

Insect, Mite, and Mollusk Management Suggestions on Commercial Strawberry Production in Florida¹

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Florida grows primarily fresh market strawberries that were valued at \$197 million in 2005, harvested from 7,300 acres³. 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, and aphids, some of which may accompany the transplants from their origin. By mid season and later, major concerns are with twospotted spider mites, thrips, fruit (vinegar) flies and sap beetles. Pamearas (seed bugs) add to the concern and may evoke complaints when they accompany berries to markets. Widow spiders sometimes are problems in fields where broad spectrum insecticides are infrequently used.

Effective management of arthropod and gastropod pests of strawberry is critical to the

profitability of the industry, requires that pests be detected in a timely manner through systematic scouting and that appropriate control measures be applied as conditions warrant.

Biological control measures have been developed for management of twospotted spider mites and are practiced by a significant portion of the industry. Information on biological control of insects and mites in strawberry production is available at <http://edis.ifas.ufl.edu/HS180> and sources of predators for biological control of spider mites are available at <http://edis.ifas.ufl.edu/HS244>. Toxicity information for many pesticides used in Florida strawberry production to commercially available predators of spider mites is summarized at <http://www.koppert.nl/e0110.html>.

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:

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 3. Anonymous. 2003. Florida Facts: Strawberries, Florida Agricultural Statistics Service.
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Ants
 Aphids
 Armyworms
 Beetles
 Budworms
 Caterpillars
 Crickets
 Cutworms & Loopers
 Fruit flies
 Grubs
 Leaf tiers & leafrollers
 Lesser cornstalk borer
 Mites
 Mole crickets
 Pamearas
 Plant (Lygus) bugs
 Snails & slugs
 Spiders
 Thrips
 Whiteflies

They include beneficial nematode and microbial insecticides, which are components of biological control. For each pest group listed, products available for control are presented by active ingredient. 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.

Additional information about pesticide products mentioned in the tables, such as registrants, precautionary signal words, restricted re-entry intervals (REI), pre-harvest intervals (PHI), and restricted use status are provided in a separate

publication *Insecticides, Miticides & Molluscicides Available to Florida's Strawberry Industry* (ENY-657) (<http://edis.ifas.ufl.edu/IN400>), to aid in the selection and safe use of the pesticides. More detailed information about a pesticide product should be sought on the specimen label. Electronic versions of specimen labels are usually available at the Web sites of CDMS (<http://www.cdms.net/manuf/default.asp>), C&P Press (<http://www.greenbook.net/>) or the affiliated manufacturer.

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. In all cases it is the responsibility of the applicator to read, understand, and comply with the label that accompanies each pesticide container.

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.

Table 1. Ant (Hymenoptera: Formicidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Carbaryl	10% Sevin Granules	F, N	Repeat applications up to a total of four times per year, but not more often than once every 7 days.
	Cutworm & Cricket Bait	F, N	
Methyl bromide & Chloropicrin	MBC 98-2	F, G, N	Pre-plant treatment only.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic 5.0 EC	F, G, N	
Pyrethrin & piperonyl butoxide	Evergreen EC 60-6 Pyreth-It Pyrenone Crop Spray	F, G, N	
Pyriproxyfen	Esteem Ant Bait	F, G, N	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.
S-methoprene	Extinguish Pro Fire Ant Bait	F, G, N	Fire ants
Spinosad	Justice Fire Ant Bait	F, G, N	Red imported fire ants (<i>Solenopsis invicta</i>). If reapplication is required, use recommended mound or broadcast application rates at intervals of no less than 14 days until control is achieved.

Footnotes:

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 numbers of patterns of applications, provide phytotoxicity precautions, etc.

Table 2. Aphid (Homoptera: Aphididae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL Neemix 4.5	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, N	
	Ecozin 3% EC	F, N	Will not control adult insects.
	Ornazin 3% EC	F, G, N	
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
<i>Beauveria bassiana</i> strain GHA	BotaniGard ES BotaniGard 22 WP	F, G, N	Contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. Application frequency: There is no limit on the number of applications or total amount which can be applied in one season. Do not apply this product through any type of irrigation system.
	Mycotrol O	F, G, N	Pea aphid; cowpea aphid; bean aphid; cotton aphid; melon aphid; cabbage aphid; potato aphid; rose aphid; green peach aphid; hop aphid; spotted alfalfa aphid; Russian wheat aphid; Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.
Bifenthrin	Brigade WSB	F, N	Do not apply more than 0.5 lbs. a.i. per acre per season. Plant back: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days following the final application of bifenthrin.
Diazinon	Diazinon AG 500 (EPA#51036-71) Diazinon Insecticide	F, N	Do not apply more than 4 lbs. a.i. per acre per season.
	Diazinon AG600 WBC	F, N	Make a maximum of one foliar application per crop and a maximum of one soil application per crop.

Table 2. Aphid (Homoptera: Aphididae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Endosulfan	Endosulfan 3EC	F, N	Strawberry aphid; do not make more than than three applications per season. Do not make more than two applications per season. Do not reapply within 15 days or more than twice during a 35-day period when fruit is present.
	Thiodan Emulsifiable Concentrate	F, N	
	Thionex 3EC Thionex 50W	F, N	Strawberry aphid; do not make more than three applications per year. Do not exceed a maximum of 3 lbs. or a.i. per acre per year. Do not reapply within 15 days or more than twice during a 35-day period when fruit is present.
Imidacloprid	Admire 2F Couraze 2F	F, N	Maximum allowed per crop season: 32.0 fl.oz./acre (0.5 lb a.i./acre); in order to maintain susceptibility to this class of chemistry it is recommended that for each crop season only a single soil application be made and foliar applications of products from this same class not be made following a long residual, soil application of this or other neonicotinoid products. Plant back: Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed.
	Alias 2F	F, N	Maximum Alias 2F allowed per crop season is 32.0 fl. oz. per acre (0.5 lb a.i./a). Plant back: Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed.

Table 2. Aphid (Homoptera: Aphididae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
	Couraze 1.6F Pasada 1.6F Provado 1.6F	F, N	Do not apply during bloom, or within 10 days prior to bloom or when bees are actively foraging. Minimum interval between applications: 5 days. Maximum allowed per crop season: 0.14 lb ai/a. Resistance management: Foliar applications of this or other group 4A products from the neonicotinoid chemical class should not be used on crops previously treated with a long-residual soil-applied product from the neonicotinoid class. Regardless of the formulation or type of application (soil or foliar), do not apply more than 0.5 lb. a.i. of Admire, Alias, or Pasada per acre per season. Plant back: Treated areas may be replanted with a crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed.
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	
Naled	Dibrom 8 Emulsive	F, N	Do not apply more than 5 pts. per acre per season. Do not apply when temperature is over 90° F.
Neem Oil	Trilogy	F, N	Do not apply to wilted or otherwise stressed plants or newly transplanted crops prior to root establishment. Avoid tank mixes with captan, sulfur or other chemically similar products as unpredictable results or leaf burn may occur. Exercise care in timing applications to early morning / late evening to minimize potential for leaf burn.

