTATTTGGTGTGTGGTTCTCTTCTGTTCTGCCCGGGCAA GAAATTACATTCTCCAAACAAAGTTTGA
Glyma18g47610 protein (SEQ ID NO:52) Soybean CLV2-like sequence	MPTQFLFCFKLLSPFLKIAPLLSWSSLPNPNQSLPSWVGSNCTSWSGITCDNRTGRVLSINLTSM NLSGKIHPSLCYLSYLNKLGLSHNNFTSPLPECFGNLLNLRAIDLHNLHGGIPDSFMRLRHLT ELVLSGNPDLGGPLPAWIGNFNSANLERLHLGFCFSGGIPESLLYLKSLKYLDLENNLLSGNLVN FQQPLVLLNLASNQFAGTLPFCFAASVQSLTVLNLNNSIVGGLPACIASFQALHNLNLSGNHLKY RIYPRLVFSEKLLVLDLSNNALSGPIPKIAETTEKLGLVLLDLSHNQFSGEIPVKITELKSLQA LFLSHNLLSGEIPARIGNLTYLQVIDLSHNSLSGTIPFSIVGCFQLYALILTNNNLSGVIQPEFD ALDILRILDISNNRFSGAIPLTLAGCKSLEIVDFSSNELSGSLNDAITKWTNLRYSLSAQNKFSG NLPSWLFTFNAIEMMDFSHNKFITGFIPTDINFKGSILFNTRNVTVKEPLVAARKVQLRVSAVSDS NQLSFTYDLSSMVGIDLSSNSLHGEIPRGLFGLAGLEYLNLSCNFLYGLPGLQKMHSLKALDLS HNSLSGHIIPGNISLQDLSILNLSYNCFSGYVPQKQGYGRFPFAGFAGNPDLCMETSSGVCDDGRT QSAQGSSFSEDRMDGPISVGIFIFISAFVSFDFGVVLFCSARARNYILQTKV

[00154] Having illustrated and described the principles of the present invention, it should be apparent to persons skilled in the art that the invention can be modified in arrangement and detail without departing from such principles. Although the materials and methods of this invention have been described in terms of various embodiments and illustrative examples, it will be apparent to those of skill in the art that variations can be applied to the materials and methods described herein without departing from the concept, spirit and scope of the invention. All such similar substitutes and modifications apparent to those skilled in the art are deemed to be within the spirit, scope and concept of the invention as defined by the appended claims.

What is claimed is:

1. A method for inhibiting plant parasitic nematode damage to a plant comprising growing a plant comprising a mutation or a transgene that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide in the presence of plant parasitic nematodes.
2. The method of claim 1, wherein said plant gene encoding a receptor for a nematode CLE peptide is selected from the group consisting of a CLV1-like gene, a CLV2-like gene, a BAM1-like gene, a BAM2-like gene, a CRN-like gene, a ACR4-like gene, an ER-like gene, and an ERL2 –like gene.
3. The method of claim 1 or 2, further comprising the step of harvesting a product of said plant.
4. The method of claim 3, wherein said product is a leaf, stem, flower, seed, root, or tuber.
5. The method of any one of claims 3-4, wherein the yield and/or quality of said product is increased relative to a control plant that is grown in presence of plant parasitic nematodes and that lacks said mutation or said transgene that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide.
6. The method of any one of claims 1-5, wherein said transgene comprises: i) an siRNA directed against said plant gene; ii) an artificial microRNA targeting said plant gene; iii) a dominant negative form of said plant gene; iv) an antisense or sense form of said plant gene; or v) a genomic insertion that disrupts said plant gene.
7. A method for obtaining a transgenic plant that exhibits resistance to a plant parasitic nematode comprising the steps of:
 - a) introducing a transgene that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide into a plant cell or a transgene that provides for inhibition of at least one CLV1-like, a CLV2-like, a BAM1-like, a BAM2-like, a CRN-like, a ACR4-like, an ER-like, and/or an ERL2 –like gene; and

b) selecting a transgenic plant obtained from said plant cell, wherein said selected transgenic plant comprises said transgene and exhibits resistance to a plant nematode.

8. A method for obtaining a transgenic plant expressing a gene product at a plant parasitic nematode feeding site, comprising the steps of:

a) introducing a transgene wherein a ACR4, BAM1, BAM2, CLV1, CLV2, CRN, ER, or ERL2 promoter is operably linked to a gene encoding said gene product into a plant cell; and,

b) selecting a transgenic plant obtained from said plant cell, wherein said selected transgenic plant comprises said transgene and exhibits expression of said gene product at said nematode feeding site.

9. The method of claim 8, wherein said gene product is inhibitory to said plant parasitic nematode.

10. The method of claim 9, wherein said inhibitory gene product is an siRNA or an amiRNA directed against a plant parasitic nematode gene.

11. The method of any one of claims 1-10, wherein said plant nematode is a cyst nematode.

12. The method of claim 11, wherein said cyst nematode is a *Heterodera* or *Globodera* spp.

13. The method of claim 12, wherein said *Heterodera* spp. is *H. avenae*, *H. bifenebra*, *H. cajani*, *H. carotae*, *H. ciceri*, *H. cruciferae*, *H. cynodontis*, *H. cyperi*, *H. daveri*, *H. elachista*, *H. fii*, *H. galeopsidis*, *H. goettingiana*, *H. graminis*, *H. hordecalis*, *H. humuli*, *H. iri*, *H. latipons*, *H. lespedeza*, *H. leucilyma*, *H. longicaudata*, *H. mani*, *H. maydis*, *H. medicaginis*, *H. oryzae*, *H. oryzicola*, *H. sacchari*, *H. salixophila*, *H. schachtii*, *H. sorghii*, *H. trifolii*, *H. urticae*, *H. vigna*, or *H. zae*.

14. The method of claim 12, wherein said *Globodera* spp. is *G. achilleae*, *G. artemisiae*, *G. hypolysi*, *G. leptonepia*, *G. mali*, *G. pallida*, *G. rostochiensis*, *G. tabacum*, or *G. zeylandica*.

15. The method of any one of claims 1-10, wherein said plant is a monocot or dicot plant, or is selected from the group consisting of a tobacco, cereal, sugar beet, cotton, fruit, fiber, oilseed, potato, rice, corn, soybean, vegetable, and wheat plant.

16. The method of any one of claims 2 or 7, wherein said CLV1-like gene, said CLV2-like gene, BAM1-like gene, a BAM2-like gene, a CRN-like gene, a ACR4-like gene, an ER-like gene, or an ERL2 –like gene is an ortholog of a corresponding *Arabidopsis*, soybean, or potato CLV1, CLV2, BAM1, BAM2, CRN, ACR4, ER, or ERL2 gene.

17. The method of anyone of claims 1-7, wherein said endogenous plant gene encoding a receptor for a nematode CLE is a potato StCLV1, StCLV2, StBAM1, StBAM2, StCRN, StACR4, StER, or StERL2 gene and the plant is a potato plant.

18. The method of claim 17, wherein said plant parasitic nematode is *G. rostochiensis* or *G. pallida*.

19. The method of any one of claims 1-7, wherein said endogenous plant gene encoding a receptor for a nematode CLE is selected from the group consisting of soybean genes of SEQ ID NO:23, SEQ ID NO:26, SEQ ID NO:29, SEQ ID NO:32, SEQ ID NO:35, SEQ ID NO:38, SEQ ID NO:41, SEQ ID NO:44, SEQ ID NO:47, and SEQ ID NO:50, and wherein said plant is a soybean plant.

20. The method of claim 19, wherein said plant parasitic nematode is *Heterodera glycines* or *H. schachtii*.

21. A plant parasitic nematode resistant transgenic plant comprising a transgene that provides for inhibition of at least one endogenous plant gene encoding a receptor for a nematode CLE peptide.

22. The transgenic plant of claim 21, wherein said transgene comprises: i) an siRNA directed against said plant gene; ii) an artificial microRNA targeting said plant gene; iii) a dominant negative form of said plant gene; iv) an antisense or sense form of said plant gene; or v) a genomic insertion that disrupts said plant gene.

23. The transgenic plant of claim 21 or 22, wherein said endogenous plant gene encoding a receptor for a nematode CLE is selected from the group consisting of soybean genes of

soybean genes of SEQ ID NO:23, SEQ ID NO:26, SEQ ID NO:29, SEQ ID NO:32, SEQ ID NO:35, SEQ ID NO:38, SEQ ID NO:41, SEQ ID NO:44, SEQ ID NO:47, and SEQ ID NO:50, and said plant is a soybean plant.

24. The transgenic plant of claim 21 or 22, wherein said endogenous plant gene encoding a receptor for a nematode CLE is a potato StCLV1, StCLV2, StBAM1, StBAM2, StCRN, StACR4, StER, or StERL2 gene and the plant is a potato plant.

25. A plant parasitic nematode resistant transgenic plant comprising a transgene wherein an ACR4, BAM1, BAM2, CLV1, CLV2, CRN, ER, or ERL2 promoter is operably linked to a gene encoding a gene product that is inhibitory to a plant parasitic nematode.

26. The transgenic plant of claim 25, wherein said gene product is a siRNA or an amiRNA directed against a plant parasitic nematode gene.

