

## Chapter 16. Strawberry Production

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### Botany and Planting

Strawberry - *Fragaria x ananassa*, Rosaceae.

**Table 16.1.** Planting information for strawberries.

Planting dates	
North Florida	Sept 15 - Oct 15
Central Florida	Sept 20 - Oct 20
South Florida	Oct 1 - Dec 1
Planting information (2-row beds)	
Distance between beds (in)	48 - 60
Distance between plants (in)	12-16
Distance between rows (in)	12 - 14
Days to first ripe fruit	30 - 60
Plant populations (acre)	16,000-22,000

### Cultivars

#### 1. MAIN CULTIVARS

**Florida Radiance.** Released in 2008. The most widely grown cultivar in central Florida. Large to medium size, uniform, conic fruit with glossy appearance; glossy-red external color and medium red internal color; moderately acidic but balanced flavor; moderately firm with good shipping quality; flexible skin that is moderately resistant to rain damage. Low to medium plant vigor with very open canopy; very long fruit stems giving excellent picking efficiency. Moderately resistant to anthracnose fruit rot and Colletotrichum crown rot; moderately susceptible to angular leaf spot, with symptoms particularly noticeable on the calyx; susceptible to Botrytis fruit rot; highly susceptible to Phytophthora root rot. Metalaxyl, the active ingredient in Ridomil Gold®, is highly effective against Phytophthora and should be injected through the drip tape as soon as plants are established. Two applications may be needed to treat an infected crop. Products containing potassium phosphite or potassium salts of phosphorus acid and the related aluminum derivatives are alternatives that should generally be applied as foliar sprays, although some are also labeled for drip application. With earlier planting dates, exposure to high temperatures during the establishment period can result in the development of elongated or “bullet” fruit in the early harvest until mid-Dec. This problem will be reduced with planting dates closer to the middle of October.

**Sweet Sensation® ‘Florida127’.** Released in 2013. Very large fruit size, moderately uniform conic to broad-conic fruit, bright-red with lighter color than other cultivars. During cool weather a longer interval between harvests compared to other cultivars is usually necessary to allow optimum color development. Exceptional flavor throughout season; 1.0 to 1.5 degree Brix higher and slightly lower acidity than ‘Florida Radiance’; susceptible to rain damage. The plant is vigorous, which may be an advantage in north

Florida but in central Florida may require reduced nutrient applications early in the season to maintain a small plant size. In central Florida, early and total yields are slightly higher than for ‘Florida Radiance’ due to a more robust plant. Recommended planting dates in central Florida are Oct 5-15. Resistant to anthracnose fruit rot and Colletotrichum crown rot; moderately resistant to charcoal rot (caused by *Macrophomina phaseolina*); moderately susceptible to angular leaf spot; susceptible to Botrytis fruit rot and powdery mildew (caused by *Podosphaera aphanis*); highly susceptible to Phytophthora root rot; take precautions against Phytophthora as recommended for ‘Florida Radiance’.

**‘Florida Beauty’.** Released in 2016. Medium fruit size, excellent conic shape and even red color; exceptional flavor throughout season, second only to Sweet Sensation® ‘Florida127’; excellent resistance to rain damage. A day-neutral cultivar with a small plant and very early onset of flowering; it is recommended to trim bloom after establishment and a second time when trimming leaves, a practice that produces larger fruit size and quality throughout the season. In central Florida, early and total yields are similar to ‘Florida Radiance’. Recommended planting dates in central Florida are Sept 25 - Oct 5. Even earlier planting dates may help to produce a vigorous plant in North Florida. In all regions, high early-season N rates similar to ‘Florida Radiance’ are recommended. Susceptible to anthracnose fruit rot and Colletotrichum crown rot; susceptible to Botrytis fruit rot and powdery mildew; moderately resistant to Phytophthora root rot.

**‘Florida Brilliance’.** Released in 2017. Large fruit size, uniform conic shape with no elongated fruit in the early season; very firm with excellent shelf-life; externally very glossy red; medium red internally; moderately resistant to rain damage. Flavor similar to or better than ‘Florida Radiance’. The plant is robust but not overly-vigorous, upright with long stems allowing ease of harvest; does not require high N applications in early season as for ‘Florida Radiance’ and ‘Florida Beauty’. In central Florida, early yields are higher than for ‘Florida Radiance’. Recommended planting dates in central Florida are Oct 1-15. Resistant to anthracnose fruit rot and Colletotrichum crown rot; moderately susceptible to angular leaf spot; moderately susceptible to Botrytis fruit rot; moderately resistant to powdery mildew and charcoal rot; susceptible to Phytophthora root rot; take precautions against Phytophthora as recommended for ‘Florida Radiance’.

#### 2. MINOR CULTIVARS

**Strawberry Festival.** Released in 2000. Due to later onset of production and smaller fruit size compared to the main varieties ‘Strawberry Festival’ has been largely phased out of production in Hillsborough County. Yet it is still a favorite in other regions for its tough plant and firm, durable fruit with excellent red color inside and out. Focus disease management on Colletotrichum fungi.

**Winterstar™ ‘FL 05-107’.** Released in 2011. Winterstar™ has a very early onset of fruit production, but fruit size can be more variable than for the main varieties. It has a compact plant that is easy to manage. Focus disease management on Botrytis fruit rot and Phytophthora root rot.

Table 16.2. Herbicides approved for managing weeds in strawberry.

Labels change frequently. Be sure to read a current product label before applying any chemical.			
Active ingredient lb. a.i./A	Trade name product/A	MOA code	Weeds controlled / remarks
<b>*** PRETRANSPLANT ***</b>			
<b>Acifluorfen up to 0.375</b>	(Ultra Blazer) 1.5 pt.	14	Broadleaves. May be applied under the plastic mulch or with a shielded or hooded spray directed to row middles. 60 day PHI.
<b>Carfentrazone up to 0.031</b>	(Aim) 2.0 EC up to 2 fl. oz.	14	Broadleaves. Apply as a pre-plant burndown for emerged broadleaves upto 4 inches tall or rosettes less than 3 inches across. Good coverage is essential. A nonionic surfactant, methylated seed oil, or crop oil concentrate is recommended. No pre-transplant interval.
<b>Flumioxazin 0.1</b>	(Chateau) 51 WDG 3 oz.	14	Broadleaves. May be applied under the plastic mulch or with a shielded or hooded spray directed to row middles before weed emergence. 30 day pre-transplant interval If applied under the plastic mulch. Do not apply after fruit set.
<b>Glyphosate</b>	(various formulations) consult labels	9	Emerged broadleaves and grasses. Apply as a preplant burndown. Consult label for individual product directions.
<b>Napropamide 4</b>	(Devrinol) 2-XT 1-2 gallons (Devrinol DF XT) 50 DF 4-8 lb.	15	Annual broadleaves and grasses. Apply under the plastic and in the row middles. Mechanically incorporated in the row middle to a 1-2 in. depth within 24 hrs of application. When applied under plastic, incorporate mechanically or with irrigation. Do not apply between bloom and harvest.
<b>Oxyfluorfen 0.25 - 0.5</b>	(Galigan H <sub>2</sub> O, GoalTender) 4 EC  0.5 - 1.0 pt. (Collide, Goal 2XL) 2 EC 1 - 2 pt.	14	Broadleaves. Apply pre-transplant just prior to installation of plastic mulch. 30 day pre-transplant interval. Mulch may be applied any time during the 30-day interval.
<b>Pelargonic acid</b>	(Scythe) 4.2 EC 3 - 10% v/v		Emerged broadleaves and grasses. Apply as a preplant burndown treatment or post transplant with shielded or hooded sprayers. Product is a contact, nonselective, foliar applied herbicide with no residual control.
<b>Pendimethalin 0.72</b>	(Prowl H <sub>2</sub> O) 3.8 1.5 pt.	3	Broadleaves and grasses in the row middles. Do not apply under the plastic. In systems that use irrigation at planting, delay application until after irrigation regime. 35 day PHI.
<b>Sulfentrazone 0.125</b>	(Spartan FL) 4F 4 oz.	14	Broadleaves, grasses and nutsedge. Apply under the plastic mulch or in row middles. Do not use on soils with less than 1% organic matter.
<b>Terbacil 0.2</b>	(Sinbar WDG) 80 WDG 4 oz.	3	Broadleaves, grasses and some sedges. One application per crop of 4 oz./A after bedding but prior to transplanting. Rainfall or irrigation required. Do not apply to soils with less than 0.5% organic matter. 110 day PHI.
<b>*** POSTTRANSPLANT ***</b>			
<b>Acifluorfen up to 0.375</b>	(Ultra Blazer) 1.5 pt.	14	Broadleaves. Apply directed to the row middles with a shielded or hooded sprayer. Do not allow to contact strawberry plants. 60 day PHI.
<b>Carfentrazone up to 0.031</b>	(Aim) 2.0 EC up to 2 fl. oz.	14	Broadleaves. Apply with hooded applicator directed to the row middles for control of emerged broadleaves upto 4 inches tall or rosettes less than 3 inches across. Good coverage is essential. A nonionic surfactant, methylated seed oil, or crop oil concentrate is recommended. 0 day PHI
<b>Clopyralid 0.125 - 0.25</b>	(Stinger) 3 EC 0.33 - 0.66 pt.	4	Broadleaves. Do not exceed 2/3 pt./A per year. Do not include a surfactant. 7 day PHI.
<b>Clethodim 0.09 - 0.13</b>	(Arrow, Select) 2 EC 6 - 8 fl. oz. (Select Max) 1 EC 9 - 16 fl. oz.	1	Perennial and annual grasses. Use higher rates under heavy grass pressure or larger weeds. Surfactant or crop oil concentrate recommended. Consult label. 4 day PHI.
<b>Fluazifop-P-butyl 0.25</b>	Fusilade DX 16 fl. Oz	1	Supplemental label. Emerged annual and perennial grasses. Most effective on young, actively growing grasses. Do not apply more than 1 application per year. 14 day PHI.
<b>Glyphosate</b>	(various formulations) consult labels	9	Emerged broadleaves, grasses and nutsedge. Apply directed to the row middles. Injury has been observed from translocation from daughter plants in the row middle to the mother plants. 14 day PHI. Spot treatment has 7 day PHI.
<b>Pelargonic acid</b>	(Scythe) 4.2 EC 3 - 10% v/v		Emerged broadleaves and grasses. Apply as a preplant burndown treatment or post transplant with shielded or hooded sprayers. Product is a contact, nonselective, foliar applied herbicide with no residual control.
<b>Paraquat 0.5</b>	(Gramoxone) 2 SL 2 pt. (Firestorm) 3 SL 1.3 pt.	22	Emerged broadleaves and grasses. Apply as a directed spray to row middles only. Do not allow spray to contact plants. Do not apply more than 3 times per season. Nonionic surfactant recommended. 21 day PHI.
<b>Sethoxydim 0.28 - 0.47</b>	(Poast) 1.5 EC 1.5 - 2.5 pt.	1	Emerged grasses. A maximum of 2.5 pt./A applied in one season. Unsatisfactory results may occur if applied to grasses under stress. Crop oil concentrate recommended. 7 day PHI.
<b>*** POSTHARVEST ***</b>			
<b>Paraquat 0.49</b>	(Gramoxone) 2 SL 1.95 pt.	22	Broadcast spray over the top of the plants after the last harvest. Thorough coverage is required to ensure maximum herbicide burndown. Do not use treated crop for human or animal consumption. Nonionic surfactant recommended.

