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Pesticide Options for Insect, Mite, and Mollusk Management in Commercial Strawberry Production in Florida[1]

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Florida growers produced primarily fresh market strawberries that were valued at $290.6 million in 2014–2015, harvested from 10,900 acres (Florida Agriculture Overview 2015). More than 95% of the crop is produced near Plant City, with smaller production areas in north Florida and around Homestead, FL.

Major early-season arthropod pests include lepidopterous larvae, twospotted spider mites, chilli thrips, and aphids, some of which may accompany the transplants from their origin. By mid-season and later, major concerns are twospotted spider mites, flower thrips, fruit (vinegar) flies, and sap beetles. Pamera seed bugs add to the concern and may evoke complaints when they accompany berries to markets. Now spotted wing drosophila flies can be present to damage fruit or to reproduce and damage the blueberry crop that follows strawberries.

Effective management of arthropod and gastropod pests of strawberry is critical to the profitability of the industry and requires that pests be detected in a timely manner through systematic scouting. Appropriate control measures should be applied as conditions warrant.

Biological control measures have been developed for management of twospotted spider mites and are practiced by a portion of the industry. Information on biological control of insects and mites in strawberry production is available at https://edis.ifas.ufl.edu/HS180. Toxicity information for many pesticides used in Florida strawberry production to commercially available predators of spider mites is summarized at http://side-effects.koppert.nl/.

The tables in this document list pesticides that are presently available to commercial strawberry producers in Florida and are organized alphabetically by the following major pest groups:

- Ants
- Aphids
- Armyworms
- Beetles and weevils
- Caterpillars (including budworms, earworms, leafrollers, leaftiers, lesser cornstalk borer, and loopers)
- Crickets
- Fruit flies (vinegar flies) and spotted wing drosophila
- Grubs
- Mites
- Mole crickets

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- Pamera seed bugs
- Plant (*Lygus*) bugs
- Snails and slugs
- Spiders
- Thrips

Available pesticides for strawberry include beneficial nematode and microbial insecticides, which are components of biological control. For each pest group listed, products available for control are presented by the active ingredient's common name. Usually only one or a few examples of each formulation are given; however, there may be other products as effective as those listed. Notes taken from labels are provided to qualify some uses. More information about pesticide products can be found on electronic versions of specimen labels which are usually available at the websites of CDMS (http://www.cdms.net/manuf/default.asp), C&P Press (http://www.greenbook.net/), or the affiliated manufacturer. The product label communicates the lawful use of the product and must be read, understood, and followed. A label may contain important limitations that are not presented here, and it remains the pesticide applicator's legal responsibility to read and follow all label instructions on the container of the specific pesticide being used.

Many pesticides decompose in the spray tank when mixed with water above pH 7. Growers should test the pH of their water and, when above 7, should add a buffering solution to maintain pH between 6.5 and 7. When using a pesticide for the first time, it is important to test the product first on a small portion of the crop and check for any possible detrimental effects over time, such as leaf distortion and plant stunting.

This summary is only a guide to aid in the proper selection of pesticides. Care has been given to provide accurate and up-to-date information, but it is possible that, through label changes, error, etc., improper uses may be indicated.

As an additional precaution, keep the telephone number and address of the nearest county poison control center in a convenient location in case of an accidental poisoning. Also, keep clean copies of labels of all pesticides on the farm premises. In the event of a poisoning, the label of the pesticide involved should be taken to the poison control center or hospital.

Reference

Florida Agriculture Overview 2015. https://www.nass.usda.gov/Quick_Stats/Ag_Overview/stateOverview.php?state=FLORIDA, NASS, USDA.

Table 1. Ant pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Beauveria bassiana ATCC 74040	Naturalis L	F, G, N	At least 3–5 applications may be necessary before pests are adequately under control. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides. Treat when pest populations are manageable and before extensive damage occurs to crops.
Carbaryl	10% Sevin Granules Cutworm & Cricket Bait	F, N	Repeat applications up to a total of five times per year, but not more often than once every 7 days. Long, 7-day pre-harvest interval (PHI). Application to wet foliage during periods of high humidity may cause injury to tender foliage.
Methyl bromide & chloropicrin	MBC 98–2[3]	F, G, N	Pre-plant treatment only.
Pyrethrin	PyGanic Crop Protection EC 1.4[4] PyGanic EC 5.0[4]	F, G, N	Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.
Pyrethrin & piperonyl butoxide	Evergreen EC 60–6 Pyreth-It Pyrenone Crop Spray	F, G, N	Do not apply more than 10 times per season. Do not re-apply within 3 days except under extreme pest pressure. In case of extreme pest pressure, do not re-apply within 24 hours. Do not harvest until spray has dried
Pyriproxyfen	Esteem Ant Bait	F, G, N	Do not water treated area for 24 hours after application. For 7 to 10 days after treatment, do not apply any other fire ant pesticide. Do not exceed more than 0.134 lb. of pyriproxyfen per acre per season. A second application may be advisable after 12 to 16 weeks in areas of heavy infestations, or when the mounds remain active, or when a reinfestation occurs.
S-methoprene	Extinguish Pro Fire Ant Bait	F, G, N	Fire ants.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product is a restricted-use pesticide.
[4] Product label indicates use in organic production.