27. The transgenic plant of claim 25 or 26, wherein said promoter comprises a promoter selected from the group consisting of an ACR4 promoter (SEQ ID NO:15), an *Arabidopsis* CLV1 promoter (SEQ ID NO:14), a potato (SEQ ID NO:16) CLV1 promoter, a soybean CLV1 promoter of SEQ ID NO:38, a soybean CLV1 promoter of SEQ ID NO: 41, an *Arabidopsis* CLV2 promoter (SEQ ID NO:4), a potato (SEQ ID NO:17) CLV2 promoter, a soybean CLV2 promoter of SEQ ID NO:35, a soybean CLV2 promoter of SEQ ID NO:50, an *Arabidopsis* CRN promoter (SEQ ID NO:5), a potato CRN promoter (SEQ ID NO:18), a soybean CRN promoter of SEQ ID NO:44, a soybean CRN promoter of SEQ ID NO: 47, an *Arabidopsis* BAM1 promoter (SEQ ID NO:3), a potato BAM1 promoter (SEQ ID NO:19), a soybean BAM1 promoter of SEQ ID NO: 23, a soybean BAM1 promoter of SEQ ID NO: 26, a potato BAM2 promoter (SEQ ID NO:20), a soybean BAM2 promoter of SEQ ID NO: 29, a soybean BAM2 promoter of SEQ ID NO: 29, a potato ER promoter (SEQ ID NO:21), a potato ERL2 promoter (SEQ ID NO:22), a variant thereof that has at least 70% sequence identity to said promoter, and a variant thereof comprising at least about 500 nucleotides of the nucleic acid sequence located 5' to the start codon or mRNA 5' cap site of the endogenous gene associated with said promoter.

28. A recombinant DNA construct comprising a plant nematode CLE receptor gene promoter that is operably linked to a heterologous gene, wherein said promoter comprises a promoter selected from the group consisting of an ACR4 promoter (SEQ ID NO:15), a potato (SEQ ID NO:16) CLV1 promoter, a soybean CLV1 promoter of SEQ ID NO:38, a soybean CLV1 promoter of SEQ ID NO: 41, a potato (SEQ ID NO:17) CLV2 promoter, a soybean CLV2 promoter of SEQ ID NO:35, a soybean CLV2 promoter of SEQ ID NO:50, a potato CRN promoter (SEQ ID NO:18), a soybean CRN promoter of SEQ ID NO:44, a soybean CRN promoter of SEQ ID NO: 47, an *Arabidopsis* BAM1 promoter (SEQ ID NO:3), a potato BAM1 promoter (SEQ ID NO:19), a soybean BAM1 promoter of SEQ ID NO: 23 , a soybean BAM1 promoter of SEQ ID NO: 26, a potato BAM2 promoter (SEQ ID NO:20), a soybean BAM2 promoter of SEQ ID NO: 29, a soybean BAM2 promoter of SEQ ID NO: 29, a potato ER promoter (SEQ ID NO:21), a potato ERL2 promoter (SEQ ID NO:22), a variant thereof that has at least 70% sequence identity to said promoter, and a variant thereof comprising at least about 500 nucleotides of the nucleic acid sequence located 5' to the start codon or mRNA 5' cap site of the endogenous gene associated with said promoter.

29. The recombinant DNA construct of claim 27, wherein said promoter is operably linked to a gene encoding a gene product that is inhibitory to a plant parasitic nematode.

1/19

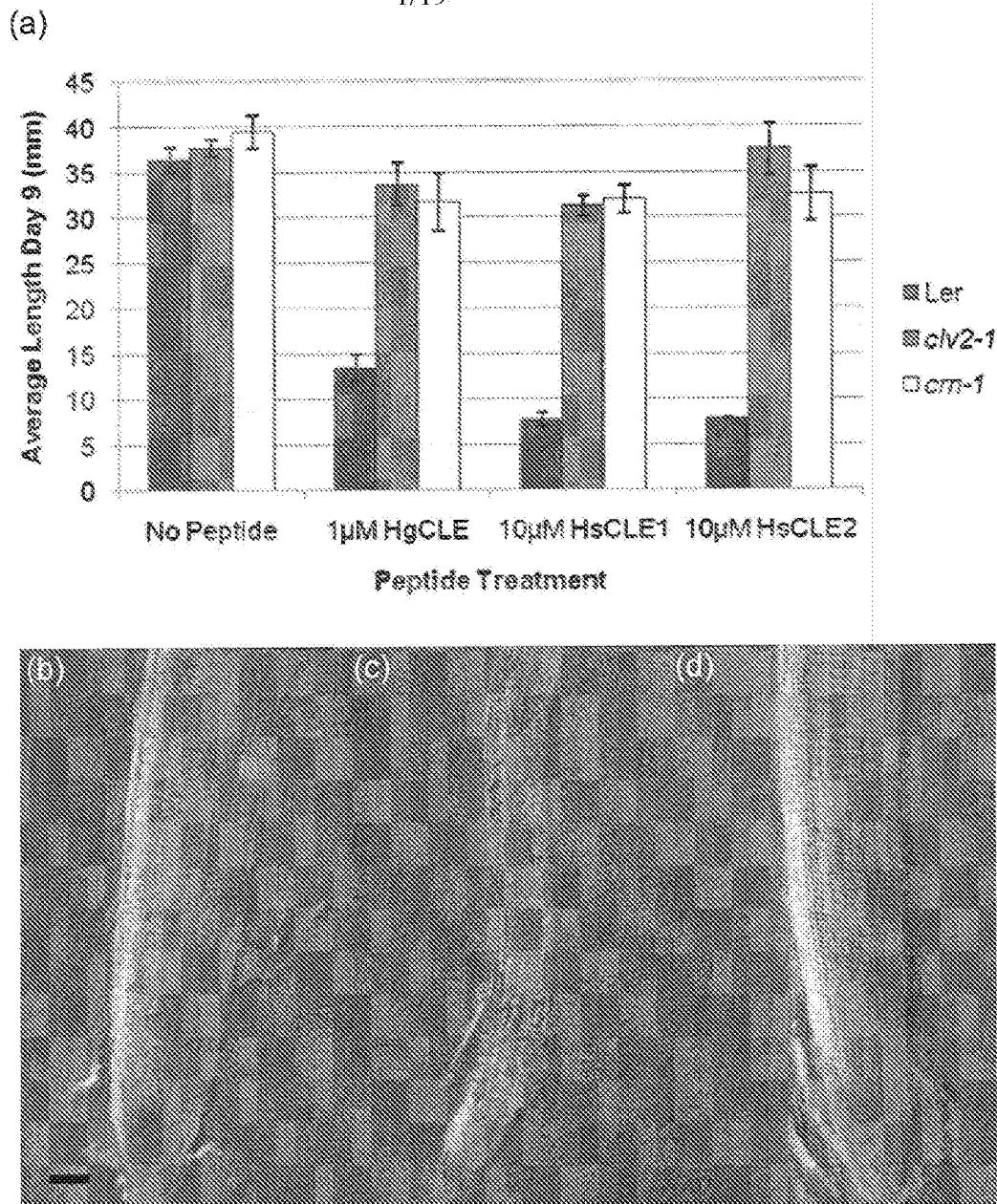


Figure 1. Effect of cyst nematode CLE peptides on receptor mutants. (a) Average root length wild-type (*Ler*), *clv2-1*, and *crm-1* seedlings grown for 9 days on media with or without the synthetic nematode dodecapeptide CLE motif. Data represent the mean $\pm$ SE, $n = 10$. (b)-(d) Representative roots tips of seedlings grown on media with or without synthetic CLE peptides for 10 days and visualized with differential interference microscopy. (b) No peptide, (c) Sensitive to peptide, and (d) Resistant to peptide. (Scale bar, 50 μ m).