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry.

Labels change frequently. Be sure to read a current product label before applying any chemical. Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
Ants	7A	<b>Extinguish fire ant bait</b> (S - methoprene)	See label		4	0	
	7D	<b>Esteem Ant Bait</b> (pyriproxyfen)	1.5-2.0 lbs		12	1	
Aphids	1B	<b>Diazinon 50W, AG600 WBC</b>	<b>50W:</b> 1-2 lbs; <b>AG600 WBC:</b> 12.75-25.5 fl oz	Make a maximum of one foliar application per crop and one soil application per crop.	3 days	5	
	1B	<b>Dibrom 8-E*</b> (Naled)	1 pint	Do not apply more than 5 pints per season.	48	1	
	1B	<b>Malathion 5EC , 8F</b> (malathion)	<b>5EC:</b> 1.5-3.2 pints; <b>8F:</b> 1.5-2.0 pints	<b>8F:</b> Do not apply more than 8 pints/A per year	12	3	Do not make more than 4 applications per year. Minimum retreatment interval is 7 days.
	3A + 6	<b>Athena</b> (bifenthrin & avermectin B1)	7.0-17.0 fl oz	Do not apply more 68 fl oz. in a growing season after transplanting.	12	3	Make 2 applications 7-10 days apart. If further applications are needed wait 21 days after the second application before repeating sequence of two applications. Do not make more than 4 applications per growing season. Do not make more than 2 applications per season. Do not apply more than once every 7 days.
	3A	<b>Azera</b> (azadirachtin & pyrethrins)	See label		4	0	
	3A	<b>*Brigade WSB</b> (bifenthrin)	6.4-32.0 oz	Do not apply more than 80 oz./A per season.	12	0	
	3A + 4A	<b>*Brigadier</b> (bifenthrin & imidacloprid)	5.1-6.14 fl oz	Maximum allowed is 17.92 fl oz/A per season.	12	7	Do not make applications less than 5 days apart.
	3A	<b>Evergreen EC 60-6</b> (pyrethrins & piperonyl butoxide)	2-16 fl oz		12	0	
	3A	<b>PyGanic EC 5.0</b> (pyrethrins)	See label		12	0	
	4A	<b>Actara</b> (thiamethoxam)	1.5-4.0 oz	Do not exceed a total of 12 oz/Acre (0.188 lb ai/A) of actara or 0.188 lb ai of thiamethoxam containing products per acre per growing season.	12	3	Minimum interval between applications is 10 days. Do not use Actara in nurseries, greenhouses, plant propagation houses, or on any plants grown for use as transplants. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
	4A	<b>Admire Pro</b> (imidacloprid)	soil - 10.5-14 fl oz foliar - 1.3 fl oz	Do not apply more than 14.0 fl oz /A for soil and 3.9 fl oz/A for foliar applications per season.	12	soil - 14 foliar - 5	Soil applications may be made as chemigation, as a plant hole treatment or as a band spray over-the-row followed by overhead irrigation. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>70 WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	4A	<b>Platinum 75 SG</b> (thiamethoxam)	1.7-4.01 oz	Do not exceed 4.01 oz./A per growing season.	12	50	
4A + 28	<b>Voliam Flexi</b> (thiamethoxam & chlorantraniliprole)	2-5 oz	Do not exceed 15.0 oz/A per growing season.	12	3	Application restrictions exist for this product because of the risk to bees and othe insect pollinators. Follow application restrictions found in the directions for use to protect pollinators.	
4D	<b>Sivanto 200 SL</b> (flupyradifurone)	7-14 fl oz	Maximum allowed per year is 28.0 fl oz/A	4	0	10 day minimum interval between applications.	

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

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Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) <i>*Restricted</i>	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	29	<b>Beleaf 50 SG</b> (flonicamid)	2.8 oz	Do not apply more than 8.4 oz./A Beleaf 50 SG per year.	12	0	Do not apply more than 3 applications per year. Allow a minimum of 7 days between applications.
	-	<b>Botanigard ES</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.
	-	<b>Aza-Direct</b> (azadirachtin)	See label; 1-2 pints for most pests and crop conditions		4	0	
	-	<b>Grandevo</b> ( <i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lbs		4	0	
	-	<b>M-Pede</b> (potassium salts of fatty acids)	See label		12	0	
	-	<b>Mycotrol ESO</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.
	-	<b>Neemix 4.5% EC</b> (azadirachtin)	4-16 fl oz		12	0	
	-	<b>PFR-97 20%WDG</b> ( <i>Isaria fumosoroseus</i> Apopka strain 97)	1-2 lbs		4	0	
	-	<b>SuffOil-X</b> (unsulfonated residue of petroleum oil)	1-2 gallons		4	0	OMRI listed.
	-	<b>Trilogy</b> (neem oil)	0.5-2%		4	0	OMRI listed. Avoid tank mixes with captan, sulfur or other chemically similar products
<b>Armyworms (see also caterpillars)</b>	1A	<b>Carbaryl 4 L</b> (carbaryl)	1-2 quarts	Do not apply more than a total of 10 quarts/A per crop per year.	12	7	Bee restriction: do not apply to target crops in bloom.
	1A	<b>Sevin 4F, 80 Solupak</b> (carbaryl)	<b>4F:</b> 1-2 quarts; <b>80 Solupak:</b> 1.25-2.5 lbs	<b>4F:</b> Do not apply more than a total of 10 quarts/A per crop per year.; <b>80 Solupak:</b> Do not apply more than a total of 12.5 quarts/A per crop per year.	12	7	
	3A + 6	<b>Athena</b> (bifenthrin & avermectin B1)	7.0-17.0 fl oz	Do not apply more 68 fl oz. in a growing season after transplanting.	12	3	Make 2 applications 7-10 days apart. If further applications are needed wait 21 days after the second application before repeating sequence of two applications. Do not make more than 4 applications per growing season. Do not make more than 2 applications per season. Do not apply more than once every 7 days.
	3A	<b>Azera</b> (azadirachtin & pyrethrins)	See label		4	0	
	3A	<b>*Brigade WSB</b> (bifenthrin)	6.4-32.0 oz	Do not apply more than 80 oz./A per season.	12	0	
	3A + 4A	<b>*Brigadier</b> (bifenthrin & imidacloprid)	5.1-6.14 fl oz	Maximum allowed is 17.92 fl oz/A per season.	12	7	Do not make applications less than 5 days apart.
	3A	<b>*Danitol 2.4 EC</b> (fenpropathrin)	10.67 - 21.33 fl oz	Do not apply more than 42.67 fl oz/A per year.	24	2	Do not apply more than twice a year to the same planting. May be tank mixed with Dipel DF for armyworm control.
	3A	<b>Evergreen EC 60-6</b> (pyrethrins & piperonyl butoxide)	2-16 fl oz		12	0	
	3A	<b>PyGanic EC 5.0</b> (pyrethrins)	See label		12	0	