Table 2. Aphid pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Abamectin	Temprano[3]	F	Suppression. Wait at least 21 days after the second application before repeating application.
Acetamiprid	Assail 30SG	F, G, N	Do not make more than two applications per growing season.
Azadirachtin	Aza-Direct[4] Azatin XL Neemix 4.5[4] Ecozin Plus 1.2% ME[4]	F, G, N	Controls targeted insect larvae when they ingest or come in contact with it, by interfering with the insect's ability to molt. It is effective on all nymphal stages. Reduces damage by repelling and deterring feeding of all stages of insect.
Azadirachtin & pyrethrins	Azera	F, G, N	Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Beauveria bassiana	Naturalis L BotaniGard ES BotaniGard 22 WP Mycotrol O[4]	F, G, N	Typically it takes 7–10 days after the first spray to see control. At least 3–5 applications may be necessary before pests are adequately under control. See labels for precautions about use with fungicides.
Bifenthrin	Brigade WSB[3]	F, N	Apply when pest populations reach damaging thresholds and repeat as necessary at 7–14 day intervals. Do not apply more than 0.5 lbs per acre per season. No pre-harvest interval.
Bifenthrin & avermectin B1	Athena[3]	F	For resistance management purposes do not use in strawberry nurseries. Do not make more than two consecutive applications and four applications per growing season. Do not apply within 3 days of harvest.
Bifenthrin & imidacloprid	Brigadier[3]	F, N	Do not make applications less than 5 days apart. Do not apply during or within 10 days after bloom or when bees are actively foraging. Long, 7-day pre-harvest interval (PHI). Plant back restrictions: Plants that have tolerances for both bifenthrin and imidacloprid may be rotated at any time. Crops that have tolerances for bifenthrin and not imidacloprid can be rotated 12 months after the final application of Brigadier insecticide. Crops that have tolerances for imidacloprid and not bifenthrin may be rotated 30 days after the final application [label has list of crops].
Chromobacterium subtsugae strain PRAA4-1	Grandevo	F, G, N	Functions primarily as a stomach poison for use in the control or suppression of many foliar-feeding pests.
Diazinon	Diazinon AG 500[3] Diazinon 50W[3] Diazinon AG600 WBC[3]	F, N	Make a maximum of one foliar application per crop and a maximum of one soil application per crop. Long, 5-day pre-harvest interval (PHI). 3-day restricted entry interval (REI).
Edible fish oil & sesame oil	Organocide 3-in-1 Garden Spray[4]	F, G, N	
Flonicamid	Beleaf 50 SG	F, N	Two sequential applications result in better than a single application. Do not make more than two applications without rotating to an insecticide with a different mode of action.
Flupyradifurone	Sivanto 200 SL	F, N	Do not tank mix with azole fungicides during bloom period. Do not apply more than **28.0 fluid ounces/Acre** of the product in a year.
Imidacloprid	Admire Pro Couraze 2F Provado 1.6 Flowable	F, N	Long, 7-day pre-harvest interval (PHI). Do not apply during bloom or within 10 days before bloom or when bees are actively foraging.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Isaria fumosorosea (formerly *Paecilomyces fumosoroseus*)	Preferal PFR-97 20% WDG[4]	F, G, N	Most effective when relative humidity is 80% or higher for 8–10 hours. Can be mixed with copper-based fungicides; do not mix with other fungicides or apply within 5 days of fungicide applications other than copper. Repeat applications at 3–10 day intervals over 2–3 weeks or as needed to maintain control. Frequent application may be required under dry conditions, during periods of increased pest buildup or reproduction, or rapid host plant growth.
Malathion	Gowan Malathion 8F Malathion 57 EC Malathion 5EC	F, N	Maximum number of applications per year is 4 and the minimum retreatment interval is 7 days.
Naled	Dibrom 8 Emulsive[3]	F, N	Do not apply within one day of harvest. Do not apply when temperature is over 90°F. Allow a minimum of 7 days between applications. Do not make more than 5 applications per season. Do not apply when temperature is over 90°F.
Neem oil	Trilogy	F, N	Avoid tank mixes with captan, sulfur, or other chemically similar products because unpredictable results or leaf burn may occur.
Oil (mineral, paraffinic, petroleum, vegetable, etc.)	Saf-T-Side Spray Oil Ultra-Fine Oil	F, N	See labels for phytotoxicity precautions.
Potassium salts of fatty acids (insecticidal soap)	AllPro Insecticidal Soap 40% M-Pede[4]	F, G, N	Do not mix with sulfur. See labels for phytotoxicity precautions.
Potassium silicate	Sil-MATRIX	F, G, N	Suppression.
Pyrethrin	PyGanic Crop Protection EC 1.4[4] PyGanic EC 5.0[4]	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyreth-It Pyrenone Crop Spray	F, G, N	Do not apply more than 10 times per season. Do not re-apply within 3 days except under extreme pest pressure.
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	
Sodium tetraborohydrate decahydrate	Prev-AM	F, N	Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am.
Sorbitol octanoate	SorbiShield 90	F, G, N	Do not apply this product through any type of irrigation system. A contact insecticide with limited residual activity.
Sucrose octanoate	SucraShield	F, G, N	Do not apply this product through any type of irrigation system. A contact insecticide with limited residual activity.
Thiamethoxam	Actara	F	Foliar application. Do not re-apply within 10 days
Thiamethoxam	Platinum 75 SG	F	Soil application. Long PHI (50 days).
Thiamethoxam & chlorantraniliprole	Voliam Flexi	F	Do not exceed a total of 15.0 oz. of product per acre per growing season. Do not apply by air.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product is a restricted-use pesticide.
[4] Product label indicates use in organic production.

Table 3. Armyworm pesticidal control measures available for commercial strawberry production in Florida. See also caterpillars (Table 5).