FIGURE 1

2/19

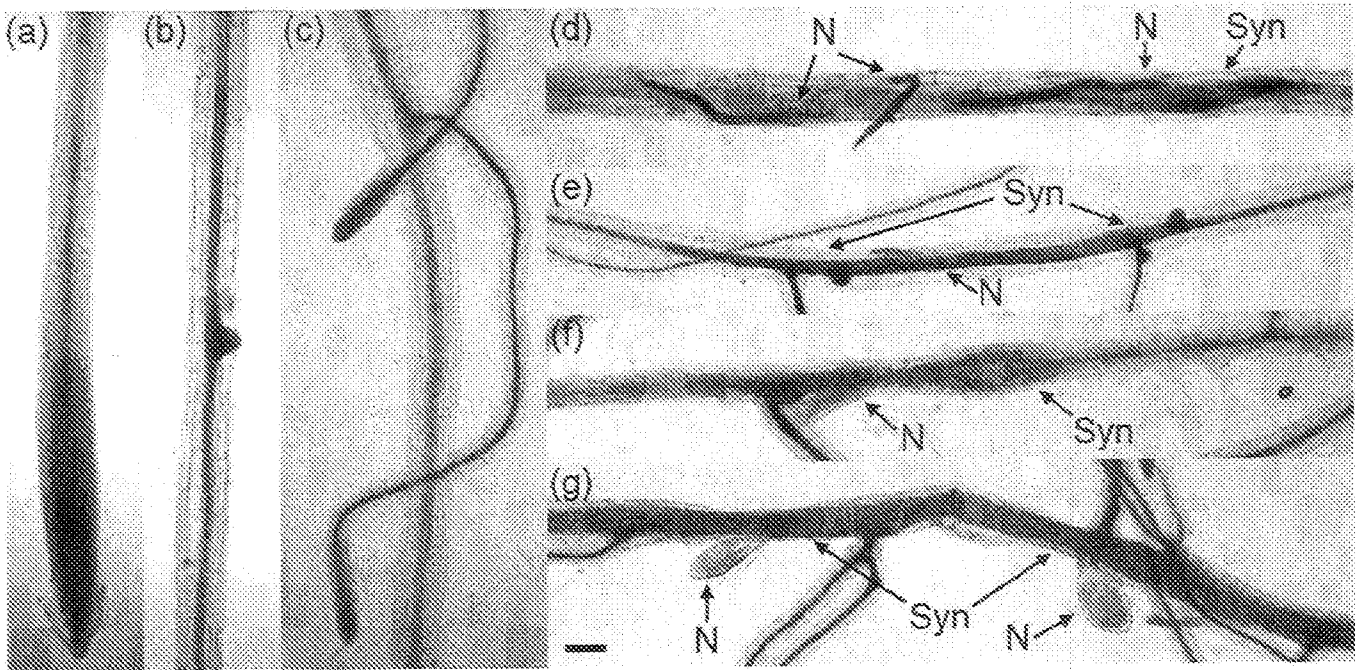


Figure 2. *CRN* expression during nematode infection. (a)-(c) *CRN:GUS* expression in uninfected *Arabidopsis* root tips (a), middle of the root (b), and older part of the root towards the hypocotyl (c). (d)-(g) *CRN:GUS* expression in response to *H. schachtii*; early parasitic J2 (d), late parasitic J2 (e), J3 parasitic (f), J4 parasitic (g). Abbreviations: nematode, N; Syn, Syncytium. (Scale bar, 50 μ m).

FIGURE 2

3/19

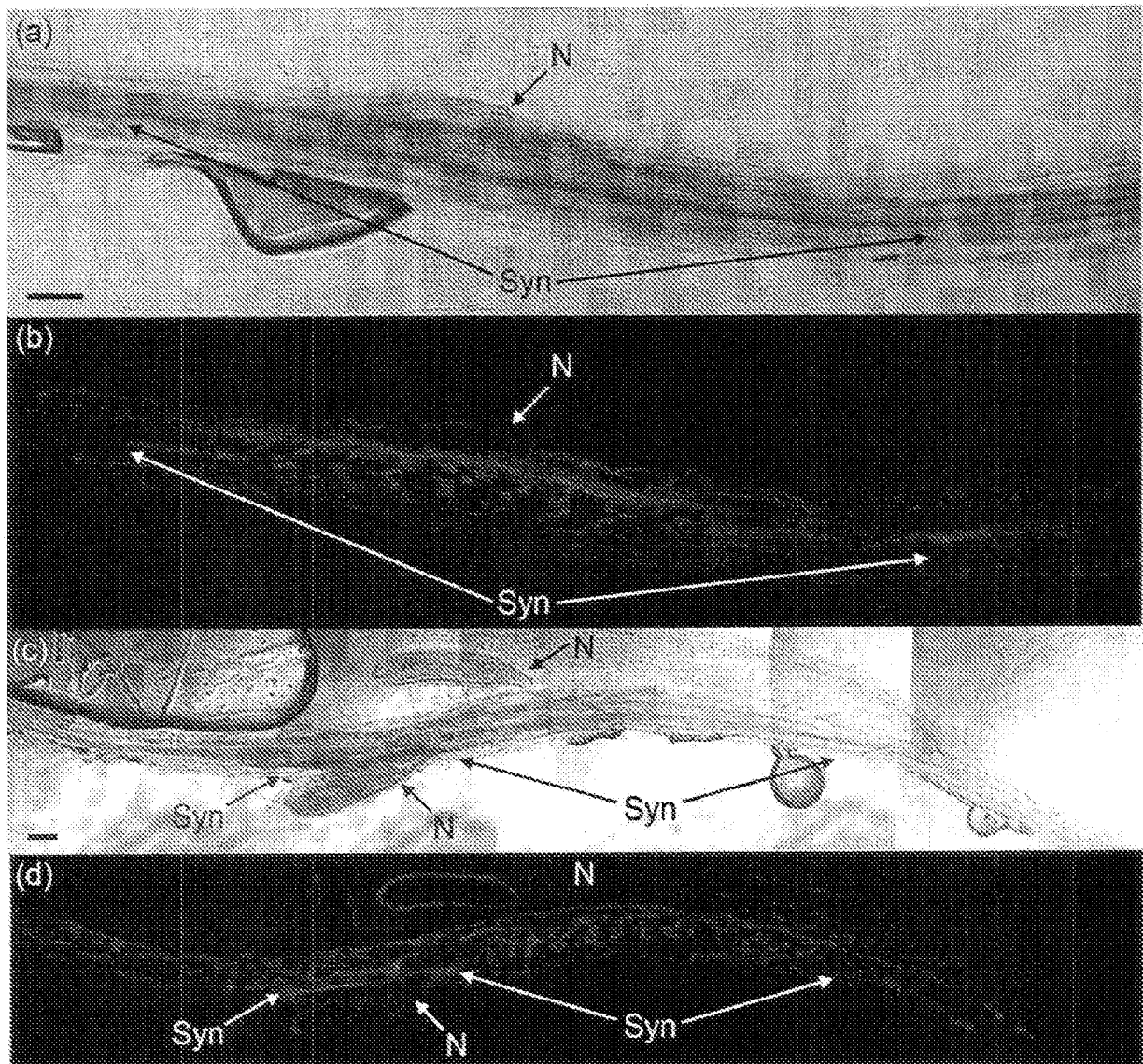


Figure 3. Confocal images of *CLV2* expression of *CLV2:H2B-mCherry* during nematode infection. (a) J2 parasitic with DIC. (b) J2 parasitic with mCherry fluorescence. (c) J3 parasitic with DIC. (d) J3 parasitic with mCherry fluorescence. Abbreviations: nematode, N; Syn, Syncytium. (Scale bars, 50 μ m).

FIGURE 3

4/19

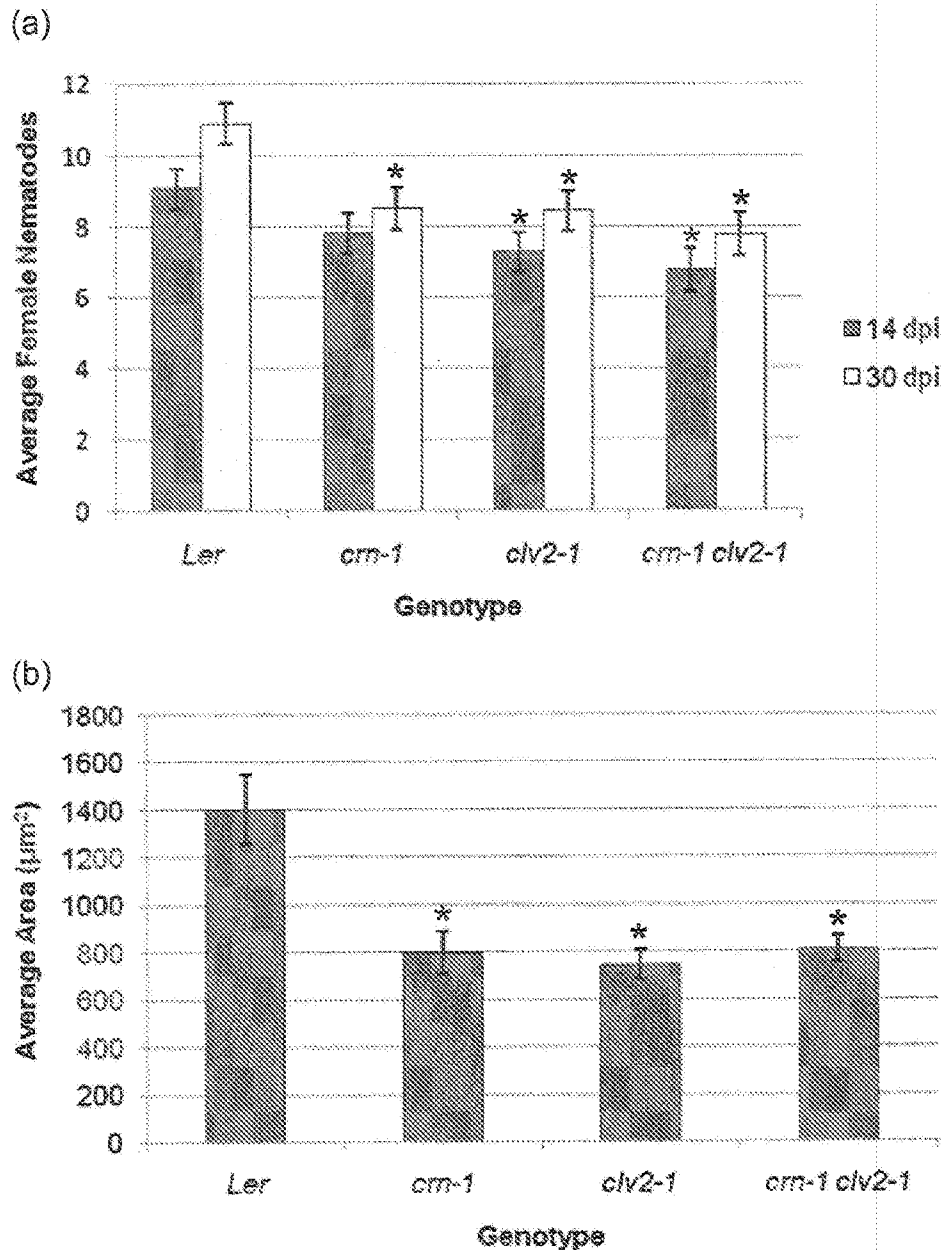


Figure 4. Effect of *clv2-1* and *crn-1* mutant alleles on *H. schachtii* infection. (a) J4 females were counted at 14dpi and adult females were counted at 30 dpi. Data represent mean $\pm$ SE, $n = 35$ for *Ler*, 32 for *crn-1*, 34 for *clv2-1*, and 29 for *crn-1 clv2-1*. Data representative of three independent experiments. (b) Seedlings were grown on vertical square plates for 10 days and inoculated with 10 ppJ2s/root. At 14 dpi, syncytia that fed only one nematode and appeared translucent were microscopically examined and their area was determined. Data represent mean $\pm$ SE, $n = 11$ for *Ler* and *crn-1*, 14 for *clv2-1*, and 12 for *crn-1 clv2-1*. Asterisks indicate statistically significant differences compared to *Ler* by Student's *t* test ($P < 0.05$).