Table 2. Aphid (Homoptera: Aphididae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Potassium Salts of Fatty Acids	AllPro Insecticidal Soap 40%	F, G, N	Application of excessive water volumes will increase potential for fruit injury by causing collection of spray at the bottom of fruit.
	M-Pede	F, G, N	Do not mix M-Pede with sulfur. Do not use within 3 days of a sulfur application. Application of excessive water volumes will increase potential for fruit injury by causing collection of spray at the bottom of fruit. Potential for plant injury increases when: Used on plants stressed by heat (>90° F), humidity, drought, more than 3 sequential applications are made at 7-day intervals, the pH of the final spray mixture is lowered below 8.0, tender new foliage is present, or insect, mite or disease pressure has already stressed plant foliage. To achieve enhanced and residual control use in combination with other recommended products.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
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	
Refined Petroleum Distillate	Saf-T-Side Spray Oil	F, N	Do not use in combination with or immediately before or after spraying with fungicides such as captan, or any product containing sulfur. Do not use with carbaryl (Sevin). Do not use with any product whose label recommends the use of no oils. Do not use in combination with NPK foliar fertilizer applications.
	Ultra-Fine Oil	F, N	Do not tank mix with insecticide or miticide whose label indicates that it should not be used with oil. The following list of pesticides represents some of the compounds that should not be used with Ultra-Fine Oil (paraffinic oil), however this list is not exhaustive: Captan (Captain), propargite (Omite), wettable sulfur or any other product containing sulfur. For fungicides not included in this listing consult the label of the specific fungicide formulation for compatibility information when used with oil.
Rosemary oil	Hexacide	F, N	Avoid application at blooming.
Rosemary oil & peppermint oil	Ecotrol EC	F, G, N	

Table 2. Aphid (Homoptera: Aphididae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Sodium tetraborohydrate decahydrte	Prev-AM	F, N	It is recommended to apply with an air-assisted type sprayer for best results. Not recommended for application in mid-day sun as temporary leaf burn may occur during periods of drought when plants are subject to heat and moisture stress. Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am. See label for list of products that Prev-Am may be mixed with. If insect populations reach economic thresholds, frequency of applications can be as often as every 4 days until control is obtained.
Thiamethoxam	Actara	F	Do not exceed a total of 12.0 oz. of Actara (0.188 lb. a.i.) per acre per growing season. Allow at least 10 days between applications. Plant back: Treated areas may be replanted immediately to any labeled crop, corn, cucurbit & legume vegetables, or some other named crops. For all others a 120 day plant back interval is required.
<p>Footnotes:</p> <p>¹ "F" indicates field production, "G" indicates greenhouse production. "N" indicates nursery production.</p> <p>² Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit numbers of patterns of applications, provide phytotoxicity precautions, etc.</p>			

Table 3. Armyworm (Lepidoptera: Noctuidae) control measures available for commercial strawberry production in Florida. See also budworms and caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL Neemix 4.5	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, G, N	
<i>Bacillus thuringiensis aizawai</i> strain GC-91	Agree WG	F, N	

Table 3. Armyworm (Lepidoptera: Noctuidae) control measures available for commercial strawberry production in Florida. See also budworms and caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<i>Bacillus thuringiensis aizawai</i> lepidopteran strain ABTS-1857	XenTari Dry Flowable	F, G, N	For best results apply full coverage sprays when 1 st or 2 nd instar larvae are present. Where 4 th or 5 th instar larvae are present, a contact insecticide should be used in combination to enhance control.
<i>Bacillus thuringiensis kurstaki</i>	Deliver LC Javelin WG	F, N	In a tank mix with contact insecticides, rates as low as 0.5 lb may be used for the control of armyworm.
<i>Bacillus thuringiensis kurstaki</i> strain ABTS-351	Biobit HP Dipel DF	F, N	May be used to control armyworms or podworms (1 st and 2 nd 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.
	Dipel ES	F, G, N	If hatch occurs over an extended period, multiple applications should be considered. Use higher rates when pest pressure is heavy and/or older larvae are present, also tank mixes with a low rate of a contact insecticide may enhance control. The use of an approved spreader sticker is recommended.
	Dipel Pro DF	F, G, N	For shade house only (F).
<i>Bacillus thuringiensis kurstaki</i> strain EG2348 lepidopteran active toxin	Condor	F, N	Use caution when mixing with other oil-based products or surfactants as such combinations could increase the risk of phytotoxicity. If any phytotoxicity occurs, discontinue use immediately.
<i>Bacillus thuringiensis kurstaki</i> EG7826 lepidopteran active toxin	Lepinox WDG	F, N	
<i>Bacillus thuringiensis kurstaki</i> EG7841 lepidopteran active toxin	Crymax Bioinsecticide	F, N	
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Bifenthrin	Brigade WSB	F, N	Do not apply more than 0.5 lbs. a.i. per acre per season. Plant back: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days following the final application of bifenthrin.

Table 3. Armyworm (Lepidoptera: Noctuidae) control measures available for commercial strawberry production in Florida. See also budworms and caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Carbaryl	Cutworm & Cricket Bait	F, N	
	Sevin Brand 4F Sevin Brand XLR Plus	F, N	Do not apply more than a total of 10 quarts per acre per crop. Repeat applications as necessary up to a total of five times but not more often than once every 7 days. Plant back: Do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl treated soil.
Fenpropathrin	Danitol 2.4EC	F, N	Fall & 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.
<i>Heterorhabditis indica</i>	Symbion	F, G, N	May be applied through pressurized irrigation systems (not soaker hoses). Do not inject into drip irrigation systems. Do not apply within 21 days of a nematicide application.
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 ai) per acre per season. For early season applications only to young crops and small plants. Rotational crop restrictions (plant back): Crops with registered uses may be replanted at any time. All other crops grown for food or feed may be replanted after 7 days.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
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	
Rosemary oil	Hexacide	F, N	Beet armyworm, fall armyworm; avoid application at blooming.
Sodium tetraborohydrate decahydrate	Prev-AM	F, N	Beet armyworm; it is recommended to apply with an air-assisted type sprayer for best results. Not recommended for application in mid-day sun as temporary leaf burn may occur during periods of drought when plants are subject to heat and moisture stress. Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-AM. See label for list of products that Prev-AM may be mixed with. If insect populations reach economic thresholds, frequency of applications can be as often as every 4 days until control is obtained.

Table 3. Armyworm (Lepidoptera: Noctuidae) control measures available for commercial strawberry production in Florida. See also budworms and caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Spinosad	Entrust	F, N	Do not apply more than a total of 9 oz of Entrust (0.45 lb a.i. of spinosad) per acre per crop. Resistance management: Rotate to a different class of insect control products after two successive applications of Entrust. Do not make more than five applications per year.
	SpinTor 2SC	F, N	Do not apply more than a total of 29 fl. oz. (0.45 lb. a.i.) per acre per crop. Resistance Management: Rotate to a different class of insect control product after two successive applications of SpinTor 2SC. Do not make more than five applications per year.
<p>Footnotes:</p> <p>¹ "F" indicates field production, "G" indicates greenhouse production. "N" indicates nursery production.</p> <p>² Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit numbers of patterns of applications, provide phytotoxicity precautions, etc.</p>			

Table 4. Beetle (Coleoptera) control measures available for commercial strawberry production in Florida. See also grubs.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL Neemix, Neemix 4.5	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, N	
	Ecozin 3% EC	F, N	Will not control adult insects.
	Ornazin 3% EC	F, G, N	
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Colorado potato beetle, Japanese beetles; repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.

Table 4. Beetle (Coleoptera) control measures available for commercial strawberry production in Florida. See also grubs.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<i>Beauveria bassiana</i> Strain GHA	Botanigard ES	F, G, N	Green June beetle; BotaniGard ES is compatible in tank mix with some fungicides; contact dealer for recommendations. Do not apply through a thermal pulse fogger. Do not apply this product through any type of irrigation system. Application frequency: There is no limit on the number of applications or total amount which can be applied in one season.
	Mycotrol O	F, G, N	Cucumber beetles, flea beetles, bean leaf beetle, Colorado potato beetle, cereal leaf beetle, elm leaf beetle; Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.
Bifenthrin	Brigade WSB	F, N	Flea beetles; strawberry sap beetle; do not apply more than 0.5 lbs. a.i. per acre per season. Plant back: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days following the final application of bifenthrin.
Carbaryl	Carbaryl 4L Carbaryl 80S Sevin Brand 4F Sevin Brand 80S Sevin XLR Plus	F, N	Sap beetles ³ ; flea beetles; June beetles; do not apply more than a total of 10 lbs a.i. per acre per crop. Repeat applications as necessary up to a total of five times but not more often than once every 7 days. Plant back: Do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl treated soil.
Fenpropathrin	Danitol 2.4EC	F, N	Strawberry sap beetle; do not exceed more than two applications totalling 2-2/3 pts. (0.8 lbs. a.i.) per acre to the same planting in 12 consecutive months.
<i>Heterorhabditis indica</i>	Symbion-South	F, G, N	Cucumber beetle, flea beetle, May beetle; may be applied through pressurized irrigation systems (not soaker hoses). Do not inject into drip irrigation systems. Do not apply within 21 days of a nematicide application.