Common Name	Trade Name/Formulation	Production Site[1]	Notes from labels[2]
Azadirachtin	Aza-Direct[3] Azatin XL Neemix 4.5[3]	F, G, N	Will not control adult insects. Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
Azadirachtin & pyrethrins	Azera	F, G, N	Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae, and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Bacillus thuringiensis aizawai	Agree WG[3] XenTari Dry Flowable[3]	F, G, N	Treat when the first feeding damage is observed and small, newly-hatched larvae are present.
Bacillus thuringiensis kurstaki	Deliver LC[3] Javelin WG[3] Biobit HP[3] Dipel DF[3] Dipel ES Lepinox WDG Crymax Bioinsecticide	F, G, N	May be used to control armyworms or podworms (1st and 2nd instar) when populations are light and full coverage sprays are applied. If mature worms or heavy populations are present, a contact insecticide should be used to enhance control.
Beauveria bassiana ATCC 74040	Naturalis L	F, G, N	At least 3–5 applications may be necessary before pests are adequately under control. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Bifenthrin	Brigade WSB[4]	F, N	Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days after the final application of bifenthrin.
Bifenthrin & avermectin B1	Athena[4]	F	Not for beet armyworm. For resistance management purposes do not use in strawberry nurseries. Do not make more than two consecutive applications and four applications per growing season. Plant back restrictions: For crops that have bifenthrin and avermectin tolerances, the plant back is immediate. All other crops may be rotated 30 days after the final application.
Bifenthrin & imidacloprid	Brigadier[4]	F, N	Not for beet armyworm. Do not apply during or within 10 days after bloom or when bees are actively foraging. Long, 7-day pre-harvest interval (PHI). Plant back restrictions: Plants that have tolerances for both bifenthrin and imidacloprid may be rotated at any time. Crops that have tolerances for bifenthrin and not imidacloprid can be rotated 12 months after the final application of Brigadier insecticide. Crops that have tolerances for imidacloprid and not bifenthrin may be rotated 30 days after the final application [label has list of crops].
Buprofezin & flubendiamide	Vetica	F, G, N	Do not make more than 2 applications per crop cycle.
Carbaryl	Cutworm & Cricket Bait Sevin Brand 4F Sevin Brand XLR Plus	F, N	Repeat applications up to a total of five times per year, but not more often than once every 7 days. Long, 7-day pre-harvest interval (PHI). Application to wet foliage during periods of high humidity may cause injury to tender foliage. Plant back: Do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl-treated soil. Long, 7-day pre-harvest interval (PHI).
Chlorantraniliprole	Coragen	F	Beet armyworm; make no more than four applications per acre per crop. Minimum interval between treatments is 7 days.
Chromobacterium subtsugae	Grandevo MBI-203 EP[3]	F, G, N	Functions primarily as a stomach poison for use in the control or suppression of many foliar-feeding pests.
Fenpropathrin	Danitol 2.4EC[4]	F, N	Beet, fall, and yellowstriped armyworm; do not exceed more than two applications totaling 2–2/3 pts. (0.8 lb. a.i.) per acre to the same planting in 12 consecutive months.

Common Name	Trade Name/Formulation	Production Site[1]	Notes from labels[2]
Flubendiamide	Synapse WG Belt SC	F, N	
Methoxyfenozide	Intrepid 2F	F, N	Do not use more than 12 fl oz per acre per application or 64 fl oz of Intrepid 2F (1 lb a.i.) per acre per season. Rotational crop restrictions. All other crops grown for food or feed may be replanted after 7 days.
Novaluron	Rimon 0.83EC	F, N	Apply when the majority of the population is at egg hatch to the second instar. Do not apply more than 36 oz. per acre per season. Does not kill adult insects.
Pyrethrin	PyGanic Crop Protection EC 1.4[3] PyGanic EC 5.0[3]	F, G, N	Do not apply more than 10 times per season. Do not re-apply within 3 days except under extreme pest pressure.
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyreth-It Pyrenone Crop Spray	F, G, N	
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	
Spinosad	Entrust[3] SpinTor 2SC	F, N	Do not apply more than a total of 9 oz per acre per crop. Resistance management: Rotate to a different class of insect control products after two successive applications. Do not make more than five applications per year.
Spinetoram	Radiant SC	F, N	Treat when pests appear, targeting egg at hatch or small larvae. Resistance Management: Do not make more than five applications per calendar year.
Steinernema carpocapsae	Millenium	F, G, N	Ground dwelling insects and borers
Thiamethoxam & chlorantraniliprole	Voliam Flexi	F	Beet armyworm.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.
[4] Product is a restricted-use pesticide.

Table 4. Beetle and weevil pesticidal control measures available for commercial strawberry production in Florida. See also grubs (Table 8).