FIGURE 4

5/19

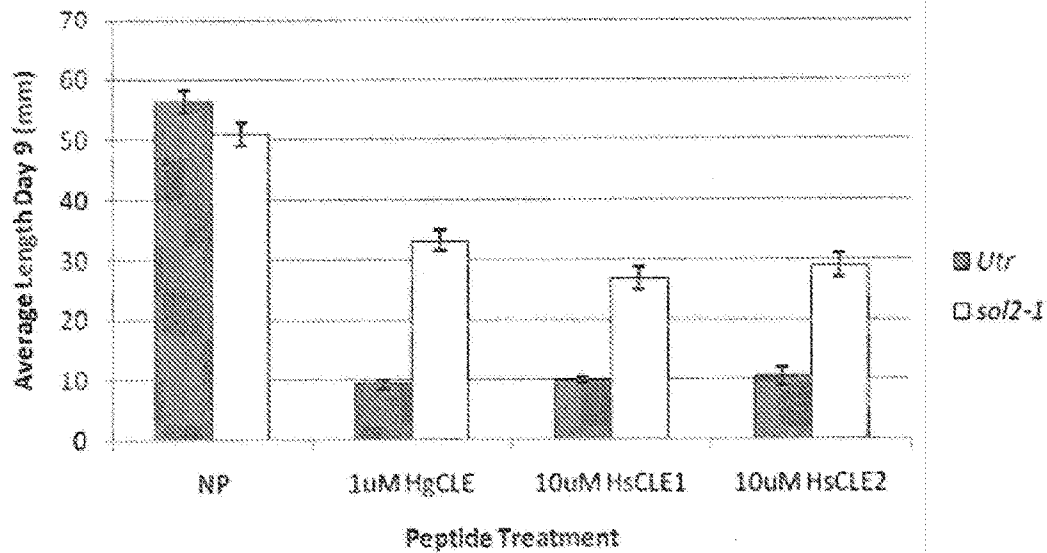


Fig. S1. Average root length wild-type (*Utr*) and *so/2-1* seedlings grown for 9 days on media with or without the synthetic nematode dodecapeptide CLE motif. Data represent the mean $\pm$ SE, $n = 10$.

FIGURE 5

6/19

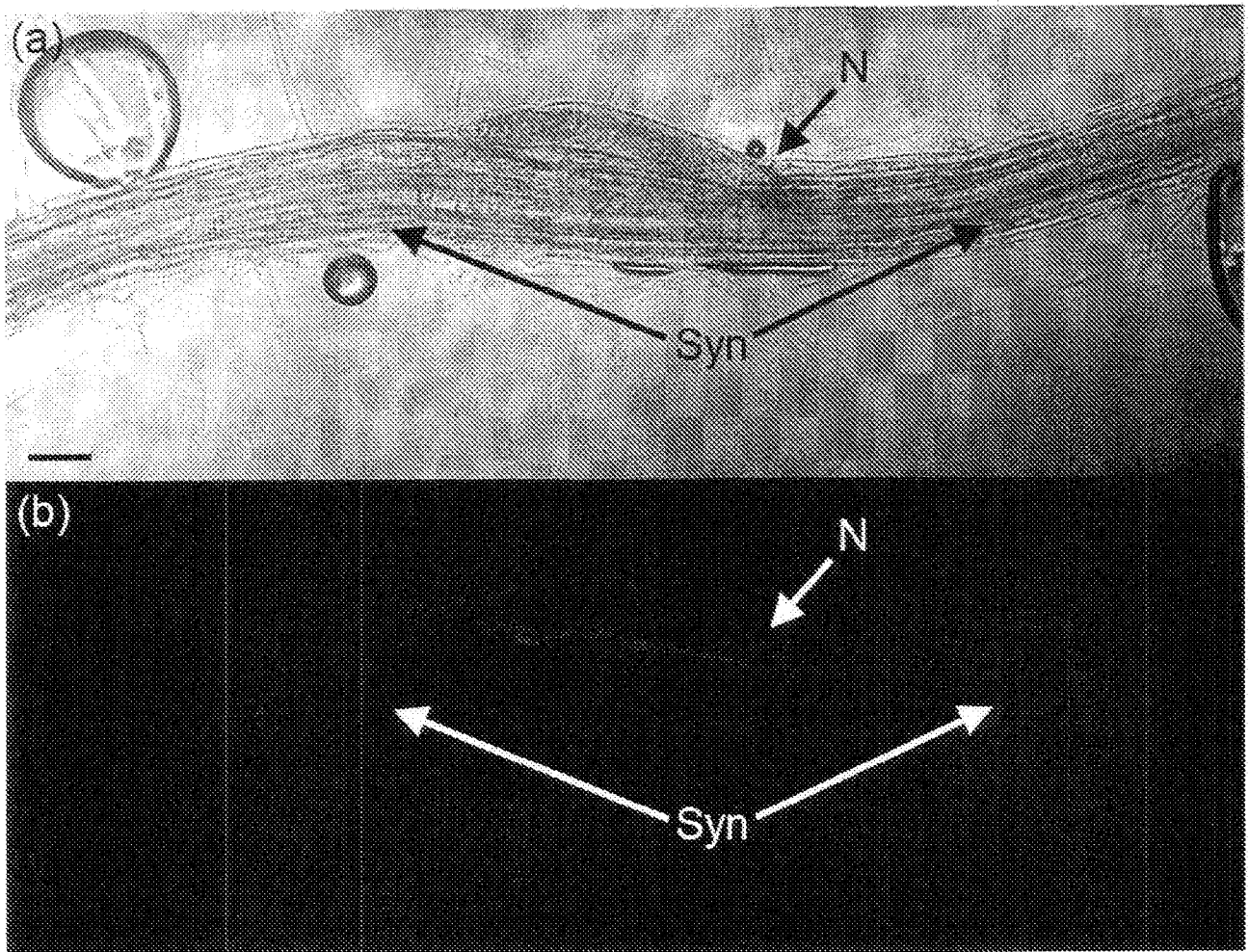


Figure S2. Confocal image of nematode autofluorescence in a wild-type root. (a and b) Feeding site induced by a parasitic J2. (a) DIC image. (b) mCherry fluorescence. (Scale bar 50um).