Table 4. Beetle (Coleoptera) control measures available for commercial strawberry production in Florida. See also grubs.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Imidacloprid	Admire 2F Couraze 2F	F, N	Poor harvest use on perennial strawberry: White grub complex (grubs of Asiatic garden beetle, European chafer, masked chafer, Japanese beetle, Oriental beetle); Maximum allowed per crop season: 32.0 fl oz./acre (0.5 lb. ai/acre); in order to maintain susceptibility to this class of chemistry it is recommended that for each crop season only a single soil application be made and foliar applications of products from this same class not be made following a long residual, soil application of this or other neonicotinoid products. Plant back: Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
Pyrethrin & Piperonyl Butoxide	Evergreen EC 60-6	F, G, N	Bean beetles, blister beetles, cucumber beetles
	Pyreth-It	F, G, N	Cucumber beetles; flea beetles
	Pyrenone Crop Spray	F, G, N	Corn sap beetle
Thiamethoxam	Actara	F	Weevil adult; do not exceed a total of 12.0 oz. of Actara (0.188 lb. a.i.) per acre per growing season. Allow at least 10 days between applications. Plant back: Treated areas may be replanted immediately to any labeled crop, corn, cucurbit & legume vegetables, or some other named crops. For all others a 120 day plant back interval is required.
<p>Footnotes:</p> <p>¹ "F" indicates field production, "G" indicates greenhouse production. "N" indicates nursery production.</p> <p>² Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit numbers of patterns of applications, provide phytotoxicity precautions, etc.</p> <p>³ These products, while not labeled for sap beetle control in strawberry, are labeled for sap beetle control in corn.</p>			

Table 5. Budworm (Lepidoptera: Noctuidae: *Heliothis* & *Helicoverpa*), including bollworm, corn earworm and tomato fruitworm, control measures available for commercial strawberry production in Florida. Also see Caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Neemix 4.5	F, G, N	
<i>Bacillus thuringiensis aizawai</i> strain ABTS-1857	XenTari Dry Flowable	F, G, N	Tobacco budworm
<i>Bacillus thuringiensis kurstaki</i>	Javelin WG	F, N	Bollworm, <i>Helicoverpa</i> spp., <i>Heliothis</i> spp., tobacco budworm
<i>Bacillus thuringiensis kurstaki</i> strain ABTS-351	Biobit HP	F, G, N	<i>Heliothis</i> (G); tobacco budworm
	Dipel DF	F, G, N	<i>Heliothis</i> (G), tobacco budworm
	Dipel Pro DF	F, G, N	<i>Heliothis</i> , tobacco budworm; shade house only (F)
<i>Bacillus thuringiensis kurstaki</i> strain EG2348 lepidopteran active toxin	Condor	F, N	Tobacco budworm; use caution when mixing with other oil-based products or surfactants as such combinations could increase the risk of phytotoxicity. If any phytotoxicity occurs, discontinue use immediately.
<i>Bacillus thuringiensis kurstaki</i> EG7841 lepidopteran active toxin	Crymax Bioinsecticide	F, N	Tobacco budworm
<i>Bacillus thuringiensis kurstaki</i> EG7826 lepidopteran active toxin	Lepinox WDG	F, N	Tobacco budworm
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Budworm, bollworm, tomato fruitworm; repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Bifenthrin	Brigade WSB	F, N	<i>Heliothis</i> spp.; do not apply more than 0.5 lbs. a.i. per acre per season. Plant back: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days following the final application of bifenthrin.
<i>Heterorhabditis indica</i>	Symbion-South	F, G, N	Corn earworm; may be applied through pressurized irrigation systems (not soaker hoses). Do not inject into drip irrigation systems. Do not apply within 21 days of a nematicide application.
Methoxyfenozide	Intrepid 2F	F, N	Corn earworm; do not use more than 12 fl. oz. per acre per application or 64 fl. oz. of Intrepid 2F (1 lb. ai) per acre per season. For early season applications only to young crops and small plants. Rotational crop restrictions (plant back): Crops with registered uses may be replanted at any time. All other crops grown for food or feed may be replanted after 7 days.

Table 5. Budworm (Lepidoptera: Noctuidae: *Heliothis* & *Heliocoverpa*), including bollworm, corn earworm and tomato fruitworm, control measures available for commercial strawberry production in Florida. Also see Caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6 Pyreth-It Pyrenone Crop Spray	F, G, N	
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 6. Caterpillar (Lepidoptera) control measures available for commercial strawberry production in Florida. Also see armyworms, budworms, cutworms and loopers, leaf tiers and leafrollers, lesser cornstalk borer.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Azatin XL Neemix, Neemix 4.5	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Ornazin 3% EC		
	Ecozin 3% EC	F, N	
<i>Bacillus thuringiensis aizawai</i> strain ABTS-1857	XenTari Dry Flowable	F, G, N	Saltmarsh caterpillar.
<i>Bacillus thuringiensis kurstaki</i>	Javelin WG Deliver LC	F, N	Saltmarsh caterpillar
<i>Bacillus thuringiensis kurstaki</i> strain ABTS-351	Biobit HP Dipel DF	F, N	Saltmarsh caterpillar
	Dipel ES	F, G, N	Saltmarsh caterpillar
	Dipel Pro DF	F, G, N	Saltmarsh caterpillar; for shade house only (F).
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Eggs of lepidopteran pests; repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.

Table 6. Caterpillar (Lepidoptera) control measures available for commercial strawberry production in Florida. Also see armyworms, budworms, cutworms and loopers, leaf tiers and leafrollers, lesser cornstalk borer.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Carbaryl	Carbaryl 4L Carbaryl 80S Sevin Brand 4F Sevin Brand 80S Sevin Brand XLR Plus	F, N	Saltmarsh caterpillar; do not apply more than a total of 10 lbs. a.i. per acre per crop. Repeat applications as necessary up to a total of five times but not more often than once every 7 days. Plant back: Do not plant rotational food crops not listed on this or other carbaryl labels in carbaryl treated soil.
<i>Heterorhabditis indica</i>	Symbion-South	F, G, N	Larval, pupal and some adult stages of pests which spend part of their live cycle in or on the soil or cryptically inside plant tissues. May be applied through pressured irrigation systems (not soaker hoses). Do not inject into drip irrigation systems. Do not apply within 21 days of a nematode application.
Pyrethrin	PyGanic Crop Protection EC-14 PyGanic EC 5.0	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6 Pyreth-It Pyreneone Crop Spray	F, G, N	
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	
Refined Petroleum Distillate	Ultra-Fine Oil	F, N	Eggs of certain caterpillars; do not tank mix with insecticide or miticide whose label indicates that it should not be used with oil. The following list of pesticides represents some of the compounds that should not be used with Ultra-Fine Oil (paraffinic oil), however this list is not exhaustive: captan (Captan), propargite (Omite), wettable sulfur or any other product containing sulfur. For fungicides not included in this listing consult the label of the specific fungicide formulation for compatibility information when used with oil.
Rosemary oil & peppermit oil	Ecotrol EC	F, G, N	Small larvae
<p>Footnotes:</p> <p>¹ "F" indicates field production, "G" indicates greenhouse production. "N" indicates nursery production.</p> <p>² Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit numbers of patterns of applications, provide phytotoxicity precautions, etc.</p>			