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Acetamiprid	Assail 30SG	F, G, N	Japanese beetle, flea beetle, sap beetles; do not make more than two applications per growing season.
Azadirachtin	Aza-Direct[3] Azatin XL Neemix 4.5[3] Ecozin Plus 1.2% ME[3]	F, G, N	Will not control adult insects. Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
Azadirachtin & pyrethrins	Azera	F, G, N	Japanese beetle, flea beetle, strawberry beetle. Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae, and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Beauveria bassiana	Naturalis L BotaniGard ES Mycotrol O[3]	F, G, N	Typically it takes 7–10 days after the first spray to see control. At least 3–5 applications may be necessary before pests are adequately under control. Most effective when used early, before high insect populations develop. See labels for precautions about use with fungicides.
Bifenthrin	Brigade WSB[4]	F, N	Flea beetles; strawberry sap beetle. Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days after the final application of bifenthrin. Do not apply more than 0.5 lb ai per acre per season
Bifenthrin & avermectin B1	Athena[4]	F	Flea beetles, strawberry sap beetles, strawberry root weevil, strawberry clipper, black vine beetle; do not make more than two consecutive applications and four applications per growing season. Do not apply in less than 50 gals of water per acre. For resistance management purposes do not use in strawberry nurseries. Plant back restrictions: For crops that have bifenthrin and avermectin tolerances, the plant back is immediate. All other crops may be rotated 30 days after the final application.
Bifenthrin & imidacloprid	Brigadier[4]	F, N	Flea beetle spp.; do not apply during or within 10 days after bloom or when bees are actively foraging. Long, 7-day pre-harvest interval (PHI). Plant back restrictions: Plants that have tolerances for both bifenthrin and imidacloprid may be rotated at any time. Crops that have tolerances for bifenthrin and not imidacloprid can be rotated 12 months after the final application of Brigadier insecticide. Crops that have tolerances for imidacloprid and not bifenthrin may be rotated 30 days after the final application [label has list of crops].
Buprofezin & flubendiamide	Vetica	F, G, N	Do not make more than 2 applications per crop cycle.
Carbaryl	Carbaryl 4L Sevin Brand 4F Sevin Brand 80S Sevin XLR Plus	F, N	Sap beetles[5]; flea beetles; June beetles, Japanese beetle, strawberry bud weevil, strawberry clipper, strawberry weevil. Plant back: Do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl-treated soil. Long, 7-day pre-harvest interval (PHI). May injure Early Dawn and Sunrise varieties of strawberries
Chlorantraniliprole	Coragen	F	Japanese beetle adult; make no more than four applications per acre per crop.
Chlorpyrifos	Govern 4E[4] Lorsban Advanced[4]	F, N	Strawberry bud weevil; pre-bloom use only. Long, 21-day pre-harvest interval (PHI) Do not make more than two applications (foliar) per year. Do not tank mix with pesticides, surfactants, or fertilizer formulations unless prior use has shown the combination noninjurious under your current conditions of use.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Fenpropathrin	Danitol 2.4EC[4]	F, N	Strawberry sap beetle, strawberry bud weevil (strawberry clipper); do not exceed more than two applications totaling 2–2/3 pts. (0.8 lbs. a.i.) per acre to the same planting in 12 consecutive months. Do not apply in less than 100 gals of water per acre.
Imidacloprid	Admire Pro Couraze 2F	F, N	Post-harvest use on perennial strawberry: White grub complex (grubs of Asiatic garden beetle, European chafer, masked chafer, Japanese beetle, Oriental beetle). Long, 14-day pre-harvest interval (PHI).
Isaria fumosorosea (formerly *Paecilomyces fumosoroseus*)	Preferal PFR-97 20% WDG[3]	F, G, N	Coleoptera grubs and larvae; most effective when relative humidity is 80% or higher for 8–10 hours. Can be mixed with copper-based fungicides; do not mix with other fungicides or apply within 5 days of fungicide applications other than copper.
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	Strawberry root weevil. Do not make more than four applications per year.
Metarhizium anisopliae strain F52	Met 52EC	F, N	Strawberry root weevil. Do not make more than four applications per year.
Novaluron	Rimon 0.83EC	F, N	Sap beetle larvae; does not kill adult insects. Apply when adults appear and prior to egg hatch. Do not apply more than 36 oz. per acre per season. The use of surfactants/ adjuvants (including non-ionic surfactants) is prohibited.
Pyrethrin	PyGanic Crop Protection EC 1.4[3] PyGanic EC 5.0[3]	F, G, N	
Pyrethrin & piperonyl butoxide	Evergreen EC 60–6 Pyreth-It Pyrenone Crop Spray	F, G, N	Cucumber beetles, flea beetles, corn sap beetle.
Pyrethrin, rotenone & associated resins	Pyrellin E.C.	F, G, N	Strawberry root worms.
Steinernema carpocapsae	Millenium	F, G, N	Ground-dwelling insects and borers: Blackvine weevil, strawberry root weevil.
Thiamethoxam	Actara	F	Weevil (adult). Do not make more than 3 applications per growing season. Do not use less than 50 gals of water per acre.
Thiamethoxam	Platinum 75 SG	F	Strawberry root weevil. Soil application. Long PHI (50 days).
Thiamethoxam & chlorantraniliprole	Voliam Flexi	F	Japanese beetle (adult), weevil (adult). **Minimum Interval Between Applications:** 10 days. Do not make more than 3 applications per growing season.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.
[4] Product is a restricted-use pesticide.
[5] These products, while not labeled for sap beetle control in strawberry, are labeled for sap beetle control in corn.

Table 5. Caterpillar pesticidal control measures available for commercial strawberry production in Florida. (Includes budworms, earworms, leafrollers, leaftiers, lesser cornstalk borer and looper.) Also see armyworms (Table 3).