FIGURE 6

7/19

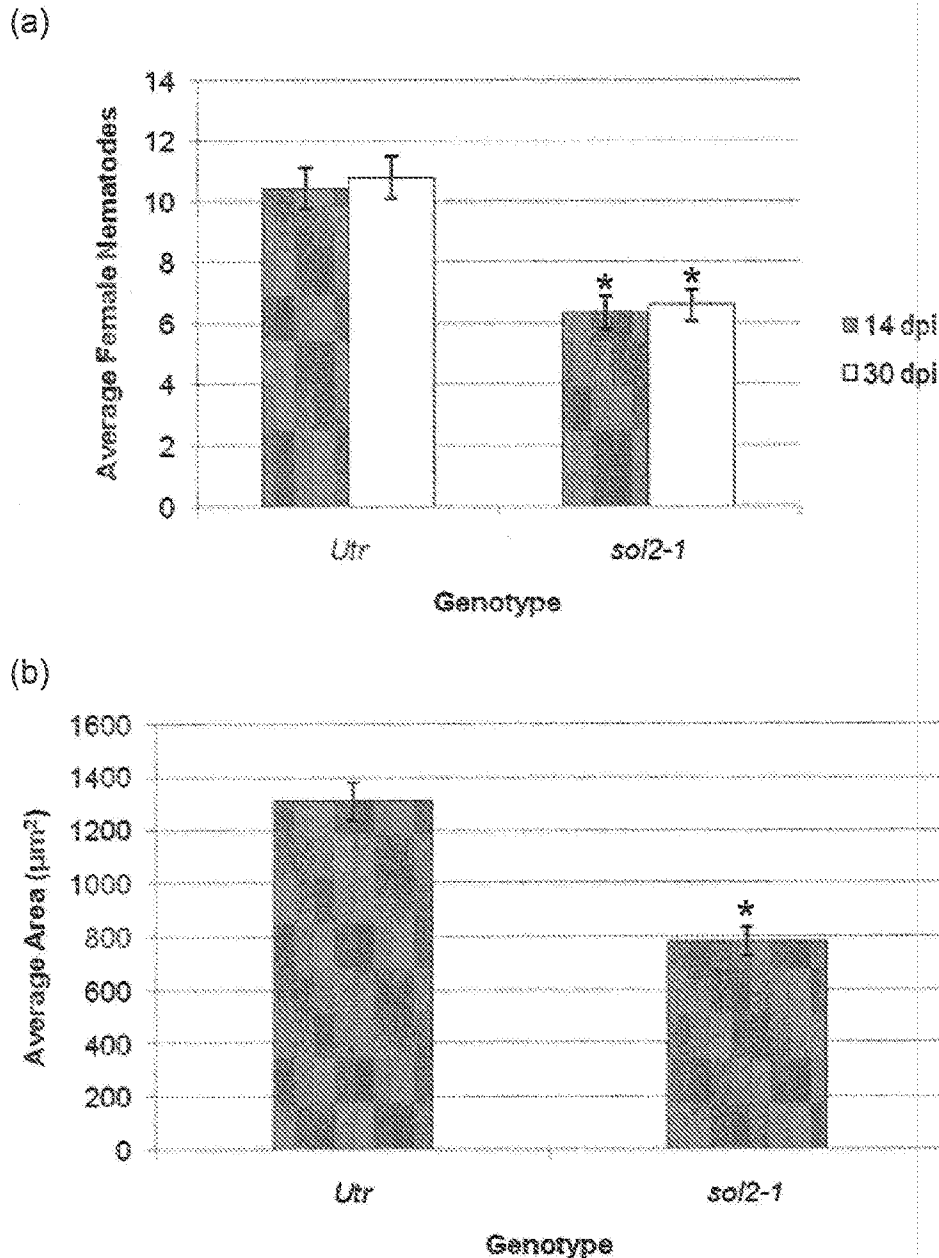


Fig. S3. Effect of *sol2-1* mutant allele on *H. schachtii* infection (a). J4 females were counted at 14dpi and adult females were counted at 30 dpi. Data represent mean $\pm$ SE, $n = 36$. Asterisks indicate statistically significant differences compared to *Ler* by Student's t test ($P < 0.0001$). Effect of *sol2-1* mutant allele on size of syncytia (b). Seedlings were grown on vertical square plates for 10 days and inoculated with 10 ppJ2s/root. At 14 dpi, syncytia that fed only one nematode and appeared translucent were microscopically examined and their area was determined. Data represent mean $\pm$ SE, $n = 11$ for *Utr* and $n = 9$ for *sol2-1*. Asterisks indicate statistically significant differences compared to *Ler* by Student's t test ($P < 0.05$).

FIGURE 7

8/19

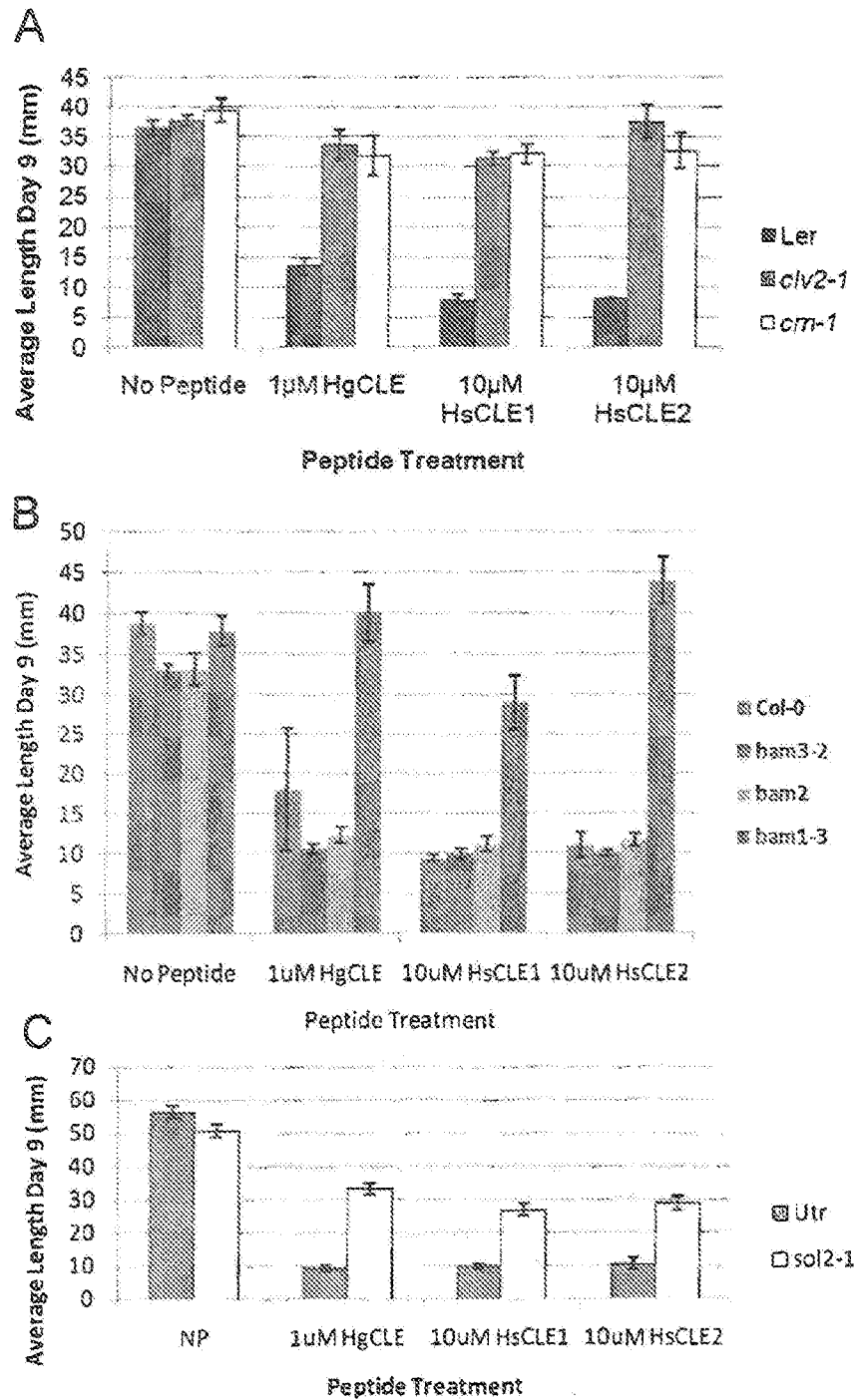


Fig.8 . Effect of *Heterodera glycines* (HgCLE) and *Heterodera schachtii* (HsCLE) nematode CLE peptides on receptor mutants. Seedlings were grown for 9 days on media with or without the synthetic nematode dodecapeptide CLE motif. Data represent the mean $\pm$ SE, $n = 10$. (A) Average root length of wild-type (Ler), *clv2-1*, and *cm-1*. (B) Average root length of wild-type (Col-0), *bam3-2*, *bam2*, and *bam1-3*. (C) Average root length of wild-type (Utr) and *sol2-1*.

FIGURE 8

9/19

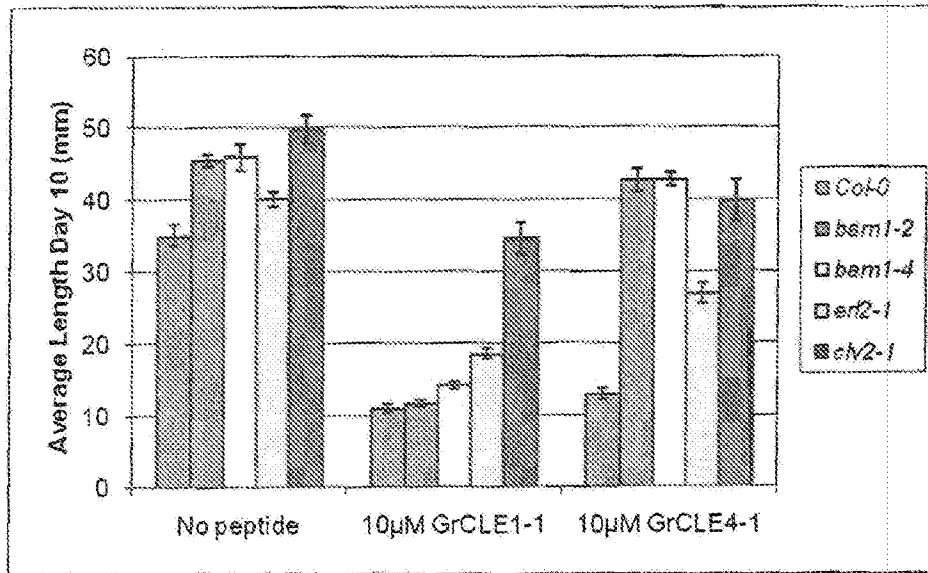


Fig.9 . Effect of *Globodera rostochiensis* (GrCLE) nematode CLE peptides on receptor mutants. Seedlings were grown for 9 days on media with or without the synthetic nematode dodecapeptide CLE motif. Data represent the mean $\pm$ SE, $n = 10$. Average root length of wild-type (*Col-0*), *bam1-2*, *bam1-4*, *erl2-1*, and *clv2-1*.