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

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Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>WP:</b> 0.8-3.0 oz	<b>70 30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	4A + 28	<b>Voliam Flexi</b> (thiamethoxam & chlorantraniliprole)	2-5 oz	Do not exceed 15.0 oz/A per growing season.	12	3	Application restrictions exist for this product because of the risk to bees and other insect pollinators. Follow application restrictions found in the directions for use to protect pollinators.
	5	<b>Entrust</b> (spinosad)	1.25-1.5 oz	Do not apply more than 9 oz/A per crop.	4	1	OMRI listed. Do not make applications less than 5 days apart except for thrips.
	5	<b>Radiant SC</b> (spinetoram)	6-10 fl oz	Do not apply more than a total of 39 fl oz/A per year.	4	1	
	11A	<b>Agree WG</b> ( <i>Bacillus thuringiensis</i> subspecies strain GC-91) <i>aizawai</i>	0.5-2.0 lbs		4	0	
	11A	<b>Biobit HP</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.5-2.0 lb		4	0	
	11A	<b>Deliver</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.25-1.5 lbs		4	0	
	11A	<b>DiPel DF</b> ( <i>Bacillus thuringiensis</i> <i>kurstaki</i> )	0.5-2.0 lbs		4	0	For armyworm and cutworm control, use the higher rate.
	11A	<b>Javelin WG</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.25-1.5 lbs		4	0	
	11A	<b>Xentari</b> ( <i>Bacillus thuringiensis</i> subspecies <i>aizawai</i> )	0.5-2.0 lbs		4	0	
	15	<b>Rimon 0.83EC</b> (novaluron)	9-12 fl oz	Do not apply more than 36 oz./A per season.	12	1	7 day minimum interval between applications.
	16 + 28	<b>Vetiva</b> (buprofezin & flubendiamide)	12.0-18.5 fl oz	Do not apply more than 37.0 fl oz/A per crop cycle.	12	3	Do not make more than 2 applications per crop cycle.
	18	<b>Intrepid 2F</b> (methoxyfenozide)	6-12 fl oz	Do not apply more than 64 fl oz/A per year.	4	3	
	28	<b>Belt SC</b> (flubendiamide)	2.0-2.4 fl oz	Do not apply more than 7.2 fl oz/A per crop season.	12	8	Do not apply more than 2.4 fl oz per 3 day interval.
	28	<b>Coragen</b> (chlorantraniliprole)	3.5-7.5 fl oz	Do not apply more than 15.4 fl oz/A per crop.	4	1	Make no more than 4 applications/A per crop. Minimum interval between treatments is 7 days.
	-	<b>Aza-Direct</b> (azadirachtin)	See label; 1-2 pints for most pests and crop conditions		4	0	
	-	<b>Grandevo</b> ( <i>Chromobacterium</i> <i>subtsugae</i> strain PRAA4-1)	1-3 lbs		4	0	
	-	<b>Neemix 4.5% EC</b> (azadirachtin)	4-16 fl oz		12	0	
Beetles and weevils (including sap beetles) (see also grubs)	1B	<b>*Govern 4E</b> (chlorpyrifos)	see label	Do not apply more than 2 quarts preplant/A per year or 2 quarts foliar/A per year.	24	21	Do not make more than 1 preplant or 2 foliar applications per year. Do not apply after berries form or when berries are present.
	1B	<b>Lorsban 75WG</b> (chlorpyrifos)	1.33-2.67 lbs	Do not apply more than 2.67 lb/A per year.	24	21	Do not make more than 1 preplant or 2 foliar applications per year.

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

**Labels change frequently. Be sure to read a current product label before applying any chemical. Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.**

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	3A + 6	<b>Athena</b> (bifenthrin & avermectin B1)	7.0-17.0 fl oz	Do not apply more 68 fl oz. in a growing season after transplanting.	12	3	Make 2 applications 7-10 days apart. If further applications are needed wait 21 days after the second application before repeating sequence of two applications. Do not make more than 4 applications per growing season. Do not make more than 2 applications per season. Do not apply more than once every 7 days.
	3A	<b>Azera</b> (azadirachtin & pyrethrins)	See label		4	0	
	3A	<b>*Brigade WSB</b> (bifenthrin)	6.4-32.0 oz	Do not apply more than 80 oz./A per season.	12	0	
	3A + 4A	<b>*Brigadier</b> (bifenthrin & imidacloprid)	5.1-6.14 fl oz	Maximum allowed is 17.92 fl oz/A per season.	12	7	Do not make applications less than 5 days apart.
	3A	<b>*Danitol 2.4 EC</b> (fenpropathrin)	10.67 - 21.33 fl oz	Do not apply more than 42.67 fl oz/A per year.	24	2	Do not apply more than twice a year to the same planting. May be tank mixed with Dipel DF for armyworm control.
	4A	<b>Admire Pro</b> (imidacloprid)	soil - 10.5-14 fl oz foliar - 1.3 fl oz	Do not apply more than 14.0 fl oz /A for soil and 3.9 fl oz/A for foliar applications per season.	12	soil - 14 foliar - 5	Soil applications may be made as chemigation, as a plant hole treatment or as a band spray over-the-row followed by overhead irrigation. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	15	<b>Rimon 0.83EC</b> (novaluron)	9-12 fl oz	Do not apply more than 36 oz./A per season.	12	1	7 day minimum interval between applications.
	-	<b>MET52 EC</b> ( <i>Metarhizium anisopliae</i> strain F52)	<b>Drench:</b> 40-80 fl oz/100 gal; <b>Foliar:</b> 0.5 pint - 2 quarts		4	0	
	-	<b>Mycotrol ESO</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.
<b>Caterpillars (including budworms, earworms, leafrollers, leaf tiers, borers, and loopers)(see also armyworms)</b>	1A	<b>Carbaryl 4 L</b> (carbaryl)	1-2 quarts	Do not apply more than a total of 10 quarts/A per crop per year.	12	7	Bee restriction: do not apply to target crops in bloom.
	1A	<b>Sevin 4F, 80 Solupak</b> (carbaryl)	<b>4F:</b> 1-2 quarts; <b>80 Solupak:</b> 1.25-2.5 lbs	<b>4F:</b> Do not apply more than a total of 10 quarts/A per crop per year.; <b>80 Solupak:</b> Do not apply more than a total of 12.5 quarts/A per crop per year.	12	7	
	1B	<b>Diazinon 50W, AG600 WBC</b>	<b>50W:</b> 1-2 lbs; <b>AG600 WBC:</b> 12.75-25.5 fl oz	Make a maximum of one foliar application per crop and one soil application per crop.	3 days	5	
	1B	<b>Dibrom 8-E*</b> (Naled)	1 pint	Do not apply more than 5 pints per season.	48	1	
	1B	<b>Malathion 5EC , 8F</b> (malathion)	<b>5EC:</b> 1.5-3.2 pints; <b>8F:</b> 1.5-2.0 pints	<b>8F:</b> Do not apply more than 8 pints/A per year	12	3	Do not make more than 4 applications per year. Minimum retreatment interval is 7 days.
	3A	<b>Azera</b> (azadirachtin & pyrethrins)	See label		4	0	