Table 7. Cricket (Orthoptera: Gryllidae) control measures available for commercial strawberry production in Florida. See also mole cricket.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Carbaryl	Cutworm & Cricket Bait	F, N	Field crickets
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	Field crickets
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6 Pyreth-It Pyrenone Crop Spray	F, G, N	
Rosemary oil & peppermint oil	Ecotrol EC	F, G, N	
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 8. Cutworm & Looper (Lepidoptera: Noctuidae) control measures available for commercial strawberry production in Florida. See also caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, N	
	Neemix 4.5	F, G, N	Black cutworm; effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
<i>Bacillus thuringiensis</i> <i>aizawai</i> strain ABTS-1857	XenTari Dry Flowable	F, G, N	
<i>Bacillus thuringiensis</i> <i>kurstaki</i>	Deliver LC Javelin WDG	F, N	Loopers

Table 8. Cutworm & Looper (Lepidoptera: Noctuidae) control measures available for commercial strawberry production in Florida. See also caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<i>Bacillus thuringiensis</i> <i>kurstaki</i> strain ABTS-351	Biobit HP	F, G, N	Loopers
	Dipel DF	F, G, N	Looper (G)
	Dipel ES	F, G, N	Looper, black cutworm
	Dipel Pro DF	F, G, N	Looper; for shade house only (F).
<i>Bacillus thuringiensis</i> <i>kurstaki</i> strain EG2348 lepidopteran active toxin	Condor	F, N	Loopers; use caution when mixing with other oil-based products or surfactants as such combinations could increase the risk of phytotoxicity. If any phytotoxicity occurs, discontinue use immediately.
<i>Bacillus thuringiensis</i> <i>kurstaki</i> EG7841 lepidopteran active toxin	Crymax Bioinsecticide	F, N	Loopers
<i>Bacillus thuringiensis</i> <i>kurstaki</i> EG7826 lepidopteran active toxin	Lepinox WDG	F, N	Loopers
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Loopers; repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
<i>Beauveria bassiana</i> strain GHA	Mycotrol O	F, G, N	Cabbage looper; Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.
Carbaryl	10% Sevin Granules Carbaryl 4L Carbaryl 80S Sevin Brand 4F Sevin Brand 80S Sevin Brand XLR Plus	F, N	Cutworms; do not apply more than a total of 10 lbs a.i. per acre per crop. Repeat applications as necessary up to a total of five times but not more often than once every 7 days. Plant back: Do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl treated soil.
	Cutworm & Cricket Bait	F, N	Cutworms
<i>Heterorhabditis indica</i>	Symbion-South	F, G, N	Cutworms; may be applied through pressurized irrigation systems (not soaker hoses). Do not inject into drip irrigation systems. Do not apply within 21 days of a nematicide application.

Table 8. Cutworm & Looper (Lepidoptera: Noctuidae) control measures available for commercial strawberry production in Florida. See also caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Methoxyfenozide	Intrepid 2F	F, N	Cutworms (suppression); do not use more than 12 fl. oz. per acre per application or 64 fl. oz. of Intrepid 2F (1 lb. ai) per acre per season. For early season applications only to young crops and small plants. Rotational crop restrictions (plant back): Crops with registered uses may be replanted at any time. All other crops grown for food or feed may be replanted after 7 days.
Methyl bromide & chloropicrin	MBC 98-2	F, G, N	Cutworms; pre-plant treatment only.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	Loopers
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6	F, G, N	Loopers
	Pyreth-It	F, G, N	Cabbage looper
	Pyrenone Crop Spray	F, G, N	
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	Cabbage looper; cutworm
Rosemary oil	Hexacide	F, N	Cabbage looper; avoid application at blooming.
Rosemary oil & peppermint oil	Ecotrol EC	F, G, N	Cutworms
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 9. Fruit fly (vinegar fly) (Diptera: Drosophilidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, N	

Table 9. Fruit fly (vinegar fly) (Diptera: Drosophilidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
	Ecozin 3% EC	F, N	Will not control adult insects.
	Neemix, Neemix 4.5	F, G, N	Fruit fly; effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Ornazin 3% EC	F, G, N	
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	Vinegar flies
Pyrethrin & piperonyl butoxide	Pyreth-It	F, G, N	Fruit flies; vinegar flies; for use on harvested fruits and vegetables: To control <i>Drosophila</i> spp. fruit flies.
	EverGreen EC 60-6 Pyrenone Crop Spray	F, G, N	
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	Fruit flies
<p>Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.</p>			

Table 10. Grub (Coleoptera) control measures available for commercial strawberry production in Florida. See also beetles.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Azatin XL Neemix 4.5	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
<i>Beauveria bassiana</i> strain GHA	BotaniGard ES	F, G, N	White grubs; BotaniGard ES is compatible in tank mix with some fungicides; contact dealer for recommendations. Do not apply through a thermal pulse fogger. Do not apply this product through any type of irrigation system. Application frequency: There is no limit on the number of applications or total amount which can be applied in one season.
	Mycotrol O	F, G, N	White grubs; Micotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.

Table 10. Grub (Coleoptera) control measures available for commercial strawberry production in Florida. See also beetles.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Chlorpyrifos	Lorsban 4E Lorsban 75WG	F, N	Preplant incorporation treatment.
<i>Heterorhabditis indica</i>	Symbion-South	F, G, N	White grubs; may be applied through pressurized irrigation systems (not soaker hoses). Do not inject into drip irrigation systems. Do not apply within 21 days of a nematicide application.
Imidacloprid	Admire 2F Coraze 2F	F, N	White grub complex; maximum allowed per crop season: 32.0 fl. oz/acre (0.5 lb. ai/acre); in order to maintain susceptibility to this class of chemistry it is recommended that for each crop season only a single soil application be made and foliar applications of products from this same class not be made following a long residual, soil application of this or other neonicotinoid products. Plant back: Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed.
Methyl bromide	MBC 98-2	F, G, N	Pre-plant
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 11. Leaf-tier & leafroller (Lepidoptera: Cambidae & Tortricidae) control measures available for commercial strawberry production in Florida. Also see caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Leafrollers; do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, N	Leafrollers
	Ecozin 3% EC	F, N	Leafrollers

Table 11. Leaf-tier & leafroller (Lepidoptera: Cambidae & Tortricidae) control measures available for commercial strawberry production in Florida. Also see caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
	Neemix 4.5	F, G, N	Leafrollers; effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
<i>Bacillus thuringiensis aizawai</i> strain ABTS-1857	XenTari Dry Flowable	F, G, N	Obliquebanded leafroller; omnivorous leafroller
<i>Bacillus thuringiensis kurstaki</i>	Deliver Javelin WG	F, N	Obliquebanded leafroller; omnivorous leafroller; omnivorous leaf-tier
<i>Bacillus thuringiensis kurstaki</i> strain ABTS-351	Biobit HP Dipel DF	F, N	Obliquebanded leafroller; omnivorous leafroller (ground only)
	Dipel Pro DF	F, G, N	Omnivorous leafroller; for shade house only (F)
<i>Bacillus thuringiensis kurstaki</i> strain EG2348 lepidopteran active toxin	Condor	F, N	Obliquebanded leafroller; use caution when mixing with other oil-based products or surfactants as such combinations could increase the risk of phytotoxicity. If any phytotoxicity occurs, discontinue use immediately.
<i>Bacillus thuringiensis kurstaki</i> EG7841 lepidopteran active toxin	Crymax Bioinsecticide	F, N	Obliquebanded leafroller
<i>Bacillus thuringiensis kurstaki</i> EG7826 lepidopteran active toxin	Lepinox WDG	F, N	Obliquebanded leafroller
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Leafrollers; repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Bifenthrin	Brigade WSB	F, N	Leafrollers; do not apply more than 0.5 lbs. a.i. per acre per season. Plant back: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days following the final application of bifenthrin.