FIGURE 9

10/19

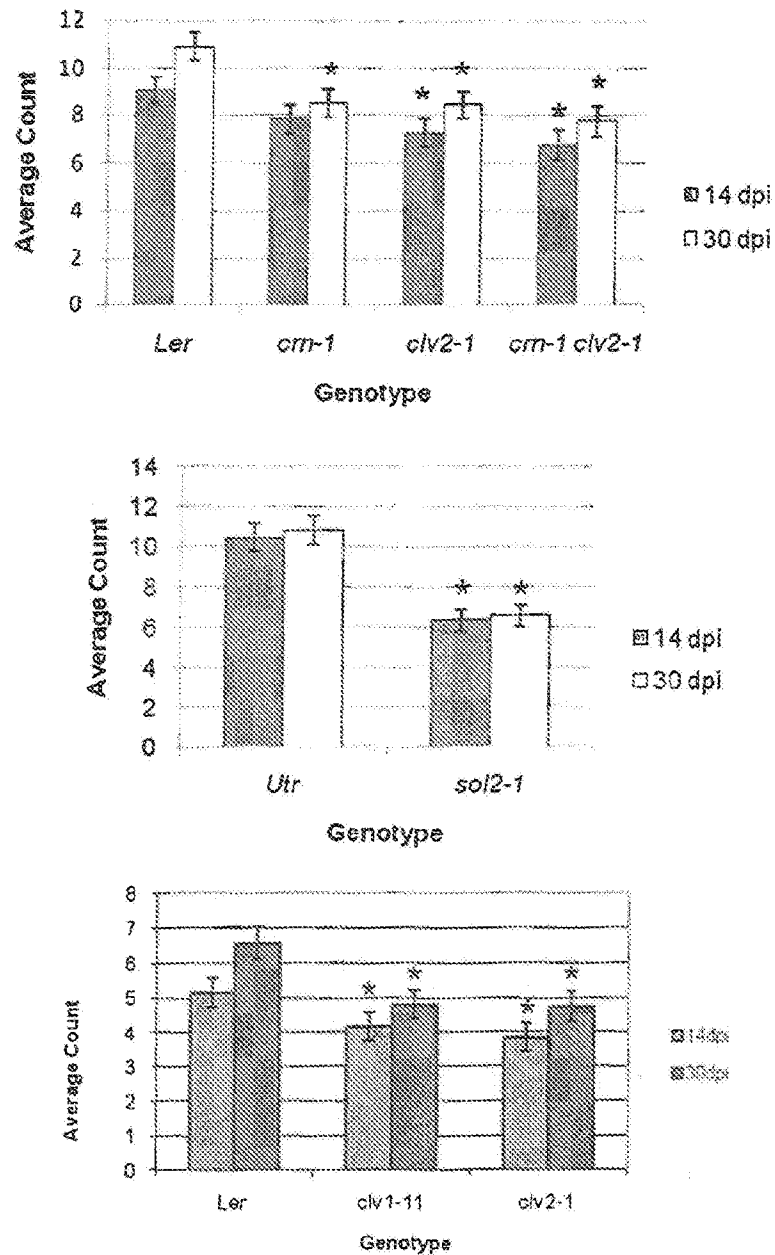


Fig 10 Effect of mutant alleles on *H. schachtii* infection. J4 females were counted at 14dpi and adult females were counted at 30 dpi. Asterisks indicate statistically significant differences compared to wild-type by Student's *t* test ($P < 0.05$). Data represent mean $\pm$ SE. Similar results were obtained from two additional biological replicates.

FIGURE 10

11/19

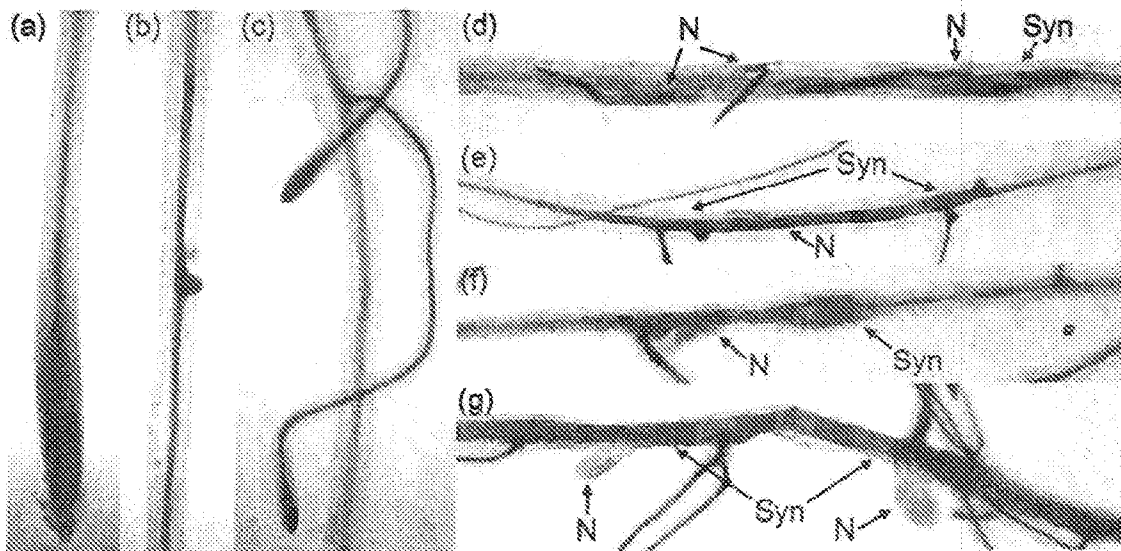


Fig.11 *CRN::GUS* expression during nematode infection. (A-C) *CRN::GUS* expression in uninfected Arabidopsis root tips (A), middle of the root (B), and older part of the root towards the hypocotyl (C). (D-G) *CRN::GUS* expression in nematode-infected roots; (D) early J2p, (E) late J2p, (F) J3 and (G) J4 females.

FIGURE 11

12/19

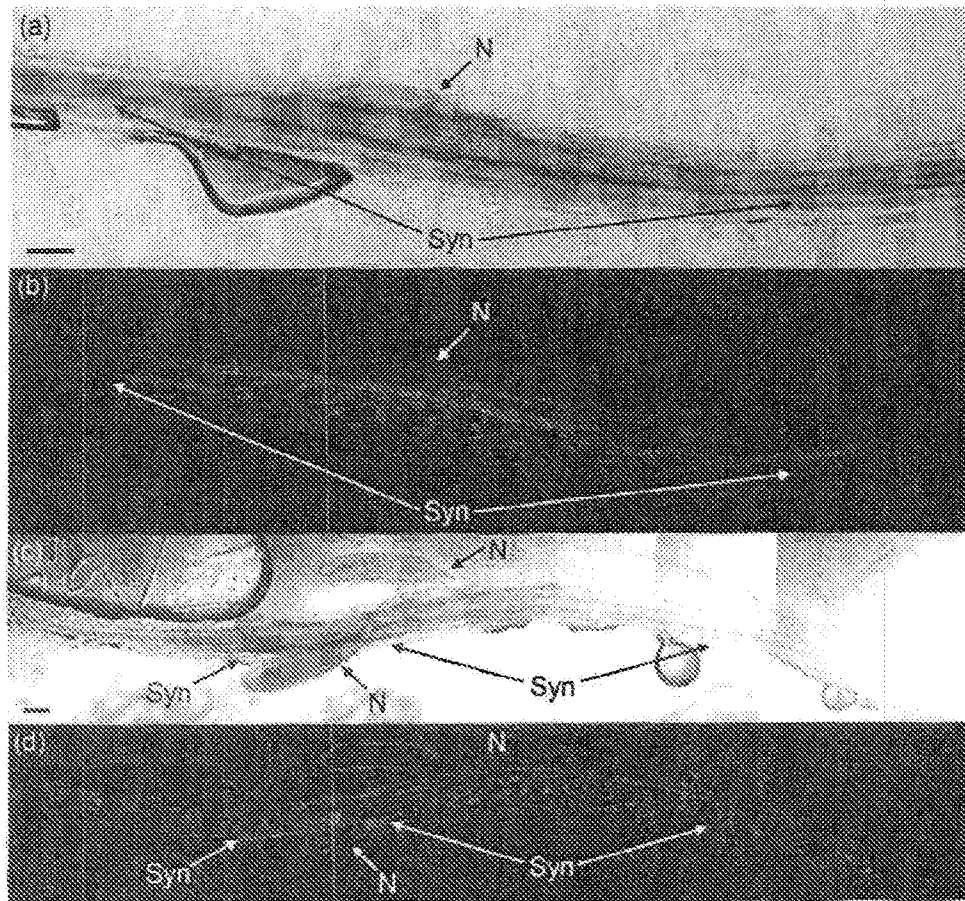


Fig 12 CLV2 expression during nematode infection. (A-D) Confocal section of a nematode induced feeding site 4 dpi (A-B) and 8dpi (A-B) expressing CLV2:H2B-mCherry which is shown in red.