**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical. Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>70 WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	5	<b>Entrust</b> (spinosad)	1.25-1.5 oz	Do not apply more than 9 oz/A per crop.	4	1	OMRI listed. Do not make applications less than 5 days apart except for thrips.
	5	<b>Radiant SC</b> (spinetoram)	6-10 fl oz	Do not apply more than a total of 39 fl oz/A per year.	4	1	
	11A	<b>Biobit HP</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.5-2.0 lb		4	0	
	11A	<b>Deliver</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.25-1.5 lbs		4	0	
	11A	<b>DiPel DF</b> ( <i>Bacillus thuringiensis</i> <i>kurstaki</i> )	0.5-2.0 lbs		4	0	For armyworm and cutworm control, use the higher rate.
	11A	<b>Javelin WG</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.25-1.5 lbs		4	0	
	11A	<b>Xentari</b> ( <i>Bacillus thuringiensis</i> subspecies <i>aizawai</i> )	0.5-2.0 lbs		4	0	
	-	<b>Botanigard ES</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.
	-	<b>Grandevo</b> ( <i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lbs		4	0	
	-	<b>Mycotrol ESO</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.
	-	<b>Neemix 4.5% EC</b> (azadirachtin)	4-16 fl oz		12	0	
	-	<b>PFR-97 20%WDG</b> ( <i>Isaria fumosoroseus</i> Apopka strain 97)	1-2 lbs		4	0	
	-	<b>Venerate XC</b> ( <i>Burkholderia</i> spp. strain A396)	1-8 quarts		4	0	OMRI listed.
<b>Crickets and cockroaches</b>	1A	<b>Carbaryl 4 L</b> (carbaryl)	1-2 quarts	Do not apply more than a total of 10 quarts/A per crop per year.	12	7	Bee restriction: do not apply to target crops in bloom.
	1B	<b>Diazinon 50W, AG600 WBC</b>	<b>50W:</b> 1-2 lbs; <b>AG600 WBC:</b> 12.75-25.5 fl oz	Make a maximum of one foliar application per crop and one soil application per crop.	3 days	5	
	1B	<b>Malathion 5EC, 8F</b> (malathion)	<b>5EC:</b> 1.5-3.2 pints; <b>8F:</b> 1.5-2.0 pints	<b>8F:</b> Do not apply more than 8 pints/A per year	12	3	Do not make more than 4 applications per year. Minimum retreatment interval is 7 days.
	15	<b>Rimon 0.83EC</b> (novaluron)	9-12 fl oz	Do not apply more than 36 oz./A per season.	12	1	7 day minimum interval between applications.
	-	<b>Botanigard ES</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.
	-	<b>Aza-Direct</b> (azadirachtin)	See label; 1-2 pints for most pests and crop conditions		4	0	

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.  
Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	-	<b>Mycotrol ESO</b> ( <i>Beauvaria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.
Fruit fly (vinegar fly) and spotted wing drosophila	3A	<b>*Brigade WSB</b> (bifenthrin)	6.4-32.0 oz	Do not apply more than 80 oz./A per season.	12	0	
	3A	<b>*Danitol 2.4 EC</b> (fenpropathrin)	10.67 - 21.33 fl oz	Do not apply more than 42.67 fl oz/A per year.	24	2	Do not apply more than twice a year to the same planting.
	3A	<b>Evergreen EC 60-6</b> (pyrethrins & piperonyl butoxide)	2-16 fl oz		12	0	
	3A	<b>PyGanic EC 5.0</b> (pyrethrins)	See label		12	0	
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>70 WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	4A	<b>Actara</b> (thiamethoxam)	1.5-4.0 oz	Do not exceed a total of 12 oz/Acre (0.188 lb ai/A) of actara or 0.188 lb ai of thiamethoxam containing products per acre per growing season.	12	3	Minimum interval between applications is 10 days. Do not use Actara in nurseries, greenhouses, plant propagation houses, or on any plants grown for use as transplants. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
	4A	<b>Admire Pro</b> (imidacloprid)	soil - 10.5-14 fl oz foliar - 1.3 fl oz	Do not apply more than 14.0 fl oz /A for soil and 3.9 fl oz/A for foliar applications per season.	12	soil - 14 foliar - 5	Soil applications may be made as chemigation, as a plant hole treatment or as a band spray over-the-row followed by overhead irrigation. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	5	<b>Entrust</b> (spinosad)	1.25-1.5 oz	Do not apply more than 9 oz/A per crop.	4	1	OMRI approved. Do not make applications less than 5 days apart except for thrips.
	28	<b>Exirel</b> (cyantraniliprole)	13.5-20.5 fl oz		12	1	for control of Spotted wing drosophila
	-	<b>Aza-Direct</b> (azadirachtin)	See label; 1-2 pints for most pests and crop conditions		4	0	
Grubs (see also beetles)	1B	<b>Govern 4E*</b> (chlorpyrifos)	see label	Do not apply more than 2 quarts preplant/A per year or 2 quarts foliar/A per year.	24	21	Do not make more than 1 preplant or 2 foliar applications per year. Do not apply after berries form or when berries are present.
	1B	<b>Lorsban 75WG</b> (chlorpyrifos)	1.33-2.67 lbs	Do not apply more than 2.67 lb/A per year.	24	21	Do not make more than 1 preplant or 2 foliar applications per year.
	3A + 6	<b>Athena*</b> (bifenthrin & avermectin B1)	8.5-17.0 fl oz at-plant	Do not apply more 68 fl oz. in a growing season after transplanting.	12	3	
	4A	<b>Admire Pro</b> (imidacloprid)	soil - 10.5-14 fl oz foliar - 1.3 fl oz	Do not apply more than 14.0 fl oz /A for soil and 3.9 fl oz/A for foliar applications per season.	12	soil - 14 foliar - 5	Soil applications may be made as chemigation, as a plant hole treatment or as a band spray over-the-row followed by overhead irrigation. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.



**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.  
Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	4A	<b>Platinum 75 SG</b> (thiamethoxam)	1.7-4.01 oz	Do not exceed 4.01 oz./A per growing season.	12	50	
	-	<b>Botanigard ES</b> ( <i>Beauvaria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.
	-	<b>Mycotrol ESO</b> ( <i>Beauvaria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.
Mites (including twospotted spider mite, strawberry spider mite, carmine spider mite, cyclamen mite, broad mite)	1B	<b>Diazinon 50W, AG600 WBC</b>	<b>50W:</b> 1-2 lbs; <b>AG600 WBC:</b> 12.75-25.5 fl oz	Make a maximum of one foliar application per crop and one soil application per crop.	3 days	5	
	1B	<b>Dibrom 8-E*</b> (Naled)	1 pint	Do not apply more than 5 pints per season.	48	1	Do not make more than 4 applications per year. Minimum retreatment interval is 7 days.
	1B	<b>Malathion 5EC , 8F</b> (malathion)	<b>5EC:</b> 1.5-3.2 pints; <b>8F:</b> 1.5-2.0 pints	<b>8F:</b> Do not apply more than 8 pints/A per year	12	3	Make 2 applications 7-10 days apart. If further applications are needed wait 21 days after the second application before repeating sequence of two applications. Do not make more than 4 applications per growing season. Do not make more than 2 applications per season. Do not apply more than once every 7 days.
	3A + 6	<b>Athena</b> (bifenthrin & avermectin B1)	7.0-17.0 fl oz	Do not apply more 68 fl oz. in a growing season after transplanting.	12	3	
	3A	<b>*Brigade WSB</b> (bifenthrin)	6.4-32.0 oz	Do not apply more than 80 oz./A per season.	12	0	Do not apply more than twice a year to the same planting. May be tank mixed with Dipel DF for armyworm control.
	3A	<b>*Danitol 2.4 EC</b> (fenpropathrin)	10.67 - 21.33 fl oz	Do not apply more than 42.67 fl oz/A per year.	24	2	Wait at least 21 days after second application before repeating application. Agri-Mek SC must be mixed with a surfactant approved for use on strawberries. Make 2 applications 7-10 days apart when mites first appear.
	6	<b>Agri-Mek 0.15 EC * , SC*</b> (abamectin)	<b>0.15EC:</b> 16 oz; <b>SC:</b> 3.5 fl oz	<b>0.15EC:</b> Do not apply more than 64 fl oz/A (0.075 lb ai/A) of Agri-Mek SC or any other foliar applied abamectin-containing product in a growing season.; <b>SC:</b> Do not apply more than 14 fl oz/A (0.075 lb ai/A) of Agri-Mek SC or any other foliar applied abamectin-containing product in a growing season.	12	3	
	10A	<b>Savey 50 DF</b> (hexythiazox)	6 oz	Do not apply more than 6 oz/A per year.	12	3	Do not make more than 1 application per season.
	10B	<b>Zeal</b> (etoxazole)	2-3 oz	Do not apply more than 3.0 oz/A per season.	12	1	Make no more than 4 applications per season.
	12B	<b>*Vendex 50 WP</b> (fenbutatin oxide)	1.5-2.0 lbs	Apply no more than 4 lbs/A per season.	48	1	Allow a minimum of 21 days between treatments. Do not make more than 2 applications per year.
	20B	<b>Kanemite 15 SC</b> (acequinocyl)	21-31 fl oz	Do not apply more than 62 fl oz/A per season.	12	1	Allow 14 days between applications.
	21A	<b>Nexter</b> (pyridaben)	7.5-17 oz	Do not make more than two applications per year. Allow 30 days between sequential applications.	12	10	
21A	<b>Portal XLO</b> (fenpyroximate)	2 pints	Do not apply more than 4.0 pints/A per crop cycle.	12	1	Do not make more than 3 applications per crop season.	
23	<b>Oberon 2SC</b> (spiromesifen)	12-16 fl oz	Do not apply more than 48 fl oz/A per crop season.	12	3	Active against eggs, nymphs and adults. Thorough coverage is necessary.	