Table 11. Leaf-tier & leafroller (Lepidoptera: Cambidae & Tortricidae) control measures available for commercial strawberry production in Florida. Also see caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Carbaryl	Carbaryl 4L Carbaryl 80S Sevin Brand 4F Sevin Brand 80S Sevin Brand XLR Plus	F, N	Omnivorous leafroller; omnivorous leaf-tier; strawberry fruitworm; strawberry leafroller; do not apply more than a total of 10 lbs a.i. per acre per crop. Repeat applications as necessary up to a total of five times but not more often than once every 7 days. Plant back: Do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl treated soil.
	Sevin 80S	F, N	Omnivorous leafroller; do not apply more than a total of 12.5 pounds per acre per crop.
	Sevin 50W	F, N	Strawberry leafroller; not compatible with oils, lime sulfur, or alkaline materials.
Diazinon	Diazinon AG 500 Diazinon Insecticide	F, N	Strawberry leafrollers; do not apply more than 4 lbs. a.i. per acre per season.
	Diazinon AG 600 WBC	F, N	Strawberry leafroller; make a maximum of one foliar application per crop and a maximum of one soil application per crop.
Malathion	Gowan Malathion 8F Malathion 5EC Drexel Malathion 5EC	F, N	Strawberry leafrollers
Naled	Dibrom 8 Emulsive	F, N	Leafrollers; omnivorous leaf-tiers; do not apply more than 5 pts. per acre per season. Do not apply when temperature is over 90° F.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
Pyrethrins & 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	Strawberry leafrollers
Pyrethrin, rotenone & associated resins	Pyrellin EC	F, G, N	Strawberry leafrollers

Table 11. Leaf-tier & leafroller (Lepidoptera: Cambidae & Tortricidae) control measures available for commercial strawberry production in Florida. Also see caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Spinosad	Entrust	F, N	Leafrollers; do not apply more than a total of 9 oz. of Entrust (0.45 lb. a.i. of spinosad) per acre per crop. Resistance management: Rotate to a different class of insect control products after two successive applications of Entrust. Do not make more than five applications per year.
	SpinTor 2SC	F, N	Leafrollers; do not apply more than a total of 29 fl. oz. (0.45 lb. a.i.) per acre per crop. Resistance Management: Rotate to a different class of insect control product after two successive applications of SpinTor 2SC. Do not make more than five applications per year.
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 12. Lesser cornstalk borer (Lepidoptera: Pyralidae: *Elasmopalpus lignosellus* (Zeller)) control measures available for commercial strawberry production in Florida. See also caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Azatin XL	F, G, N	Borer; effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Ornazin 3% EC	F, G, N	Borers
	Ecozin 3% EC	F, N	Borers
<i>Bacillus thuringiensis</i> <i>kurstaki</i>	Deliver Javelin WDG	F, N	European corn borer, southwestern corn borer, peach twig borer
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Corn borers; repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
<i>Beauveria bassiana</i> strain GHA	Mycotrol O	F, G, N	Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply openly through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.

Table 12. Lesser cornstalk borer (Lepidoptera: Pyralidae: *Elasmopalpus lignosellus* (Zeller)) control measures available for commercial strawberry production in Florida. See also caterpillars.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	Including but not limited to: European corn borer; if chemigation is used, apply only through sprinkler irrigation systems.
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6	F, G, N	For the control of insects: Such as ... European corn borer.
	Pyrenone Crop Spray	F, G, N	
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	For the control of such insects as ... peach borers.
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 13. Mite (Acari) (including spider mites, cyclamen mites and rust mites) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Abamectin	Abacus Abba 0.15 EC Agri-Mek 0.15 EC Epi-Mek 0.15 EC Reaper 0.15 EC Zoro	F	Twospotted spider mite; do not repeat treatment within 21 days of second application. Do not exceed 64 oz. in a growing season. Do not use in strawberry nurseries. Do not apply with aircraft.
Acequinocyl	Kanemite 15 SC	F, N	Two spotted spider mite (<i>Tetranychus urticae</i>); strawberry spider mite (<i>Tetranychus turkestanii</i>); do not use Kanemite in successive miticide applications; use in rotation with other treatments having different modes of action. Do not apply more than a total of 62 fl. oz. (0.6 lb a.i.) per acre per season. Do not apply in less than 100 gallons of water per acre. Do not make more than two applications per year. Allow a minimum of 21 days between applications of Kanemite. Plant back: Crops other than strawberries may not be rotated for a least 1 year following treatment of strawberries. Do not tank mix with strongly alkaline material and do not combine with fosetyl-al (Aliette, Linebacker). Do not apply by air.

Table 13. Mite (Acari) (including spider mites, cyclamen mites and rust mites) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatrol EC	F, N	
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Tetranychid mites; repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
Bifenazate	Acramite 50WS	F, N	European red mite; McDaniel mite; Pacific spider mite; two spotted spider mite; strawberry mite; two sprays is the total number of sprays per season. Minimum period between applications is 21 days. Do not plant another crop within 30 days after last application due to chances of bifenazate residues showing up in rotational crops. Nursery use must be on plants that will not bear fruit within 1 year of application.
Bifenthrin	Brigade WSB	F, N	Spider mites; do not apply more than 0.5 lbs. a.i. per acre per season. Plant back: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days following the final application of bifenthrin.
Diazinon	Diazinon AG-500	F, N	Cyclamen mites; do not apply more than 4 lbs. a.i. per acre per season. For cyclamen mites direct spray to plant crowns.
	Diazinon AG600 WBC	F, N	Cyclamen mite; direct spray to plant crowns; make a maximum of one foliar application per crop and a maximum of one soil application per crop.
	Diazinon Insecticide	F, N	Cyclamen mites; do not apply more than 4 lbs. A.I. per acre per season. For cyclamen mites direct spray to plant crowns and do not make more than three foliar applications per season.

Table 13. Mite (Acari) (including spider mites, cyclamen mites and rust mites) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Dicofol	Dicofol 4E	F, N	Cyclamen mites; twospotted mites; do not make more than two applications per season. Do not apply if temperature exceeds 90° F. For cyclamen mites only, use 4 pints per acre in 2 to 3 thorough, high drenching sprays (400 gallons per acre) at 10 to 20 day intervals. Applicators must be in enclosed cabs or cockpits.
	Kelthane 50WSP	F, N	Broad mite; cyclamen mite; twospotted spider mite; applicators must be in enclosed cabs or cockpits. Do not make more than two applications per season. For cyclamen mites application rate is 3 to 4 lbs. per acre.
Endosulfan	Endosulfan 3EC	F, N	Cyclamen mites; do not make more than two applications per season. Do not exceed a maximum of 2 lbs. of a.i (2.66 qts) per acre per season. For multiple applications do not apply at intervals less than 35 days when fruit is present.
	Thiodan Emulsifiable Concentrate	F, N	For cyclamen mite: Use 4 qt. per acre in 400 gal. of water. Do not apply at intervals less than 35 days when fruit is present.
	Thionex 3EC Thionex 50W	F, N	Cyclamen mites; do not make more than three applications per year. Do not exceed a maximum of 3 lbs. of a.i. (4 qts/6 lbs.) per acre per year. Do not apply at intervals less than 35 days when fruit is present.
Etoxazole	Zeal Miticide	F, N	Twospotted spider mite; do not apply more than 3 oz. of Zeal per acre per season. Do not make more than one Zeal application per growing season.
Fenbutatin-oxide	Vendex 50WP	F, N	Twospotted spider mite; make no more than two applications per season. Apply no more than 4 pounds per acre per season.
Fenpropathrin	Danitol 2.4EC	F, N	Twospotted spider mite; Do not exceed more than two applications totalling 2-2/3 pts. (0.8 lbs. A.I.) per acre to the same planting in 12 consecutive months. Alternate with other insecticides or non-pyrethroid miticides if retreatment is needed in less than 30 days.
Hexythiazox	Savey 50 DF	F	Twospotted spider mite; do not make more than one application per year. Do not use in strawberry nurseries. Plant back: Do not plant rotational crops other than those on this label within 120 days of application.
Naled	Dibrom 8 Emulsive	F, N	Spider mites; do not apply more than 5 pts. per acre per season. Do not apply when temperature is over 90° F.