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Acetamiprid	Assail 30SG	F, G, N	Obliquebanded leafroller, gypsy moth; do not make more than two applications per growing season.
Azadirachtin	Aza-Direct[3] Azatin XL Ecozin Plus 1.2% ME[3] Neemix 4.5[3]	F, G, N	Will not control adult insects. Controls targeted insect larvae when they ingest or come in contact with it, by interfering with the insect's ability to molt. It is effective on all larval or nymphal stages. Reduces damage by repelling and deterring feeding of all stages of insect.
Azadirachtin & pyrethrins	Azera	F, G, N	Loopers, obliquebanded leafroller, omnivorous leafroller, cutworms. Controls pests through contact, ingestion and insect growth regulator activity. Kills larval, pupae and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Bacillus thuringiensis aizawai strain ABTS-1857	XenTari Dry Flowable	F, G, N	Loopers, obliquebanded leafroller, omnivorous leafroller, saltmarsh caterpillar, tobacco budworm. Treat when larvae are young (early instars) before the crop is damaged. Larvae must be actively feeding on treated, exposed plant surfaces. Under heavy pest population pressure, use the higher labeled application rates, shorten the spray interval, and/or raise spray volume to improve spray coverage.
Bacillus thuringiensis kurstaki	Javelin WG[3] Deliver LC[3] Biobit HP[3] Dipel DF[3] Dipel ES Dipel Pro DF[3]	F, G, N	Bollworm, *Helicoverpa* spp., *Heliothis* spp., tobacco budworm, tomato fruitworm, looper, black cutworm, obliquebanded leafroller, omnivorous leafroller, omnivorous looper, saltmarsh caterpillar. Larvae must be actively feeding on treated, exposed plant surfaces.
Beauveria bassiana	Naturalis L Mycotrol O[3]	F, G, N	Eggs of lepidopteran pests, leafrollers, corn borer, loopers, tomato fruitworm; at least 3–5 applications may be necessary before pests are adequately under control. See labels for precautions about use with fungicides.
Bifenthrin	Brigade WSB[4]	F, N	*Heliothis* spp., leafrollers; Do not apply more than 0.5 lbs. per acre per season. No pre-harvest interval. Plant back restrictions: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days after the final application of bifenthrin.
Bifenthrin & avermectin B1	Athena[4]	F	Corn earworm, leafroller, looper; do not make more than two consecutive applications and four applications per growing season. Plant back restrictions: For crops that have bifenthrin and avermectin tolerances, the plant back is immediate. All other crops may be rotated 30 days after the final application.
Bifenthrin & imidacloprid	Brigadier[4]	F, N	Corn earworm; do not apply during or within 10 days after bloom or when bees are actively foraging. Long, 7-day pre-harvest interval (PHI). Plant back restrictions: Plants that have tolerances for both bifenthrin and imidacloprid may be rotated at any time. Crops that have tolerances for bifenthrin and not imidacloprid can be rotated 12 months after the final application of Brigadier insecticide. Crops that have tolerances for imidacloprid and not bifenthrin may be rotated 30 days after the final application [label has list of crops].
Carbaryl	Carbaryl 4L Sevin Brand 4F Sevin Brand XLR Plus	F, N	Omnivorous leafroller, omnivorous leaftier, strawberry fruitworm, strawberry leafroller, saltmarsh caterpillar; do not plant rotational food crops not listed on this or other carbaryl labels in carbaryl-treated soil. Long, 7-day pre-harvest interval (PHI).
Chlorantraniliprole	Coragen	F	Cabbage looper, corn earworm; make no more than four applications per acre per crop.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Chromobacterium subtsugae strain PRAA4-1	Grandevo	F, G, N	Functions primarily as a stomach poison for use in the control or suppression of many foliar-feeding pests.
Diazinon	Diazinon AG 500[4] Diazinon 50W[4] Diazinon AG600 WBC[4]	F, N	Strawberry leafroller; make a maximum of one foliar application per crop and a maximum of one soil application per crop. Long, 5-day pre-harvest interval (PHI).
Edible fish oil & sesame oil	Organocide 3-in-1 Garden Spray[3]	F, G, N	Leafrollers.
Flubendiamide	Synapse WG Belt SC	F, N	Corn earworm, cutworm, lesser cornstalk borer, omnivorous leaftier, strawberry leafroller. Do not apply more than 15.0 oz per acre (0.225 lb ai/A) per crop season.
Isaria fumosorosea (formerly *Paecilomyces fumosoroseus*)	Preferal PFR-97 20% WDG[3]	F, G, N	Lepidoptera caterpillars and larvae; most effective when relative humidity is 80% or higher for 8–10 hours. Can be mixed with copper-based fungicides; do not mix with other fungicides or apply within 5 days of fungicide applications other than copper.
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	Strawberry leafrollers. Do not make more than 4 applications per year.
Methoxyfenozide	Intrepid 2F	F, N	Armyworms; corn earworm (suppression), cutworms (suppression).
Naled	Dibrom 8 Emulsive[4]	F, N	Leafrollers, omnivorous leaftiers; Do not make more than 5 applications per season. Do not apply when temperature is over 90°F.
Novaluron	Rimon 0.83EC	F, N	Corn earworm, loopers, webworms; Does not kill adult insects. Apply when the majority of the population is at egg hatch to the second instar. Do not apply more than 36 oz. per acre per season.
Oil (mineral, paraffinic, petroleum, vegetable, etc.)	Ultra-Fine Oil	F, N	Eggs of certain caterpillars; see labels for phytotoxicity precautions.
Polyhedral occlusion bodies of the nuclear polyhedrosis virus of *Helicoverpa zea*	Gemstar LC[3]	F, N	Corn earworm, *Helicoverpa zea*, cotton bollworm, tomato fruitworm, tobacco budworm, *Heliothis virescens*. Highly selective insecticide containing a naturally-occurring virus that infects and kills only larvae.
Pyrethrin	PyGanic Crop Protection EC-1.4[3] PyGanic EC 5.0[3]	F, G, N	Leafrollers, budworms, loopers, fireworms, webworms
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyreth-It Pyrenone Crop Spray	F, G, N	Budworms, loopers, leafrollers, leaftiers, lesser cornstalk borer. Do not apply more than 10 times per season. Do not re-apply within 3 days except under extreme pest pressure.
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	Cabbage looper, strawberry leafrollers.
Pyrethrin, rotenone & associated resins	Pyrellin E.C.	F, G, N	Strawberry leafrollers.
Sorbitol octanoate	SorbiShield 90	F, G, N	Do not apply this product through any type of irrigation system. A contact insecticide with limited residual activity.
Spinosad	Entrust[3] SpinTor 2SC	F, G, N	Leafrollers. Do not make more than five applications per year.
Steinernema carpocapsae	Millenium	F, G, N	Ground-dwelling insects and borers; armyworms.
Thiamethoxam & chlorantraniliprole	Voliam Flexi	F	Cabbage looper, corn earworm. Do not exceed a total of 15.0 oz. of product per acre per growing season.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.
[4] Product is a restricted-use pesticide.

Table 6. Cricket pesticidal control measures available for commercial strawberry production in Florida. See also mole cricket (Table 10).

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Azadirachtin & pyrethrins	Azera	F, G, N	Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae, and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Beauveria bassiana	Naturalis L Botanigard ES Mycotrol O[3]	F, G, N	At least 3–5 applications may be necessary before pests are adequately under control. See labels for precautions about use with fungicides.
Carbaryl	Cutworm & Cricket Bait	F, N	Field crickets. Long, 7-day pre-harvest interval (PHI).
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	Field crickets. Maximum number of applications per year is 4 and the minimum retreatment interval is 7 days.
Novaluron	Rimon 0.83EC	F, N	Does not kill adult insects. Apply when the majority of the population is at egg hatch to the second instar. Do not apply more than 36 oz. per acre per season.
Pyrethrin	PyGanic Crop Protection EC 1.4[3] PyGanic EC 5.0[3]	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyreth-It Pyrenone Crop Spray	F, G, N	Do not apply more than 10 times per season. Do not re-apply within 3 days except under extreme pest pressure.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.