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

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Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	25	<b>Nealta</b> (cyflumetofen)	13.7 fl oz	Do not apply more than 27.4 fl oz/A per season per crop.	12	1	Active against eggs, nymphs and adults. Thorough coverage is necessary.
	-	<b>Acramite 50 WS</b> (bifenazate)	0.75-1.0 lb	Two applications allowed per season; 21 days minimum between applications.	12	1	Acramite is not systemic in action; therefore complete coverage of both upper and lower leaf surfaces and of fruit is necessary for effective control.
	-	<b>Aza-Direct</b> (azadirachtin)	See label; 1-2 pints for most pests and crop conditions		4	0	
	-	<b>Grandevo</b> ( <i>Chromobacterium subsugae</i> strain PRAA4-1)	1-3 lbs		4	0	
	-	<b>JMS Stylet Oil</b> (paraffinic oil)	3 quarts/100 gal water		4	0	OMRI listed.
	-	<b>MET52 EC</b> ( <i>Metarhizium anisopliae</i> strain F52)	<b>Drench:</b> 40-80 fl oz/100 gal; <b>Foliar:</b> 0.5 pint - 2 quarts		4	0	
	-	<b>M-Pede</b> (potassium salts of fatty acids)	See label		12	0	
	-	<b>PFR-97 20%WDG</b> ( <i>Isaria fumosoroseus</i> Apopka strain 97)	1-2 lbs		4	0	
	-	<b>SuffOil-X</b> (unsulfonated residue of petroleum oil)	1-2 gallons		4	0	OMRI listed.
	-	<b>Trilogy</b> (neem oil)	0.5-2%		4	0	OMRI listed. Avoid tank mixes with captan, sulfur or other chemically similar products
<b>Plant bugs, including Lygus</b>	1A	<b>Carbaryl 4 L</b> (carbaryl)	1-2 quarts	Do not apply more than a total of 10 quarts/A per crop per year.	12	7	
	1A	<b>Sevin 4F, 80 Solupak</b> (carbaryl)	<b>4F:</b> 1-2 quarts; <b>80 Solupak:</b> 1.25-2.5 lbs	<b>4F:</b> Do not apply more than a total of 10 quarts/A per crop per year.; <b>80 Solupak:</b> Do not apply more than a total of 12.5 quarts/A per crop per year.	12	7	Do not make more than 4 applications per year. Minimum retreatment interval is 7 days.
	1B	<b>Malathion 5EC , 8F</b> (malathion)	<b>5EC:</b> 1.5-3.2 pints; <b>8F:</b> 1.5-2.0 pints	<b>8F:</b> Do not apply more than 8 pints/A per year	12	3	Make 2 applications 7-10 days apart. If further applications are needed wait 21 days after the second application before repeating sequence of two applications. Do not make more than 4 applications per growing season. Do not make more than 2 applications per season. Do not apply more than once every 7 days.
	3A + 6	<b>Athena</b> (bifenthrin & avermectin B1)	7.0-17.0 fl oz	Do not apply more 68 fl oz. in a growing season after transplanting.	12	3	
	3A	<b>*Brigade WSB</b> (bifenthrin)	6.4-32.0 oz	Do not apply more than 80 oz./A per season.	12	0	Do not make applications less than 5 days apart.
	3A + 4A	<b>*Brigadier</b> (bifenthrin & imidacloprid)	5.1-6.14 fl oz	Maximum allowed is 17.92 fl oz/A per season.	12	7	Do not apply more than twice a year to the same planting. May be tank mixed with Dipel DF for armyworm control.
	3A	<b>*Danitol 2.4 EC</b> (fenpropathrin)	10.67 - 21.33 fl oz	Do not apply more than 42.67 fl oz/A per year.	24	2	
	3A	<b>Evergreen EC 60-6</b> (pyrethrins & piperonyl butoxide)	2-16 fl oz		12	0	
	3A	<b>PyGanic EC 5.0</b> (pyrethrins)	See label		12	0	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.  
Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	7 day minimum interval between applications.
	15	<b>Rimon 0.83EC</b> (novaluron)	9-12 fl oz	Do not apply more than 36 oz./A per season.	12	1	Do not apply more than 3 applications per year. Allow a minimum of 7 days between applications.
	29	<b>Beleaf 50 SG</b> (flonicamid)	2.8 oz	Do not apply more than 8.4 oz./A Beleaf 50 SG per year.	12	0	Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.
	-	<b>Botanigard ES</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.
	-	<b>Mycotrol ESO</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	
	-	<b>PFR-97 20%WDG</b> ( <i>Isaria fumosoroseus</i> Apopka strain 97)	1-2 lbs		4	0	Bee restriction: do not apply to target crops in bloom.
Thrips (including flower thrips, chilli thrips)	1B	<b>Dibrom 8-E*</b> (Naled)	1 pint	Do not apply more than 5 pints per season.	48	1	Do not make more than 4 applications per year. Minimum retreatment interval is 7 days.
	1B	<b>Malathion 5EC , 8F</b> (malathion)	<b>5EC:</b> 1.5-3.2 pints; <b>8F:</b> 1.5-2.0 pints	<b>8F:</b> Do not apply more than 8 pints/A per year	12	3	
	3A	<b>Azera</b> (azadirachtin & pyrethrins)	See label		4	0	
	3A	<b>Evergreen EC 60-6</b> (pyrethrins & piperonyl butoxide)	2-16 fl oz		12	0	
	3A	<b>PyGanic EC 5.0</b> (pyrethrins)	See label		12	0	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>70 WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	OMRI approved. Do not make applications less than 5 days apart except for thrips.
	5	<b>Entrust</b> (spinosad)	1.25-1.5 oz	Do not apply more than 9 oz/A per crop.	4	1	
	5	<b>Radiant SC</b> (spinetoram)	6-10 fl oz	Do not apply more than a total of 39 fl oz/A per year.	4	1	Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.
	28	<b>Exirel</b> (cyantraniliprole)	13.5-20.5 fl oz		12	1	The label for this product contains warnings for the protection of pollinators.
	-	<b>BotaniGard ES</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	
	-	<b>Aza-Direct</b> (azadirachtin)	See label; 1-2 pints for most pests and crop conditions		4	0	
	-	<b>Grandevo</b> ( <i>Chromobacterium subsugae</i> strain PRAA4-1)	1-3 lbs		4	0	
-	<b>MET52 EC</b> ( <i>Metarhizium anisopliae</i> strain F52)	<b>Drench:</b> 40-80 fl oz/100 gal; <b>Foliar:</b> 0.5 pint - 2 quarts		4	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.	
-	<b>Mycotrol ESO</b> ( <i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart		4	0		