Table 13. Mite (Acari) (including spider mites, cyclamen mites and rust mites) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Neem oil	Trilogy	F, N	Spider mites; do not apply to wilted or otherwise stressed plants or newly transplanted crops prior to root establishment. Avoid tank mixes with captan, sulfur or other chemically similar products as unpredictable results or leaf burn may occur.
Potassium salts of fatty acids	Insecticidal Soap 49.52	F, G, N	Suppression; caution: Do not use on new transplants, newly rooted cuttings, or plants stressed by drought. Avoid application when leaf temperature exceeds 85°F.
	M-Pede	F, G, N	Twospotted mites; to achieve enhanced and residual control use in combination with other recommended products. Do not mix M-Pede with sulfur. Do not use within 3 days of a sulfur application. Application of excessive water volumes will increase potential for fruit injury by causing collection of spray at the bottom of fruit. Potential for plant injury increases when: Used on plants stressed by heat (>90°F), humidity, drought, more than 3 sequential applications are made at 7-day intervals, the pH of the final spray mixture is lowered below 8.0, tender new foliage is present, or insect, mite or disease pressure has already stressed plant foliage.
Propargite	Omite 30WS Omite CR	F, N	Twospotted spider mite; may be used on plants only when they will not bear fruit within 1 year of application; total number of sprays per year is two. Minimum spray interval is 21 days. Leaf damage has been observed when: 1) applied with other chemicals or spray adjuvants 2) temperatures on application date reach 75° F, or within a few days thereafter 3) rain falls on the application date or within a few days thereafter.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	If chemigation is used, apply only through sprinkler irrigation systems.
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6 Pyrenone Crop Spray	F, G, N	Clover mite
Pyrethrin, rotenone & associated resins	Pyrellin EC	F, G, N	Apply in intervals of 7 days or less.
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	

Table 13. Mite (Acari) (including spider mites, cyclamen mites and rust mites) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Refined petroleum distillate	JMS Stylet-Oil	F, G, N	Spray at no less than 400 psi using ceramic spray nozzels. Spray should be initiated as soon as plants emerge. Plants should be sprayed weekly or twice weekly depending on level of pest infestation. Do not spray: wet foliage, when freezing temperatures are anticipated within 48 hrs. of an oil application, when temperatures are above 90°F, when plants are under heat or moisture stress.
	Mit-E-Oil	F, N	Do not use from peak bloom through peak fruiting period. To minimize the danger of phytotoxicity do not apply when temperatures of 75° F or higher are expected for several days after application.
	Saf-T-Side Spray Oil	F, N	Do not use in combination with or immediately before or after spraying with fungicides such as captan, or any product containing sulfur. Do not use with carbaryl (Sevin). Do not use with any product whose label recommends the use of no oils. Do not use in combination with NPK foliar fertilizer applications.
	Ultra-Fine Oil	F, N	Do not tank mix with insecticide or miticide whose label indicates that it should not be used with oil. The following list of pesticides represents some of the compounds that should not be used with Ultra-Fine Oil, however this list is not exhaustive: captan (Captan), propargite (Omite), wettable sulfur or any other product containing sulfur. For fungicides not included in this listing consult the label of the specific fungicide formulation for compatibility information when used with oil.
Rosemary oil	Hexacide	F, N	Avoid application at blooming.
Rosemary oil & peppermint oil	Ecotrol EC	F, G, N	Twospotted spider mite
Sodium tetraborohydrate decahydrate	Prev-Am	F, N	It is recommended to apply with an air-assisted type sprayer for best results. Not recommended for application in mid-day sun as temporary leaf burn may occur during periods of drought when plants are subject to heat and moisture stress. Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am. See label for list of products that Prev-Av may be mixed with. If insect populations reach economic thresholds, frequency of applications can be as often as every 4 days until control is obtained.

Table 13. Mite (Acari) (including spider mites, cyclamen mites and rust mites) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Spiromesifen	Oberon 2 SC	F, N	Maximum allowed per 7-day interval is 16 fl.oz.(0.25 lb a.i.) per acre. Maximum allowed per crop season is 48 fl.oz. (0.75 lb. a.i.) per acre. Maximum number of applications per crop season is three.
Sulfur	Kumulus DF	F, N	Red spider mite
	Micronized Gold	F, G, N	Red spider mite; in greenhouse: broad mite, russet mite; rust mite; twospotted mite.
	Suffa 6F	F, N	Begin application at early leaf stage and repeat as necessary. Sulfur may injure strawberries under certain climatic conditions. During periods of high temperatures sulfur may burn foliage and fruit. Do not use during periods of excessively high temperatures. Do not use with oil or within 4 weeks of an oil application.
	Sulfur 6L	F, N	Red spider mite; twospotted spider mite
	Sulfur 90W	F, G, N	Red spider mite; in greenhouse: broad mite; begin application at early leaf stage and repeat as necessary. Sulfur may injure strawberries under certain climatic conditions. During periods of high temperatures sulfur may burn foliage and fruit. Do not use during periods of excessively high temperatures. Do not use with oil or within 4 weeks of an oil application.
	Thiolux Jet Dry Flowable Micronized Sulfur	F, N	Red spider mite; begin application at early leaf stage and repeat with or without pesticides. Sulfur may injure strawberries under certain climatic conditions. Do not use on sulfur sensitive varieties. During periods of high temperatures sulfur may burn foliage and fruit. Do not use during periods of excessively high temperatures. Do not use with oil or within 2 weeks of an oil application.
<p>Footnotes:</p> <p>¹ "F" indicates field production, "G" indicates greenhouse production. "N" indicates nursery production.</p> <p>² Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit numbers of patterns of applications, provide phytotoxicity precautions, etc.</p> <p>³ Nursery use must be on plants that will not bear fruit within 1 year of application.</p>			

Table 14. Mole cricket (Orthoptera: Gryllotalpidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<i>Beauveria bassiana</i> strain GHA	Mycotrol O	F, G, N	Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.
Carbaryl	Cutworm & Cricket Bait	F, N	
Diazinon	Diazinon AG 500 Diazinon Insecticide	F, N	Do not apply more than 4 lbs. a.i. per acre per season.
	Diazinon AG600 WBC	F, N	Make a maximum of one foliar application per crop and a maximum of one soil application per crop.
<i>Heterorhabditis indica</i>	Symbion-South	F, G, N	Larval, pupal and some adult stages of pests which spend part of their life cycle in or on the soil or cryptically inside plant tissues. May be applied through pressurized irrigation systems (not soaker hoses). Do not inject into drip irrigation systems. Do not apply within 21 days of a nematicide application.
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 15. Pamera (*Pachbrachius* spp. (Hemiptera: Lygaeidae)) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	True bugs; do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatrol EC	F, N	True bugs
	Ecozin 3% EC	F, N	Bugs; will not control adult insects.
	Ornazin 3% EC	F, G, N	Bugs

Table 15. Pamera (*Pachbrachius* spp. (Hemiptera: Lygaeidae)) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<i>Beauveria bassiana</i> strain GHA	BotaniGard ES	F, G, N	Plant butgs such as chinch bugs; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. Application frequency: There is no limit on the number of applications or total amount which can be applied in one season. Do not apply this product through any type of irrigation system.
	Mycotrol O	F, G, N	Seed bugs; Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	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.
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 16. Plant (Lygus) bugs (Hemiptera: Miridae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatrol EC	F, N	
	Neemix 4.5	F, G, N	