Table 7. Fruit fly (vinegar fly) and spotted wing drosophila pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/Formulation	Production Site[1]	Notes from labels[2]
Acetamiprid	Assail 30SG	F, G, N	Do not make more than two applications per growing season.
Azadirachtin	Aza-Direct[3] Azatin XL Ecozin Plus 1.2% ME[3] Neemix 4.5[3]	F, G, N	Controls targeted insect larvae when they ingest or come in contact with it, by interfering with the insect's ability to molt. It is effective on all larval or nymphal stages. Reduces damage by repelling and deterring feeding of all stages of insect.
Azadirachtin & pyrethrins	Azera	F, G, N	Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae, and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Bifenthrin[4]	Brigade WSB[5]	F, N	Do not apply more than 0.5 lb. per acre per season. Plant back restrictions: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days after the final application of bifenthrin.
Fenpropathrin[4]	Danitol 2.4EC[5]	F, N	Do not exceed more than two applications to the same planting in 12 consecutive months.
Malathion[4]	Gowan Malathion 8F Malathion 5EC	F, N	Do not make more than 4 applications per year.
Naled[4]	Dibrom 8 Emulsive[5]	F, N	Do not apply when temperature is over 90°F.
Pyrethrin	PyGanic Crop Protection EC 1.4[3] PyGanic EC 5.0[3]	F, G, N	Vinegar flies.
Pyrethrin & piperonyl butoxide	Pyreth-It EverGreen EC 60–6 Pyrenone Crop Spray	F, G, N	Fruit flies; vinegar flies; for use on harvested fruits and vegetables: To control *Drosophila* spp. fruit flies. Do not apply more than 10 times per season.
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	Fruit flies.
Spinetoram[4]	Radiant SC	F, N	Resistance Management: do not make more than two consecutive applications of group 5 insecticides (spinetoram and spinosad). Do not make more than five applications per calendar year.
Spinosad[4]	Entrust SC GF-120 NF Naturalyte Fruit Fly Bait[3]	F, N	Tephritid fruit flies.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.
[4] These products do not make a label claim for drosophila control but have been shown to be useful to manage spotted wing drosophila.
[5] Product is a restricted-use pesticide.

Table 8. Grub pesticidal control measures available for commercial strawberry production in Florida. See also beetles (Table 4).

Common Name	Trade Name/Formulation	Production Site[1]	Notes from labels[2]
Azadirachtin	Azatin XL Neemix 4.5[3]	F, G, N	Controls targeted insect larvae when they ingest or come in contact with it, by interfering with the insect's ability to molt. It is effective on all larval or nymphal stages. Reduces damage by repelling and deterring feeding of all stages of insect.
Beauveria bassiana strain GHA	BotaniGard ES Mycotrol O[3]	F, G, N	Typically it takes 7–10 days after the first spray to see control. See labels for precautions about use with fungicides.
Chlorpyrifos	Govern 4E[4] Lorsban 75WG	F, N	Grub; do not make more than one (pre-plant) application per year.
Heterorhabditis bacteriophora	Nemasys G	F, G, N	European chafer, oriental beetle, and Japanese beetle grubs.
Steinernema carpocapsae	Millenium	F, G, N	Ground-dwelling insects and borers: Strawberry root weevil. Apply when larvae are active, before damage occurs.
Thiamethoxam	Platinum	F	Grub; Pre-harvest interval is 50 days.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.
[4] Product is a restricted-use pesticide.

Table 9. Mite pesticidal control measures available for commercial strawberry production in Florida. (Includes spider mites, cyclamen mites, and rust mites.)

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Abamectin	Agri-Mek 0.15 EC[3] Temprano[3]	F	Twospotted spider mite, strawberry spider mite, suppression of cyclamen mite. For resistance management purposes, do not use in strawberry nurseries. Suppression. Wait at least 21 days after the second application before repeating application.
Acequinocyl	Kanemite 15 SC	F, N	Twospotted spider mite (*Tetranychus urticae*), strawberry spider mite. Allow a minimum of 21 days between treatments.
Beauveria bassiana ATCC 74040	Naturalis L	F, G, N	Tetranychid mites. At least 3–5 applications may be necessary before pests are adequately under control. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Bifenazate	Acramite 50WS	F, N	Twospotted spider mite; strawberry mite; two sprays is the total number of sprays per season. Allow a minimum of 21 days between treatments. Nursery use must be on plants that will not bear fruit within 1 year of application.
Bifenthrin	Brigade WSB[3]	F, N	Spider mites; Do not apply more than 0.5 lb ai per growing season. Plant back restrictions: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days after the final application of bifenthrin.
Bifenthrin & avermectin B1	Athena[3]	F	Cyclamen mite, carmine spider mite, strawberry mite, twospotted spider mite; do not make more than 2 consecutive applications and 4 applications per growing season. For resistance management purposes do not use in strawberry nurseries. Plant back restrictions: For crops that have bifenthrin and avermectin tolerances, the plant back is immediate. All other crops may be rotated 30 days after the final application.
Chromobacterium subtsugae strain PRAA4-1	Grandevo[4]	F, G, N	
Diazinon	Diazinon AG-500[3] Diazinon AG600 WBC[3] Diazinon 50W[3]	F, N	Twospotted spider mite, cyclamen mite; For cyclamen mites, direct spray to plant crowns. Do not make more than one foliar application per crop and one soil application per crop. Long, 5-day pre-harvest interval (PHI).
Edible fish oil & sesame oil	Organocide 3-in-1 Garden Spray[4]	F, G, N	Spider mites.
Etoxazole	Zeal Miticide	F, N	Twospotted spider mite; predominately an ovicide/larvicide and should be used early in the life cycle of mites. Do not make more than one application per growing season.
Fenbutatin-oxide	Vendex 50WP[3]	F, N	Twospotted spider mite; make no more than two applications per season.
Fenpropathrin	Danitol 2.4EC[3]	F, N	Twospotted spider mite; Apply as mites appear but before mite counts exceed 20/leaflet (eggs + motiles), repeat application no sooner than 30 days if warranted. Do not exceed more than two applications to the same planting in 12 consecutive months.
Fenpyroximate	Portal XLO	F, N	Broad mite, cyclamen mite, twospotted spider mite; do not make more than two applications per season.
Hexythiazox	Onager OpteK	F	Twospotted spider mite; do not make more than one application per year. Do not use in strawberry nurseries.
Isaria fumosorosea (formerly *Paecilomyces fumosoroseus*)	Preferal PFR-97 20% WDG[4]	F, G, N	Spider mites, broad mites, rust mites; most effective when relative humidity is 80% or higher for 8–10 hours. Can be mixed with copper-based fungicides; do not mix with other fungicides or apply within 5 days of fungicide applications other than copper.
Metarhizium anisopliae strain F52	Met 52EC	F, N	Do not make more than four applications per year.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Naled	Dibrom 8 Emulsive[3]	F, N	Spider mites; do not apply when temperature is over 90°F.
Neem oil	Trilogy[4]	F, N	Spider mites; avoid tank mixes with captan, sulfur, or other chemically similar products because unpredictable results or leaf burn may occur.
Oil (mineral, paraffinic, petroleum, vegetable, etc.)	Mite-E-Oil Ultra-Pure Oil	F, N	See labels for phytotoxicity precautions.
Potassium salts of fatty acids (insecticidal soap)	AllPro Insecticidal Soap 40% M-Pede[4]	F, G, N	Twospotted mites; do not mix with sulfur. See labels for phytotoxicity precautions.
Potassium silicate	Sil-MATRIX	F, G, N	Spider mites suppression.
Pyrethrin	PyGanic Crop Protection EC 1.4[4] PyGanic EC 5.0[4]	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyrenone Crop Spray	F, G, N	Strawberry mites.
Pyrethrin, rotenone & associated resins	Pyrellin EC	F, G, N	
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	
Sodium tetraborohydrate decahydrate	Prev-Am	F, N	Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am.
Sorbitol octanoate	SorbiShield 90	F, G, N	A contact insecticide with limited residual activity.
Spiromesifen	Oberon 2 SC	F, N	Twospotted spider mite; maximum number of applications per crop season is three.
Sucrose octanoate	SucraShield	F, G, N	A contact insecticide with limited residual activity.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product is a restricted-use pesticide.
[4] Product label indicates use in organic production.