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

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Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	-	<b>Neemix 4.5% EC</b> (azadirachtin)	4-16 fl oz		12	0	
	-	<b>PFR-97 20%WDG</b> ( <i>Isaria fumosoroseus</i> Apopka strain 97)	1-2 lbs		4	0	
<b>Whiteflies</b>	1B	<b>Malathion 5EC , 8F</b> (malathion)	<b>5EC:</b> 1.5-3.2 pints; <b>8F:</b> 1.5-2.0 pints	<b>8F:</b> Do not apply more than 8 pints/A per year	12	3	Make 2 applications 7-10 days apart. If further applications are needed wait 21 days after the second application before repeating sequence of two applications. Do not make more than 4 applications per growing season. Do not make more than 2 applications per season. Do not apply more than once every 7 days.
	3A + 6	<b>Athena</b> (bifenthrin & avermectin B1)	7.0-17.0 fl oz	Do not apply more 68 fl oz. in a growing season after transplanting.	12	3	
	3A	<b>Azera</b> (azadirachtin & pyrethrins)	See label		4	0	Do not make applications less than 5 days apart.
	3A + 4A	<b>*Brigadier</b> (bifenthrin & imidacloprid)	5.1-6.14 fl oz	Maximum allowed is 17.92 fl oz/A per season.	12	7	
	3A	<b>Evergreen EC 60-6</b> (pyrethrins & piperonyl butoxide)	2-16 fl oz		12	0	
	3A	<b>PyGanic EC 5.0</b> (pyrethrins)	See label		12	0	Minimum interval between applications is 10 days. Do not use Actara in nurseries, greenhouses, plant propagation houses, or on any plants grown for use as transplants. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
	4A	<b>Actara</b> (thiamethoxam)	1.5-4.0 oz	Do not exceed a total of 12 oz/Acre (0.188 lb ai/A) of actara or 0.188 lb ai of thiamethoxam containing products per acre per growing season.	12	3	Soil applications may be made as chemigation, as a plant hole treatment or as a band spray over-the-row followed by overhead irrigation. Application restrictions exist for this product because of risk to bees and other insect pollinators. Follow application restrictions found in directions for use to protect pollinators.
	4A	<b>Admire Pro</b> (imidacloprid)	soil - 10.5-14 fl oz foliar - 1.3 fl oz	Do not apply more than 14.0 fl oz /A for soil and 3.9 fl oz/A for foliar applications per season.	12	soil - 14 foliar - 5	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.
	4A	<b>Assail 30 SG, 70 WP</b> (acetamiprid)	<b>30 SG:</b> 1.9-6.9 oz; <b>70 WP:</b> 0.8-3.0 oz	<b>30 SG:</b> Do not exceed a total of 13.8 oz of Assail 30 SG/A during each growing season.; <b>70 WP:</b> Do not exceed a total of 6.0 oz Assail 70 WP/A. per growing season.	12	1	
	4A	<b>Platinum 75 SG</b> (thiamethoxam)	1.7-4.01 oz	Do not exceed 4.01 oz./A per growing season.	12	50	Application restrictions exist for this product because of the risk to bees and othe insect pollinators. Follow application restrictions found in the directions for use to protect pollinators.
	4A + 28	<b>Voliam Flexi</b> (thiamethoxam & chlorantraniliprole)	2-5 oz	Do not exceed 15.0 oz/A per growing season.	12	3	10 day minimum interval between applications.
	4D	<b>Sivanto Prime</b> (flupyradifurone)	7-14 fl oz	Maximum allowed per year is 28.0 fl oz/A	4	0	Do not make more than 2 applications per growing season. Do not apply more than once every 7 days.

**Table 16.3.** Selected insecticides approved for managing insect pests of strawberry. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical. Also refer to Table 19.1. for biopesticide and other alternative products labeled for disease management.

Insect or mite pest	MOA Code <sup>1</sup>	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	Max rate product per season	REI (hours)	Days to Harvest	Remarks <sup>2</sup>
	7D	<b>Esteem 0.86 EC</b> (pyriproxyfen)	10 fl oz	Do not exceed 20 fl oz/A per season.	12	2	Do not make more than 2 applications per crop cycle. Allow at least 10 days between applications.
	16	<b>Courier SC</b> (buprofezin)	9.0-13.6 oz	Do not apply more than 27.2 fl oz/A per crop cycle.	12	3	Do not make more than 2 applications per crop cycle.
	16 + 28	<b>Vetiva</b> (buprofezin & flubendiamide)	12.0-18.5 fl oz	Do not apply more than 37.0 fl oz/A per crop cycle.	12	3	Allow 14 days between applications.
	21A	<b>Portal XLO</b> (fenpyroximate)	2 pints	Do not apply more than 4.0 pints/A per crop cycle.	12	1	Do not make more than 3 applications per crop season.
	23	<b>Oberon 2SC</b> (spiromesifen)	12-16 fl oz	Do not apply more than 48 fl oz/A per crop season.	12	3	
	-	<b>Botanigard ES</b> ( <i>Beauvaria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	
	-	<b>Aza-Direct</b> (azadirachtin)	See label; 1-2 pints for most pests and crop conditions		4	0	
	-	<b>Grandevo</b> ( <i>Chromobacterium subsugae</i> strain PRAA4-1)	1-3 lbs		4	0	OMRI listed.
	-	<b>JMS Stylet Oil</b> (paraffinic oil)	3 quarts/100 gal water		4	0	
	-	<b>MET52 EC</b> ( <i>Metarhizium anisopliae</i> strain F52)	<b>Drench:</b> 40-80 fl oz/100 gal; <b>Foliar:</b> 0.5 pint - 2 quarts		4	0	
	-	<b>M-Pede</b> (potassium salts of fatty acids)	See label		12	0	OMRI listed. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.
	-	<b>Mycotrol ESO</b> ( <i>Beauvaria bassiana</i> strain GHA)	0.25 - 1 quart		4	0	
	-	<b>Neemix 4.5% EC</b> (azadirachtin)	4-16 fl oz		12	0	
	-	<b>PFR-97 20%WDG</b> ( <i>Isaria fumosoroseus</i> Apopka strain 97)	1-2 lbs		4	0	OMRI listed.
	-	<b>SuffOil-X</b> (unsulfonated residue of petroleum oil)	1-2 gallons		4	0	Do not make more than 4 applications per year. Minimum retreatment interval is 7 days.

<sup>1</sup> Mode of Action (MOA) codes for plant pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 8.2 March 2017. Number codes (1 through 29) are used to distinguish the main insecticide mode of action groups, with additional letters for certain sub-groups within each main group. All insecticides within the same group (with same number) indicate same active ingredient or similar mode of action. This information must be considered for the insecticide resistance management decisions. - = unknown, or a mode of action that has not been classified yet.

<sup>2</sup> Information provided in this table applies only to Florida. Be sure to read a current product label before applying any product. The use of brand names and any mention or listing of commercial products or services in the publication does not imply endorsement by the University of Florida Cooperative Extension Service nor discrimination against similar products or services not mentioned. OMRI listed: Listed by the Organic Materials Review Institute for use in organic production.

\* Restricted use insecticide.

**Table 16.4.** Strawberry fungicides ordered by disease and then FRAC group according to their mode of action.

Pertinent Diseases or Pathogens	Fungicide Group <sup>1</sup>	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks <sup>2</sup>
			Applic.	Season	Harvest	Reentry	
<b>Labels change frequently. Be sure to read a current product label before applying any chemical. Refer to Table 19.2 for biopesticide and other alternative products labeled for disease management.</b>							
Angular leaf spot	M1	(copper compounds) <b>Many brands available:</b> AmeriCop 40 DF, Badge SC, Basic Copper 53, Badge X2, Champ DP Dry Prill, Champ Formula 2 Flowable, Champ WG, COC DF, COC WP, C-O-C-S WDG, Copper Count-N, CS 2005 Cueva, Cuprofix Ultra 40 Dispers, Cuproxat Flowable, Kentan DF, Kocide 2000, Kocide 3000, Kocide DF, Mastercop, Nordox, Nordox 75WG, Nu Cop 3L, Nu Cop 50 DF, Nu Cop 50 WP, Nu Cop HB, Cuproxat	SEE INDIVIDUAL LABELS		1-2	Varies by product from 4 hr to 2 day	Frequent use of copper fungicides may cause foliar burn
	21	Actigard 50 WG (acibenzolar-s-methyl)	0.75 oz	6 oz	0	0.5	Do not apply to plants that are stressed due to drought, excessive moisture, cold weather, herbicide injury, etc.
Anthracnose fruit rot	M4	Captan 50W, Captan 50 WP, Captan 80 WDG, Captec 4L (captan)	SEE INDIVIDUAL LABELS		1	1	Rate per treated acre. Special label for FL allows up to 24 applications per season
	M4 + 17	Captevate 68 WDG (captan + fenhexamid)	5.25 lb	21 lb	0	1	Do not make more than 2 consecutive applications
	1 + 3	Protocol (thiophanate-methyl + propiconazole)	1.33 pt	5.3 pt	1	1	Do not make more than 2 consecutive applications before rotating to another fungicide with a different mode of action
	3	(propiconazole) <b>Many brands available:</b> Amtide Propiconazole EC, Bumper 41.8 EC, Fitness, Orbit, Propi-Star EC, Shar-Shield PPZ, Tilt, Topaz	4 fl oz	16 fl oz	0	0.5	Do not make more than 2 consecutive applications
	3 + 9	Inspire Super (difenoconazole + cyprodinil)	20 fl oz	80 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to another fungicide with different mode of action
	3 + 11	Quadris Top (difenoconazole + azoxystrobin)	14 fl oz	56 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to another fungicide group and no more than 4 appl/crop per year.
	3 + 11	Quilt Xcel (azoxystrobin + propiconazole)	14 oz	56 oz	0	0.5	Do not make more than 2 consecutive applications and no more than 4 appl/crop
	9 + 12	Switch 62.5 WG (cyprodinil + fludioxonil)	14 oz	56 oz	0	0.5	Do not make more than 2 consecutive appl. Do not plant crops not on the label for 30 days after last appl. See special label for instructions on dipping transplants
	11	(azoxystrobin) <b>Many brands available:</b> Abound, Aframe, Azaka, Azoxy 2SC, Equation SC, Satori, Trevo	15.4 fl oz	1.92 qt	0	4 hr	Do not make more than 2 sequential appl. and no more than 4 appl/crop year. See label for instructions on dipping transplants
	11	Cabrio EG (pyraclostrobin)	14 fl oz	70 fl oz	0	0.5	Do not make more than 2 sequential applications and no more than 5 appl/crop year
	11	Flint (trifloxystrobin)	3.2 oz.	19.2 oz.	0	0.5	Do not apply more than 2 sequential applications of Flint of other Group 11 fungicides. Do not exceed more than 6 total applications of Group 11 fungicides per season
	11	Aftershock Evito (fluoxastrobin)	5.7 fl oz	22.8 fl oz	1	0.5	Do not make more than 2 sequential applications and no more than 4 applications per season, and a minimum interval of 14 days between applications
11 + 7	Merivon (pyraclostrobin + fluxapyroxad)	11 fl oz	33 fl oz	0	12 hr	Do not make more than 2 sequential applications before alternating to a another non-Group 7 or non-Group 11 fungicide	