Table 16. Plant (Lygus) bugs (Hemiptera: Miridae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
<i>Beauveria bassiana</i> Strain GHA	Botanigard ES	F, G, N	BotaniGard ES is compatible in tank mix with some fungicides; contact dealer for recommendations. Do not apply through a thermal pulse fogger. Do not apply this product through any type of irrigation system. Application frequency: There is no limit on the number of applications or total amount which can be applied in one season.
	Mycotrol O	F, G, N	Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.
Bifenthrin	Brigade WSB	F, N	Do not apply more than 0.5 lbs. a.i. per acre per season. Plant back: Plants for which bifenthrin tolerances exist may be rotated at any time. All other crops may be rotated 30 days following the final application of bifenthrin.
Carbaryl	Carbaryl 4L Carbaryl 80S Sevin Brand 4F Sevin Brand 80S Sevin Brand XLR Plus	F, N	Tarnished plant bug; do not apply more than a total of 10 lbs a.i. per acre per crop. Repeat applications as necessary up to a total of five times but not more often than once every 7 days. Plant back: Do not plant rotational food and feed crops not listed on this or other carbaryl labels in carbaryl treated soil.
Endosulfan	Endosulfan 3EC Thionex 3EC Thionex 50W	F, N	Tarnished plant bug; do not make more than three applications per year. Do not exceed a maximum of 3 lbs. of a.i. per acre per year. Do not reapply within 15 days or more than twice during a 35-day period when fruit is present.
Fenpropathrin	Danitol 2.4EC	F, N	Lygus, tarnished plant bug; do not exceed more than two applications totalling 2-2/3 pts. (0.8 lbs. A.I.) per acre to the same planting in 12 consecutive months.
Malathion	Gowan Malathion 8F Malathion 5EC Drexel Malathion 5EC	F, N	

Table 16. Plant (Lygus) bugs (Hemiptera: Miridae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Naled	Dibrom 8 Emulsive	F, N	Do not apply more than 5 pts. per acre per season. Do not apply when temperature is over 90° F.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	If chemigation is used, apply only through sprinkler irrigation systems.
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6 Pyrenone Crop Spray	F, G, N	
Refined Petroleum Distillate	Ultra-Fine Oil	F, N	Do not tank mix with insecticide or miticide whose label indicates that it should not be used with oil. The following list of pesticides represents some of the compounds that should not be used with Ultra-Fine Oil (paraffinic oil), however this list is not exhaustive: captan (Captan), propargite (Omite), wettable sulfur or any other product containing sulfur. For fungicides not included in this listing consult the label of the specific fungicide formulation for compatibility information when used with oil.
Sodium tetraborohydrate decahydrate	Prev-Am	F, N	It is recommended to apply with an air-assisted type sprayer for best results. Not recommended for application in mid-day sun as temporary leaf burn may occur during periods of drought when plants are subject to heat and moisture stress. Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am. See label for list of products that Prev-Am may be mixed with. If insect populations reach economic thresholds, frequency of applications can be as often as every 4 days until control is obtained.
Thiamethoxam	Actata	F	Lygus bug suppression; do not exceed a total of 12.0 oz. of Actara (0.188 lb. a.i.) per acre per growing season. Allow at least 10 days between applications. Plant back: Treated areas may be replanted immediately to any labeled crop, corn, cucurbit & legume vegetables, or some other named crops. For all others a 120 day plant back interval is required.
<p>Footnotes:</p> <p>¹ "F" indicates field production, "G" indicates greenhouse production. "N" indicates nursery production.</p> <p>² Notes are taken from product labels and restrict use to the condition indicated (suppression, beet armyworm, exposed thrips, etc.), limit numbers of patterns of applications, provide phytotoxicity precautions, etc.</p>			

Table 17. Slug & Snail (Mollusca: Gastropoda: Pulmonata: Limacidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Iron phosphate	Sluggo-AG	F, G, N	
Metaldehyde	Deadline Bullets, M-PS	F, N	
	Durham Metaldehyde Granules 3.5, 7.5	F, N	
	OR-CAL Slug & Snail Bait	F, N	
	Slug-Fest	F, N	
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 18. Spiders (widow spiders: Balck widow (*Latrodectus mactans* (Fabricius) and other widow spiders) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Bifenthrin	Brigade WSB ³	F, N	
Malathion	Ortho Malathion Plus Insect Spray ³	F, N	Spiders; spot treatment to areas such as irrigation valves and other equipment; apply as a course spray; outdoors only.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	spiders
Pyrethrin & piperonyl butoxide	EverGreen EC 60-6	F, G, N	spiders
	Pyrenone Crop Spray	F, G, N	
Footnotes: 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 numbers of 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.			

Table 19. Thrips (Thysanoptera: Thripidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, G, N	
	Ecozin 3% EC	F, N	Will not control adult insects.
	Neemix 4.5	F, G, N	<i>Thrips palmi</i> ; effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Ornazin 3% EC	F, G, N	Do not exceed 22.5 oz. per application.
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.
<i>Beauveria bassiana</i> Strain GHA	Botanigard 22WP Botanigard ES	F, G, N	Contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. Application frequency: There is no limit on the number of applications or total amount which can be applied in one season. Do not apply this product through any type of irrigation system.
	Mycotrol O	F, G, N	Western flower thrips, greenhouse thrips, onion thrips; <i>Thrips palmi</i> ; Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	
Naled	Dibrom 8 Emulsive	F, N	Do not apply more than 5 pts. per acre per season. Do not apply when temperature is over 90°F.

Table 19. Thrips (Thysanoptera: Thripidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Neem oil	Triology	F, N	Suppression; do not apply to wilted or otherwise stressed plants or newly transplanted crops prior to root establishment. Avoid tank mixes with captan, sulfur or other chemically similar products as unpredictable results or leaf burn may occur. Exercise care in timing applications to early morning / late evening to minimize potential for leaf burn.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
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	
Pyrethrin, rotenone & associated resins	Pyrellin EC	F, G, N	
Refined petroleum distillate	Ultra-Fine Oil	F, N	Do not tank mix with insecticide or miticide whose label indicates that it should not be used with oil. The following list of pesticides represents some of the compounds that should not be used with Ultra-Fine Oil (paraffinic oil), however this list is not exhaustive: captan (Captan), propargite (Omite), wettable sulfur or any other product containing sulfur. For fungicides not included in this listing consult the label of the specific fungicide formulation for compatibility information when used with oil.
Sodium tetraborohydrate decahydrate	Prev-Am	F, N	It is recommended to apply with an air-assisted type sprayer for best results. Not recommended for application in mid-day sun as temporary leaf burn may occur during periods of drought when plants are subject to heat and moisture stress. Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am. See label for list of products that Prev-Am may be mixed with. If insect populations reach economic thresholds, frequency of applications can be as often as every 4 days until control is obtained.

Table 19. Thrips (Thysanoptera: Thripidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Spinosad	Entrust	F, N	Do not apply more than a total of 9 oz. of Entrust (0.45 lb. a.i. of spinosad) per acre per crop. Resistance management: Rotate to a different class of insect control products after two successive applications of Entrust. Do not make more than five applications per year.
	SpinTor 2SC	F, N	Do not apply more than a total of 29 fl. oz. (0.45 lb. A.I.) per acre per crop. Resistance Management: Rotate to a different class of insect control product after two successive applications of SpinTor 2SC. Do not make more than five applications per year.
Footnotes: 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 numbers of patterns of applications, provide phytotoxicity precautions, etc.			