FIGURE 12

13/19

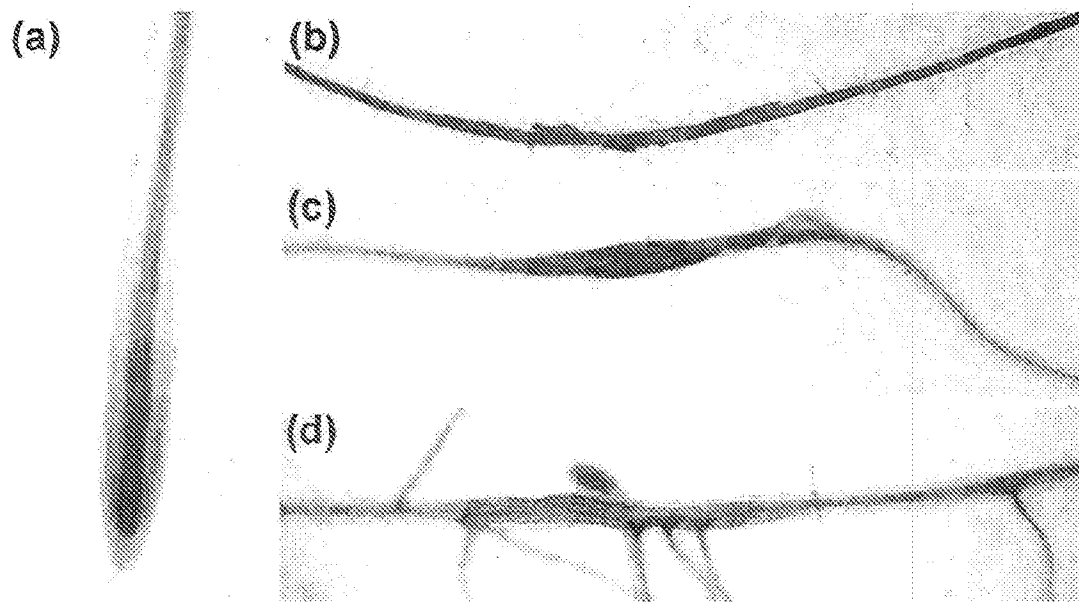


Fig13 *BAM1:GUS* expression in *Arabidopsis* in response to nematode infection. (A) Uninfected root tip. (B-D) GUS expression in nematode infected roots; (B) Early parasitic J2, (C) Parasitic J3, and (D) Parasitic J4.

FIGURE 13

14/19

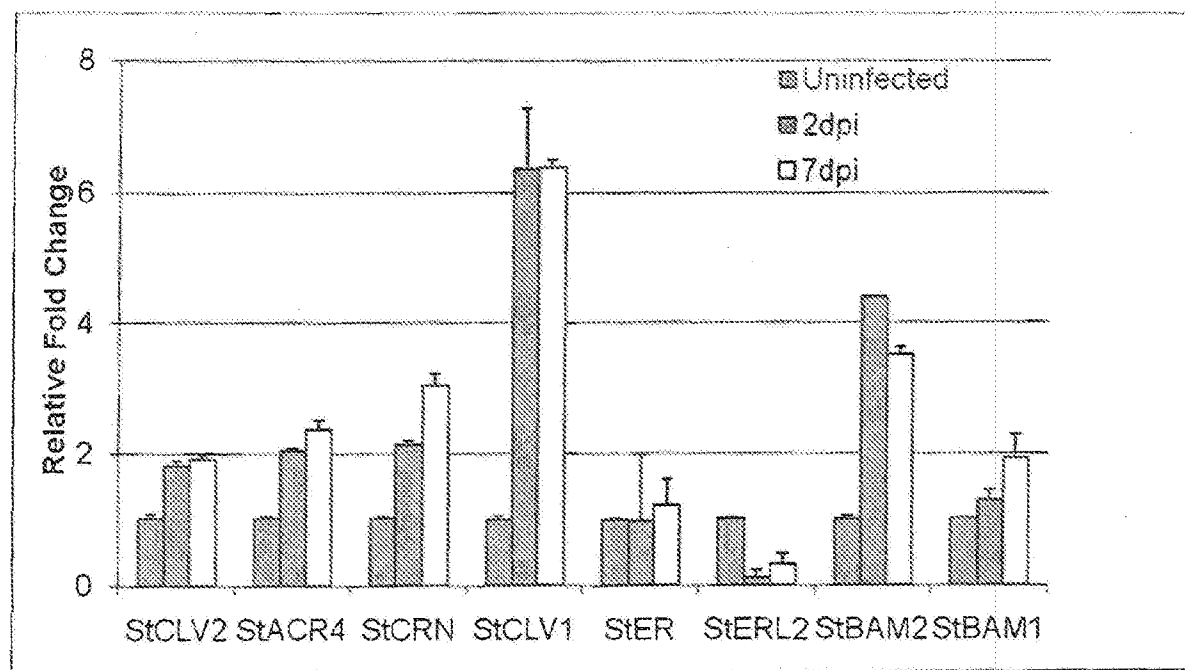


Fig 14 qRT-PCR analysis showing differential expression of candidate potato receptor genes in *G. rostochiensis*-infected potato roots.