**Table 16.4.** Strawberry fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group <sup>1</sup>	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks <sup>2</sup>
			Applic.	Season	Harvest	Reentry	
<b>Labels change frequently. Be sure to read a current product label before applying any chemical. Refer to Table 19.2 for biopesticide and other alternative products labeled for disease management.</b>							
	11 + 7	Pristine (pyraclostrobin + boscalid)	23 oz	115 oz	0	0.5	Do not make more than 2 consecutive appl. and no more than 5 appl/ crop
	11 + 7	Luna Sensation (tryfloxystrobin + fluopyram)	7.6 fl oz	27.3 fl oz	0	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	19	Affirm WDG, Ph-D, Oso, Veranda O (polyoxin-D)	SEE INDIVIDUAL LABELS		0	4 hr	Use in alternation with fungicides that have different modes of action. Do not make more than 3 applications per season.
<b>Botrytis fruit rot</b>	M3	Thiram Granuflo, Thiram 24/7 (thiram)	SEE INDIVIDUAL LABELS			1	Do not rotate treated crops with other crops for which Thiram is not registered
	M4	(captan) <b>Many brands available:</b> Captan 50W, Captan 50 WP, Captan 80 WDG, Captec 4L	SEE INDIVIDUAL LABELS		1	1	Rate per treated acre. Special label for FL allows up to 24 applications per season
	M4 + 17	Captevat 68 WDG (captan + fenhexamid)	5.25 lb	21 lb	0	1	Do not make more than 2 consecutive applications
	M12	Fracture (banda de lupinus albus doce - BLAD)	36.6 fl oz	183 fl oz	1	4 hr	Do not make more than 2 sequential applications.
	1	(thiophanate-methyl) <b>Many brands available:</b> Thiophanate-methyl 85 WDG, Topsin 4.5 FL, Topsin 70 WDG, Topsin M 70 WP, Topsin M WSB, Incognito 4.5F, Cercobin, Nufarm T-Methyl 4.5 F, Nufarm T-Methyl 70WSB	SEE INDIVIDUAL LABELS		1	1	Fungicides from different chemical groups should be used in spray program for disease resistance management
	1 + 3	Protocol (thiophanate-methyl + propiconazole)	1.33 pt	5.3 pt	1	1	Do not make more than 2 consecutive applications before rotating to another fungicide with a different mode of action
	2	(iprodione) <b>Many brands available:</b> Enclosure 4, Iprodione 4L AG, Meteor, Nevada 4F, Rovral 4 Flowable	2 pt	2 pt	N/A	1	Do not make more than 1 application per season. Do not apply after first fruiting flower
	3 + 9	Inspire Super (difenoconazole + cyprodinil)	20 fl oz	80 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to another fungicide with different mode of action
	7	Fontelis (penthioopyrad)	24 fl oz	72 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to a fungicide from a different group
	7	Kenja 400 SC (isofetamid)	15.5 fl oz	54 fl oz	0	0.5	Do not plant other crops not registered within 30 days after last application
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	27 fl oz	54.7 fl oz	1	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Luna Sensation (fluopyram + tryfloxystrobin)	7.6 fl oz	27.3 fl oz	0	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Merivon (fluxapyroxad + pyraclostrobin)	11 fl oz	33 fl oz	0	12 hr	Do not make more than 2 sequential applications before alternating to another non-Group 7 or non-Group 11 fungicide
	7 + 11	Pristine (boscalid + pyraclostrobin)	23 oz	115 oz	0	0.5	Do not make more than 2 consecutive appl. and no more than 5 appl/ crop
9	Scala SC (pyrimethanil)	18 fl oz	54 fl oz	1	0.5	Do not make more than 2 consecutive applications. Do not use more than 2 of 6 appl. in any one season	
9 + 12	Switch 62.5 WG (cyprodinil + fludioxonil)	14 oz	56 oz	0	0.5	Do not make more than 2 consecutive appl. Do not plant crops not on the label for 30 days after last appl. See special label for instructions on dipping transplants	

**Table 16.4.** Strawberry fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group <sup>1</sup>	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks <sup>2</sup>
			Applic.	Season	Harvest	Reentry	
<b>Labels change frequently. Be sure to read a current product label before applying any chemical. Refer to Table 19.2 for biopesticide and other alternative products labeled for disease management.</b>							
	17	Elevate 50 WDG (fenhexamid)	1.5 lb	6 lb	0	0.5	Do not make more than 2 consecutive applications
	19	Affirm WDG, Ph-D, Oso, Veranda O (polyoxin-D)	SEE INDIVIDUAL LABELS		0	4 hr	Use in alternation with fungicides that have different modes of action. Do not make more than 3 applications per season.
<b>Botrytis</b> (suppression only)	3 + 11	Topguard (flutriafol + azoxystrobin)	8 fl oz	32 fl oz	0	0.5	Do not apply more than 4 applications per year.
	11	(azoxystrobin) <b>Many brands available:</b> Abound, Aframe, Azaka, Azoxy 2SC, Equation SC, Satori, Trevo	15.4 fl oz	1.92 qt	0	4 hr	Do not make more than 2 sequential appl. and no more than 4 appl/crop year. See label for instructions on dipping transplants
	11	Cabrio EG (pyraclostrobin)	14 fl oz	70 fl oz	0	0.5	Do not make more than 2 sequential applications and no more than 5 appl/crop year
	11	Flint (trifloxystrobin)	3.2 oz.	19.2 oz.	0	0.5	Do not apply more than 2 sequential applications of Flint of other Group 11 fungicides. Do not exceed more than 6 total applications of Group 11 fungicides per season
	11	Aftershock Evito (fluoxastrobin)	5.7 fl oz	22.8 fl oz	1	0.5	Do not make more than 2 sequential applications and no more than 4 applications per season, and a minimum interval of 14 days between applications
	11	Intuity (mandestrobin)	6 fl oz	12 fl oz	0	0.5	Do not make more than 2 applications per year. Do not apply at intervals of less than 14 days.
<b>Charcoal rot</b> ( <i>Macrophomina phaseolina</i> )		Rhyme (flutriafol)	7 fl oz	28 fl oz	0	0.5	Product is to be applied through drip irrigation (see label for chemigation directions)
<b>Colletotrichum</b> <b>Crown rot</b>	1	(thiophanate-methyl) <b>Many brands available:</b> Thiophanate-methyl 85 WDG, Topsin 4.5 FL, Topsin 70 WDG, Topsin M 70 WP, Topsin M WSB, Incognito 4.5F, Cercobin, Nufarm T-Methyl 4.5 F, Nufarm T-Methyl 70WSB	SEE INDIVIDUAL LABELS		1	1	Fungicides from different chemical groups should be used in spray program for disease resistance management
	3 + 11	Topguard (flutriafol + azoxystrobin)	8 fl oz	32 fl oz	0	0.5	Do not apply more than 4 applications per year.
	7	Kenja 400 SC (isofetamid)	15.5 fl oz	54 fl oz	0	0.5	Do not plant other crops not registered within 30 days after
<b>Leaf Scorch</b>	1	(thiophanate-methyl) <b>Many brands available:</b> Thiophanate-methyl 85 WDG, Topsin 4.5 FL, Topsin 70 WDG, Topsin M 70 WP, Topsin M WSB, Incognito 4.5F, Cercobin, Nufarm T-Methyl 4.5 F, Nufarm T-Methyl 70WSB	SEE INDIVIDUAL LABELS		1	1	Fungicides from different chemical groups should be used in spray program for disease resistance management
	1 + 3	Protocol (thiophanate-methyl + propiconazole)	1.33 pt	5.3 pt	1	1	Do not make more than 2 consecutive applications before rotating to another fungicide with a different mode of action
<b>Leaf spot</b>	M4	(captan) <b>Many brands available:</b> Captan 50W, Captan 50 WP, Captan 80 WDG, Captec 4L	SEE INDIVIDUAL LABELS		1	1	Rate per treated acre. Special label for FL allows up to 24 applications per season
	2	(iprodione) <b>Many brands available:</b> Enclosure 4, Iprodione 4L AG, Meteor, Nevado 4F, Rovral 4 Flowable	2 pt	2 pt	N/A	1	Do not make more than 1 application per season. Do not apply after first fruiting flower
	3	(propiconazole) <b>Many brands available:</b>	4 fl oz	16 fl oz	0	0.5	Do not make more than 2 consecutive applications