Table 10. Mole cricket pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Azadirachtin	AzaGuard	F, G, N	Spray nymphs soon after egg hatch.
Azadirachtin & pyrethrins	Azera	F, G, N	Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae, and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Beauveria bassiana strain GHA	Mycotrol O[3]	F, G, N	Typically it takes 7–10 days after the first spray to see control. See label for precautions about use with fungicides.
Carbaryl	Cutworm & Cricket Bait	F, N	Long, 7-day pre-harvest interval (PHI).
Diazinon	Diazinon AG 500[4] Diazinon 50W[4] Diazinon AG600 WBC[4]	F, N	Make a maximum of one foliar application per crop and a maximum of one soil application per crop. Long, 5-day pre-harvest interval (PHI).
Pyrethrin	PyGanic EC 5.0[3]	F, G, N	

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.
[4] Product is a restricted-use pesticide.

Table 11. Pamera seed bug pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Azadirachtin	Aza-Direct[3] Azatrol EC[3] Ecozin Plus 1.2% ME[3]	F, G, N	True bugs; Controls targeted insect larvae when they ingest or come in contact with it, by interfering with the insect's ability to molt. It is effective on all larval or nymphal stages. Reduces damage by repelling and deterring feeding of all stages of insect.
Azadirachtin & pyrethrins	Azera	F, G, N	Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae, and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Beauveria bassiana strain GHA	BotaniGard ES Mycotrol O[3]	F, G, N	Typically it takes 7–10 days after the first spray to see control. At least 3–5 applications may be necessary before pests are adequately under control. See labels for precautions about use with fungicides.
Pyrethrin	PyGanic Crop Protection EC 1.4[3] PyGanic EC 5.0[3]	F, G, N	Label does not list the insect but does not limit use to listed insects.
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyrenone Crop Spray	F, G, N	Label does not list this insect but does not limit use to listed insects.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.

Table 12. Plant (*Lygus*) bug pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Acetamiprid	Assail 30SG	F, G, N	Do not make more than two applications per growing season.
Azadirachtin	Azatrol EC[3] Neemix 4.5[3]	F, G, N	Lygus bug; will not control adult insects. Reduces damage by repelling and deterring feeding of all stages of insect.
Azadirachtin & pyrethrins	Azera	F, G, N	Lygus bug. Controls pests through contact, ingestion, and insect growth regulator activity. Kills larval, pupae, and adults stages of insects. No pre-harvest interval and no restrictions on number of applications per year or by season.
Beauveria bassiana	Naturalis L BotaniGard ES Mycotrol O[3]	F, G, N	Typically it takes 7–10 days after the first spray to see control. At least 3–5 applications may be necessary before pests are adequately under control. See labels for precautions about use with fungicides.
Bifenthrin	Brigade WSB[4]	F, N	*Lygus* spp.; Apply when pest populations reach damaging thresholds and repeat as necessary at 7–14 day intervals. Do not apply more than 0.5 lb. ai per acre per season. No pre-harvest interval. Plant back restrictions: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days after the final application of bifenthrin.
Bifenthrin & avermectin B1	Athena[4]	F	*Lygus* spp.; do not make more than 2 consecutive applications and 4 applications per growing season. For resistance management purposes do not use in strawberry nurseries. Plant back restrictions: For crops that have bifenthrin and avermectin tolerances, the plant back is immediate. All other crops may be rotated 30 days after the final application.
Bifenthrin & imidacloprid	Brigadier[4]	F, N	*Lygus* spp.; do not apply during or within 10 days after bloom or when bees are actively foraging. Long, 7-day pre-harvest interval (PHI). Plant back restrictions: Plants that have tolerances for both bifenthrin and imidacloprid may be rotated at any time. Crops that have tolerances for bifenthrin and not imidacloprid can be rotated 12 months after the final application of Brigadier insecticide. Crops that have tolerances for imidacloprid and not bifenthrin may be rotated 30 days after the final application [label has list of crops].
Carbaryl	Carbaryl 4L Sevin Brand 4F Sevin Brand 80S Sevin Brand XLR Plus	F, N	Tarnished plant bug; do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl-treated soil. Long, 7-day pre-harvest interval (PHI).
Fenpropathrin	Danitol 2.4EC[4]	F, N	Lygus, tarnished plant bug; do not exceed more than two applications totaling 2–2/3 pts. (0.8 lbs. A.I.) per acre to the same planting in 12 consecutive months.
Isaria fumosorosea (formerly *Paecilomyces fumosoroseus*)	Preferal PFR-97 20% WDG[3]	F, G, N	Most effective when relative humidity is 80% or higher for 8–10 hours. Can be mixed with copper-based fungicides; do not mix with other fungicides or apply within 5 days of fungicide applications other than copper.
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	Maximum number of applications per year is 4 and the minimum retreatment interval is 7 days.
Naled	Dibrom 8 Emulsive[4]	F, N	Do not make more than 5 applications per season. Do not apply when temperature is over 90°F.
Novaluron	Rimon 0.83EC	F, N	Lygus; does not kill adult insects.
Oil (mineral, paraffinic, petroleum, vegetable, etc.)	Ultra-fine Oil	F, N	See label for phytotoxicity precautions.
Potassium salts of fatty acids (insecticidal soap)	DES-X[3]	F, N	Do not mix with sulfur. See label for phytotoxicity precautions.
Pyrethrin	PyGanic Crop Protection EC 1.4[3] PyGanic EC 5.0[3]	F, G, N	