FIGURE 14

15/19

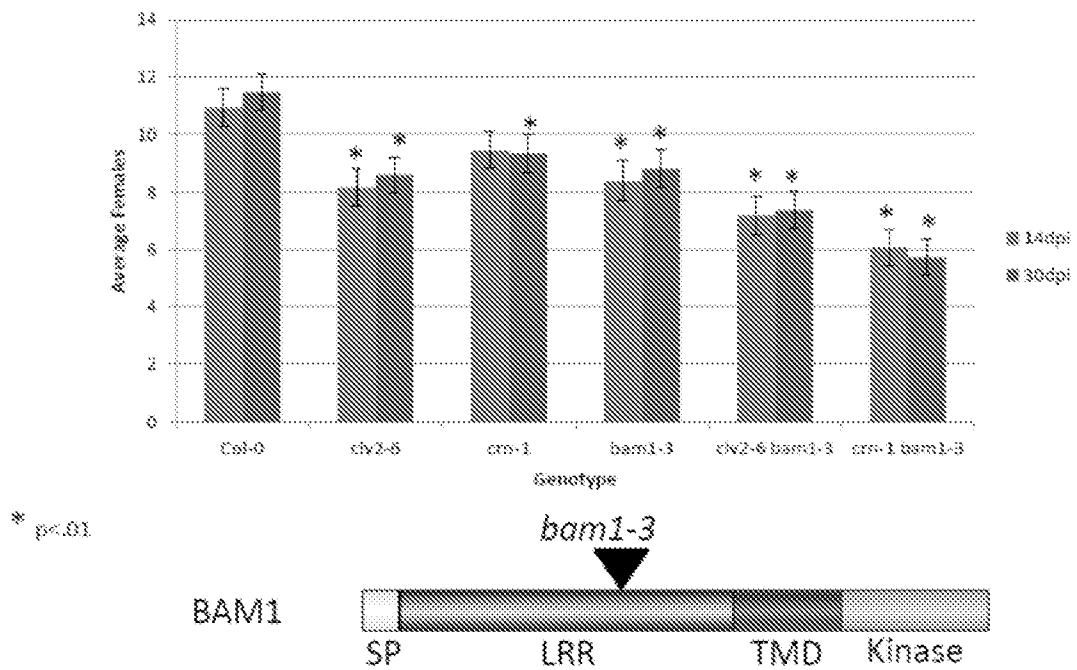
clv2-6, crn-1, and bam1-3

FIGURE 15

16/19

CLV1:GUS

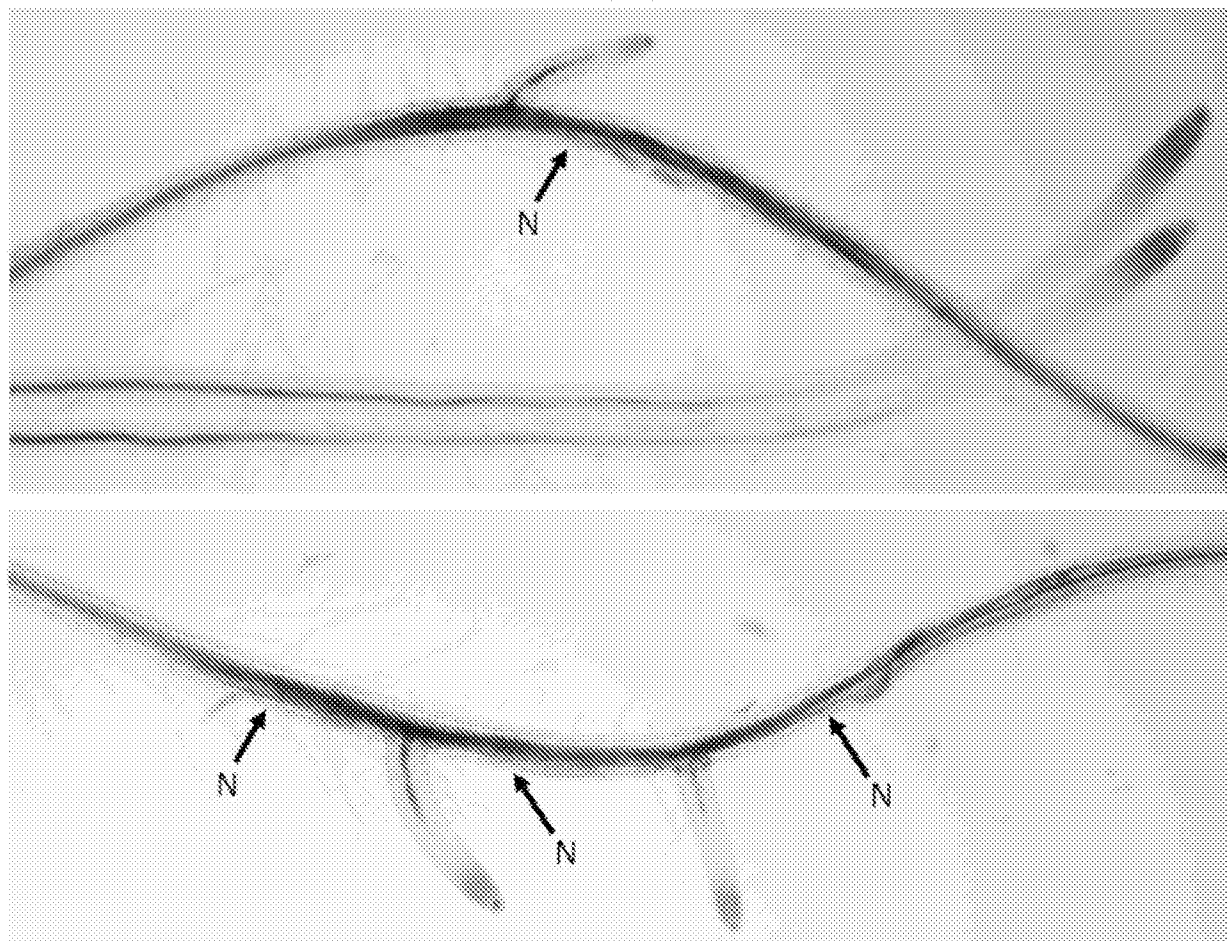


FIGURE 16

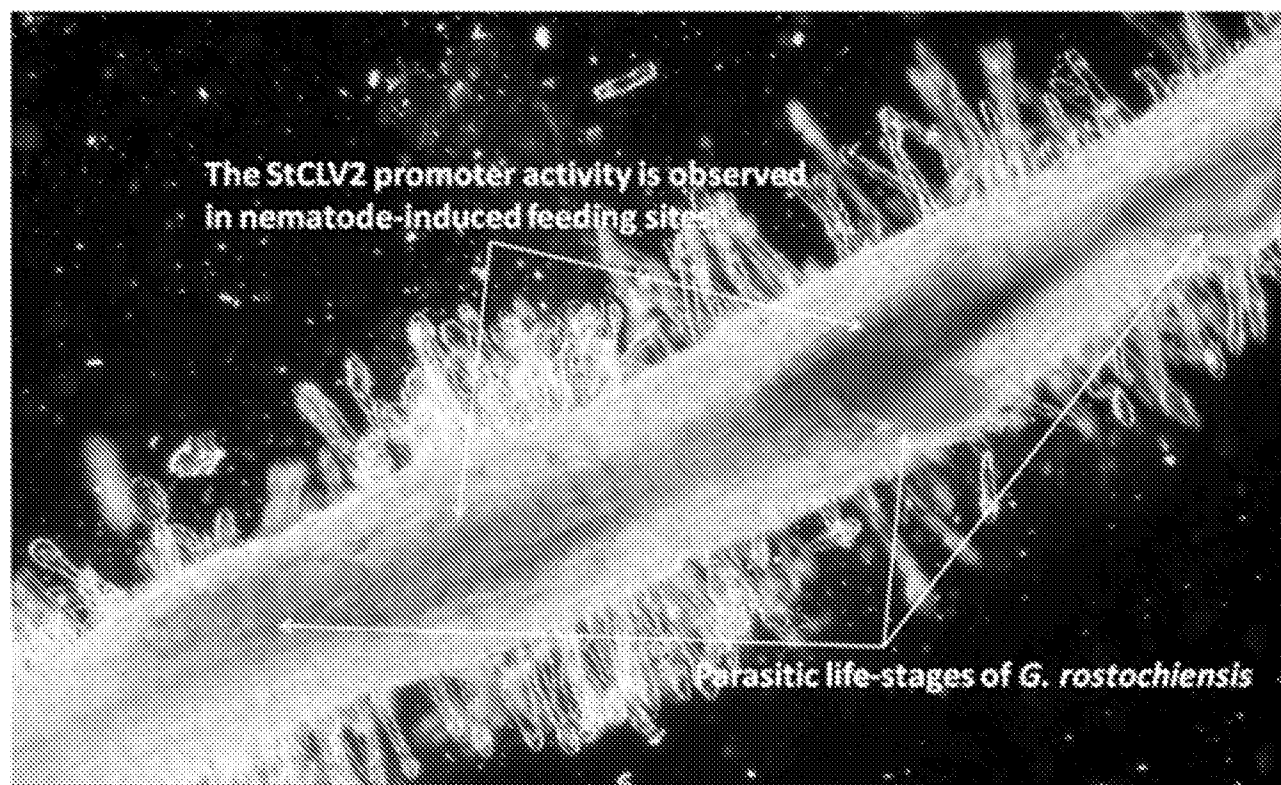


FIGURE 17

18/19

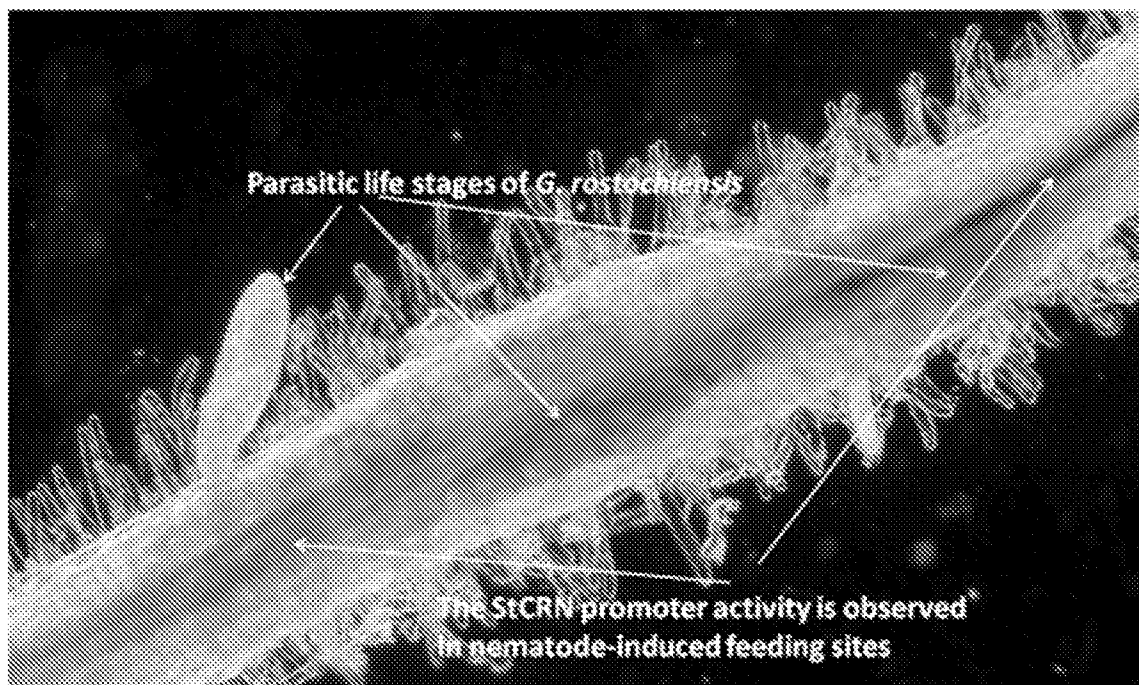


FIGURE 18

19/19

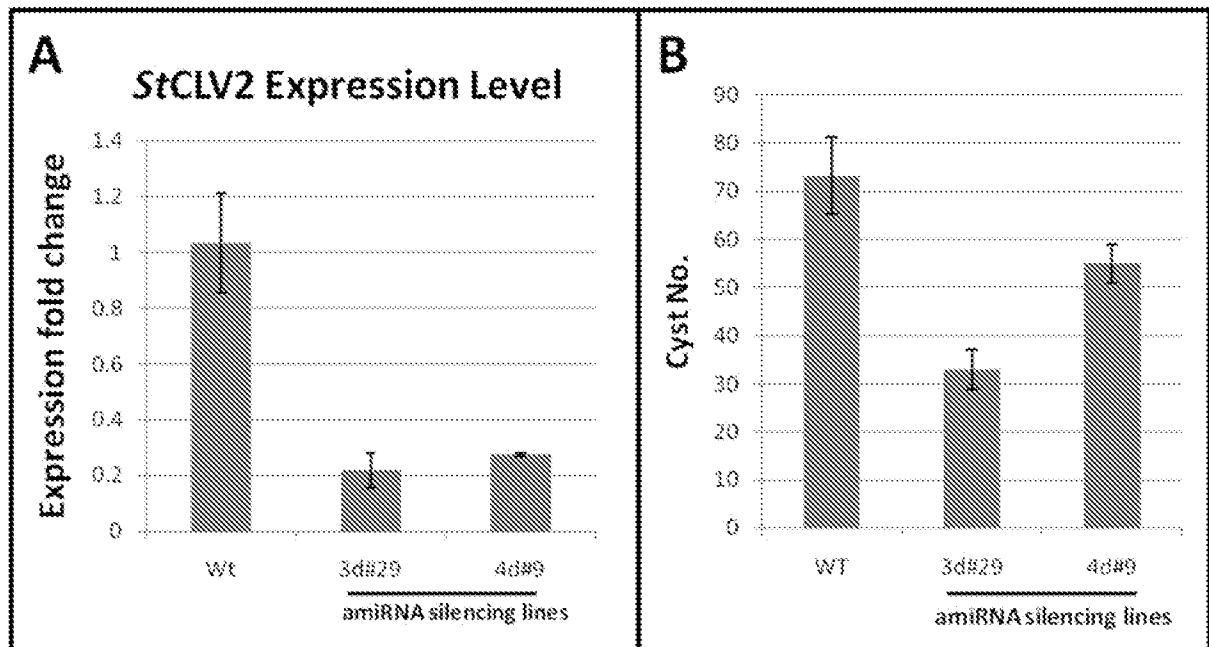


FIGURE 19