Table 20. Whitefly (Homoptera: Aleyrodidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Azadirachtin	Aza-Direct	F, G, N	Do not use less than 5 oz. per acre of Aza-Direct alone. When tank mixed with other insecticidal products, the rate of Aza-Direct may be reduced by half, but not less than 4 oz. per acre.
	Azatin XL	F, G, N	Effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Azatrol EC	F, N	
	Ecozin 3% EC	F, N	Will not control adult insects.
	Neemix 4.5	F, G, N	Greenhouse whitefly; silverleaf whitefly; sweetpotato whitefly; effective on all larval stages and pupae. Reduces damage by repelling and deterring feeding of all stages of insect.
	Ornazin 3% EC	F, G, N	
<i>Beauveria bassiana</i> ATCC 74040	Naturalis L	F, G, N	Repeat at 3 to 5 day intervals as needed. At least three to five applications may be necessary before adequate control is reached. Do not tank mix with fungicides. Wait a minimum of 48 hours after application before applying fungicides.

Table 20. Whitefly (Homoptera: Aleyrodidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
<p><i>Beauveria bassiana</i> Strain GHA</p>	<p>Botanigard 22WP Botanigard ES</p>	<p>F, G, N</p>	<p>Contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. Application frequency: There is no limit on the number of applications or total amount which can be applied in one season. Do not apply this product through any type of irrigation system.</p>
	<p>Mycotrol O</p>	<p>F, G, N</p>	<p>Sweet potato whitefly, citrus whitefly, banded-winged whitefly, greenhouse whitefly; Mycotrol O is not compatible in tank mix with fungicides; contact dealer for recommendations on use with fungicides. Do not apply through a thermal pulse fogger. If chemigation is used, apply only through overhead sprinkler systems or drip (trickle and microjet) systems. Do not use in systems having smaller than 40-mesh screens.</p>
<p>Endosulfan</p>	<p>Endosulfan 3EC</p>	<p>F, N</p>	<p>Do not make more than two applications per season. Do not exceed a maximum of 2 lbs. (2.66 qts) of a.i. per acre per season. Do not reapply within 15 days or more than twice during a 35-day period when fruit is present.</p>
	<p>Thionex 3EC Thionex 50W</p>	<p>F, N</p>	<p>Do not make more than three applications per year. Do not exceed a maximum of 3 lbs. of a.i. per acre per year. Do not reapply within 15 days or more than twice during a 35-day period when fruit is present.</p>
<p>Fenprothrin</p>	<p>Danitol 2.4EC</p>	<p>F, N</p>	<p>Greenhouse whitefly; strawberry whitefly; silverleaf whitefly; sweetpotato whitefly; 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. Alternate with other insecticides or non-pyrethroid miticides if retreatment is needed in less than 30 days.</p>

Table 20. Whitefly (Homoptera: Aleyrodidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Imidacloprid	Admire 2F Couraze 2F	F, N	Maximum allowed per crop season: 32.0 fl oz./acre (0.5 lb. ai/acre); in order to maintain susceptibility to this class of chemistry it is recommended that for each crop season only a single soil application be made and foliar applications of products from this same class not be made following a long residual, soil application of this or other neonicotinoid products. Plant back: Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed.
	Alias 2F	F, N	Maximum Alias 2F allowed per crop season is 32.0 fl. oz. per acre (0.5 lb a.i./a). Plant back: Treated areas may be replanted with any crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed;
	Couraze 1.6F Pasada 1.6F Provado 1.6F	F, N	Do not apply during bloom, or within 10 days prior to bloom or when bees are actively foraging. Minimum interval between applications: 5 days. Maximum allowed per crop season: 0.14 lb. ai/a. Resistance management: Foliar applications of this or other group 4A products from the neonicotinoid chemical class should not be used on crops previously treated with a long-residual soil-applied product from the neonicotinoid class. Regardless of the formulation or type of application (soil or foliar), do not apply more than 0.5 lb. a.i. of Admire, Alias, or Pasada per acre per season. Plant back: Treated areas may be replanted with a crop specified on an imidacloprid label, or any crop for which a tolerance exists for the active ingredient, as soon as practical following the last application. For crops not listed on an imidacloprid label, or for crops for which no tolerances for the active ingredient have been established, a 12-month plant back interval should be observed.

Table 20. Whitefly (Homoptera: Aleyrodidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Malathion	Gowan Malathion 8F Malathion 5EC	F, N	
Potassium salts of fatty acids	AllPro Insecticidal Soap 40%	F, G, N	Application of excessive water volumes will increase potential for fruit injury by causing collection of spray at the bottom of fruit.
	M-Pede	F, G, N	Do not mix M-Pede with sulfur. Do not use within 3 days of a sulfur application. Application of excessive water volumes will increase potential for fruit injury by causing collection of spray at the bottom of fruit. Potential for plant injury increases when: Used on plants stressed by heat (>90°F), humidity, drought, more than 3 sequential applications are made at 7-day intervals, the pH of the final spray mixtrue is lowered below 8.0, tender new foliage is present, or insect, mite or disease pressure has already stressed plant foliage. To achieve enhanced and residual control use in combination with other recommended products.
Pyrethrin	PyGanic Crop Protection EC 1.4 PyGanic EC 5.0	F, G, N	
Pyrethrin & piperonyl butoxide	EverGreen EC 60.6 Pyrenone Crop Spray Pyreth-It	F, G, N	
Pyrethrin, piperonyl butoxide & silicon dioxide	Diatect II Multipurpose	F, G, N	
Pyriproxyfen	Esteem 0.86 EC	F, G, N	Banded wing whitefly, greenhouse whitefly, silverleaf whitefly, sweetpotato whitefly; only whole fields should be treated. Do not make more than two applications per growing season. Do not exceed 20 fl. oz. of Esteem 0.86 EC per acre per season. Do not apply earlier than 30 days after the last Esteem treatment. Plant back: Do not plant any crop other than those with registered pyriproxyfen uses in treated areas sooner than 30 days after last application. Do not apply more than 0.134 lb. of pyriproxyfen per acre per season regardless of formulation.

Table 20. Whitefly (Homoptera: Aleyrodidae) control measures available for commercial strawberry production in Florida.

Common Name	Trade Name/ Formulation	Production Site ¹	Notes from Label ²
Refined petroleum distillate	Saf-T-Side Spray Oil	F, N	Do not use in combination with or immediately before or after spraying with fungicides such as captan, or any product containing sulfur. Do not use with carbaryl (Sevin) or dimethoate. Do not use with any product whose label recommends the use of no oils. Do not use in combination with NPK foliar fertilizer applications.
	Ultra-Fine Oil	F, N	Do not tank mix with insecticide or miticide whose label indicates that it should not be used with oil. The following list of pesticides represents some of the compounds that should not be used with Ultra-Fine Oil (paraffinic oil), however this list is not exhaustive: captan (Captan), propargite (Omite), wettable sulfur or any other product containing sulfur. For fungicides not included in this listing consult the label of the specific fungicide formulation for compatibility information when used with oil.
Rosemary oil	Hexacide	F, N	Avoid application at blooming.
Rosemary oil & peppermint oil	Ecotrol EC	F, G, N	
Sodium tetraborohydrate decahydrate	Prev-Am	F, N	It is recommended to apply with an air-assisted type sprayer for best results. Not recommended for application in mid-day sun as temporary leaf burn may occur during periods of drought when plants are subject to heat and moisture stress. Do not mix with chemicals containing sulfur or oils. Do not add adjuvants to Prev-Am. See label for list of products that Prev-Am may be mixed with. If insect populations reach economic thresholds, frequency of applications can be as often as every 4 days until control is obtained.
Thiamethoxam	Actara	F	Do not exceed a total of 12.0 oz. of Actara (0.188 lb. a.i.) per acre growing season. Allow at least 10 days between applications. Plant back: Treated areas may be replanted immediately to any labeled crop, corn, cucurbit & legume vegetables, or some other named crops. For all others a 120 day plant back interval is required.

Footnotes:

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 numbers of patterns of applications, provide phytotoxicity precautions, etc.