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6 Pyrenone Crop Spray	F, G, N	Do not apply more than 10 times per season. Do not re-apply within 3 days except under extreme pest pressure. In case of extreme pest pressure, do not re-apply within 24 hours. Do not harvest until spray has dried
Sodium tetraborohydrate decahydrate	Prev-Am	F, N	Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am.
Sorbitol octanoate	SorbiShield 90	F, G, N	A contact insecticide with limited residual activity.
Thiamethoxam	Actara	F	Lygus bug suppression.
Thiamethoxam & chlorantraniliprole	Voliam Flexi	F	Lygus bug suppression. Do not exceed a total of 15.0 oz. of product per acre per growing season.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product label indicates use in organic production.
[4] Product is a restricted-use pesticide.

Table 13. Slug and snail pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site[1]	Notes from labels[2]
Iron phosphate	Sluggo-AG	F, G, N	
Metaldehyde	Durham Metaldehyde Granules 3.5, 7.5 OR-CAL Slug & Snail Bait Slug-Fest	F, N	

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.

Table 14. Spider (widow spiders: black widow and other widow spiders) pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/Formulation	Production Site[1]	Notes from labels[2]
Bifenthrin[3]	Brigade WSB[4]	F, N	Plant back restrictions: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days after the final application of bifenthrin.
Malathion[3]	Ortho Malathion Plus Insect Spray	F, N	Spiders; spot treatment to areas such as irrigation valves and other equipment; apply as a course spray.
Pyrethrin	PyGanic Crop Protection EC 1.4[5] PyGanic EC 5.0[5]	F, G, N	Spiders.
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyrenone Crop Spray	F, G, N	Spiders.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Bifenthrin and malathion are labeled for spider control in outdoor ornamentals and turf, but no claim is made for spider control in strawberry crops.
[4] Product is a restricted-use pesticide.
[5] Product label indicates use in organic production.

Table 15. Thrips pesticidal control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/Formulation	Production Site[1]	Notes from labels[2]
Abamectin	Temprano[3]	F	Suppression. Wait at least 21 days after the second application before repeating application.
Acetamiprid	Assail 30SG	F, G, N	Do not make more than two applications per growing season.
Azadirachtin	Aza-Direct[4] Azatin XL Azatrol EC[4] Ecozin Plus 1.2% ME[4] Neemix 4.5[4]	F, G, N	Controls targeted insects when they ingest or come in contact with the product, by interfering with the insect's ability to molt. It is effective on all larval or nymphal stages. Reduces damage by repelling and deterring feeding of all stages of insect.
Beauveria bassiana	Naturalis L BotaniGard 22WP BotaniGard ES Mycotrol O[4]	F, G, N	Typically it takes 7–10 days after the first spray to see control. At least 3–5 applications may be necessary before pests are adequately under control. See labels for precautions about use with fungicides.
Chromobacterium subtsugae strain PRAA4-1	Grandevo	F, G, N	
Edible fish oil & sesame oil	Organocide 3-in-1 Garden Spray[4]	F, G, N	
Fenpyroximate	Portal	F, N	Citrus thrips suppression; do not make more than two applications per season.
Isaria fumosorosea (formerly *Paecilomyces fumosoroseus*)	Preferal PFR-97 20% WDG[4]	F, G, N	Thrips pupae; most effective when relative humidity is 80% or higher for 8–10 hours. Can be mixed with copper-based fungicides; do not mix with other fungicides or apply within 5 days of fungicide applications other than copper.

Common Name	Trade Name/Formulation	Production Site[1]	Notes from labels[2]
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	Maximum number of applications per year is 4 and the minimum retreatment interval is 7 days.
Naled	Dibrom 8 Emulsive[3]	F, N	Do not apply when temperature is over 90°F.
Neem oil	Trilogy[4]	F, N	Suppression; avoid tank mixes with captan, sulfur, or other chemically similar products because unpredictable results or leaf burn may occur.
Novaluron	Rimon 0.83EC	F, N	Does not kill adult insects.
Oil (mineral, paraffinic, petroleum, vegetable, etc.)	Ultra-Fine Oil	F, N	See label for phytotoxicity precautions.
Pyrethrin	PyGanic Crop Protection EC 1.4[4] PyGanic EC 5.0[4]	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60–6 Pyreth-It Pyrenone Crop Spray	F, G, N	Do not apply more than 10 times per season. Do not re-apply within 3 days except under extreme pest pressure.
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	
Pyrethrin, rotenone & associated resins	Pyrellin EC	F, G, N	
Sorbitol octanoate	SorbiShield 90	F, G, N	A contact insecticide with limited residual activity.
Spinetoram	Radiant SC	F, N	Resistance management: Do not make more than two consecutive applications of group 5 insecticides (spinetoram and spinosad). Do not make more than five applications per calendar year.
Spinosad	Entrust[4] SpinTor 2SC	F, N	Resistance management: Rotate to a different class of insect control products after two successive applications. Do not make more than five applications per year.
Steinernema feltiae	Nemasys	G	Western flower thrips.
Sucrose octanoate	SucraShield	F, G, N	A contact insecticide with limited residual activity.

[1] "F" indicates field production. "G" indicates greenhouse production. "N" indicates nursery production.
[2] Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit number and patterns of applications, provide phytotoxicity precautions, etc.
[3] Product is a restricted-use pesticide.
[4] Product label indicates use in organic production.