**Table 16.4.** Strawberry fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group <sup>1</sup>	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks <sup>2</sup>
			Applic.	Season	Harvest	Reentry	
<b>Labels change frequently. Be sure to read a current product label before applying any chemical. Refer to Table 19.2 for biopesticide and other alternative products labeled for disease management.</b>							
(suppression only)		Amide Propiconazole EC, Bumper 41.8 EC, Orbit, Propi-Star EC, Shar-Shield PPZ, Tilt, Topaz					
	3	Nova 40W Rally 40WSP, Sonoma 40 WSP (myclobutanil)	5 oz	30 oz	0	1	Do not plant rotational crops until 30 days after last application
	3	Mettle 125 ME (tetraconazole)	5 fl oz	20 fl oz	0	0.5	Do not apply same product within 14 days. Do not apply more than 4 applications per season.
	3 + 11	Quadris Top (azoxystrobin + difenoconazole)	14 fl oz	56 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to another fungicide group and no more than 4 appl/crop per year.
	3 + 11	Quilt Xcel (azoxystrobin + propiconazole)	14 oz	56 oz	0	0.5	Do not make more than 2 consecutive applications and no more than 4 appl/crop
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	27 fl oz	54.7 fl oz	1	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Luna Sensation (fluopyram + trifloxystrobin)	7.6 fl oz	27.3 fl oz	0	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Merivon (fluxapyroxad + pyraclostrobin)	11 fl oz	33 fl oz	0	12 hr	Do not make more than 2 sequential applications before alternating to a another non-Group 7 or non-Group 11 fungicide
(suppression only)	7 + 11	Pristine (boscalid + pyraclostrobin)	23 oz	115 oz	0	0.5	Do not make more than 2 consecutive appl. and no more than 5 appl/ crop
	11	Cabrio EG (pyraclostrobin)	14 fl oz	70 fl oz	0	0.5	Do not make more than 2 sequential applications and no more than 5 appl/crop year
	3 + 11	Topguard (flutriafol + azoxystrobin)	8 fl oz	32 fl oz	0	0.5	Do not apply more than 4 applications per year.
<b>Leather rot</b>	4	Ridomil Gold EC, Ridomil Gold SL Ultra Flourish (mefenoxam)	1 pt/trtd acre	1 ½ qt/trtd acre	0	2	See label for use in drip irrigation
	4	Metalaxyl 2E AG, MetaStar 2E AG (metalaxyl)	2 qt	6 qt	0	2	See label for use in drip irrigation
	11	(azoxystrobin) <b>Many brands available:</b> Abound, Aframe, Azaka, Azoxy 2SC, Equation SC, Satori, Trevo	15.4 fl oz	1.92 qt	0	4 hr	Do not make more than 2 sequential appl. and no more than 4 appl/crop year. See label for instructions on dipping transplants
	33	Aliette WDG, Legion 80WDG, Linebacker WDG (foseetyl-Al)	5 lb	30 lb	12 hr	0.5	Do not tank mix with copper fungicides, adjuvants or foliar fertilizers
	33	Alude, Confine Extra, Fosphite, Fungi-Phite, K-Phite, Phorcephite, Phostrol, Rampart	SEE INDIVIDUAL LABELS		0	4 hr	Do not tank mix with copper fungicides
<b>Phomopsis leaf blight</b>	3	Mettle 125 ME (tetraconazole)	5 fl oz	20 fl oz	0	0.5	Do not apply same product within 14 days. Do not apply more than 4 applications per season.
	3	Nova 40W Rally 40WSP, Sonoma 40 WSP (myclobutanil)	5 oz	30 oz	0	1	Do not plant rotational crops until 30 days after last application

**Table 16.4.** Strawberry fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group <sup>1</sup>	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks <sup>2</sup>
			Applic.	Season	Harvest	Reentry	
<b>Labels change frequently. Be sure to read a current product label before applying any chemical. Refer to Table 19.2 for biopesticide and other alternative products labeled for disease management.</b>							
(suppression only)	11	Flint (trifloxystrobin)	3.2 oz.	19.2 oz.	0	0.5	Do not apply more than 2 sequential applications of Flint of other Group 11 fungicides. Do not exceed more than 6 total applications of Group 11 fungicides per season
(suppression only)	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	27 fl oz	54.7 fl oz	1	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Luna Sensation (fluopyram + tryfloxystrobin)	7.6 fl oz	27.3 fl oz	0	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
<b>Phomopsis soft rot</b>	2	(iprodione) <b>Many brands available:</b> Enclosure 4, Iprodione 4L AG, Meteor, Nevada 4F, Rovral 4 Flowable	2 pt	2 pt	N/A	1	Do not make more than 1 application per season. Do not apply after first fruiting flower
(suppression only)	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	27 fl oz	54.7 fl oz	1	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Luna Sensation (fluopyram + tryfloxystrobin)	7.6 fl oz	27.3 fl oz	0	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
<b>Phytophthora crown rot</b>	4	Metalaxyl 2E AG, MetaStar 2E AG (metalaxyl)	2 qt	6 qt	0	2	See label for use in drip irrigation
	4	Ridomil Gold EC, Ridomil Gold SL Ultra Flourish (mefenoxam)	1 pt/trtd acre	1 ½ qt/trtd acre	0	2	See label for use in drip irrigation
	33	Alude, Confine Extra, Fosphite, Fungi-Phite, K-Phite, Phorcephite, Phostrol, Rampart	SEE INDIVIDUAL LABELS		0	4 hr	Do not tank mix with copper fungicides
<b>Powdery mildew</b>	M2	(sulfur) <b>Many brands available:</b> Acoidal, Cosavet DF, Crusade DF, Kumulus DF, Micro Sulf, Microfine Sulfur, Microthiol Disperss, Rebel DF, Sulfur 90W, Wettable Sulfur, Wettable Sulfur 92, Yellow Jacket Dusting Sulfur, Yellow Jacket Wettable Sulfur	SEE INDIVIDUAL LABELS		1	1	Do not use during hot weather
	M2 + 33	Sanction (potassium phosphate + sulfur)	6 pt	24 pt	N/A	1	Do not apply during hot weather. May cause injure during certain climatic conditions
	M12	Fracture (banda de lupinus albus doce - BLAD)	24.4 fl oz	122 fl oz	1	4 hr	Do not make more than 2 sequential applications.
	1	(thiophanate-methyl) <b>Many brands available:</b> Thiophanate-methyl 85 WDG, Topsin 4.5 FL, Topsin 70 WDG, Topsin M 70 WP, Topsin M WSB, Incognito 4.5F, Cercobin, Nufarm T-Methyl 4.5 F, Nufarm T-Methyl 70WSB	SEE INDIVIDUAL LABELS		1	1	Fungicides from different chemical groups should be used in spray program for disease resistance management
	1 + 3	Protocol (thiophanate-methyl + propiconazole)	1.33 pt	5.3 pt	1	1	Do not make more than 2 consecutive applications before rotating to another fungicide with a different mode of action
	3	(propiconazole) <b>Many brands available:</b> Amtide Propiconazole EC, BUMPER 41.8 EC, BUMPER ES, Orbit, Propi-Star EC, Shar-Shield PPZ, Tilt, Topaz	4 fl oz	16 fl oz	0	0.5	Do not make more than 2 consecutive applications
	3	Nova 40W Rally 40WSP, Sonoma 40 WSP (myclobutanil)	5 oz	30 oz	0	1	Do not plant rotational crops until 30 days after last application

**Table 16.4.** Strawberry fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group <sup>1</sup>	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks <sup>2</sup>
			Applic.	Season	Harvest	Reentry	
<b>Labels change frequently. Be sure to read a current product label before applying any chemical. Refer to Table 19.2 for biopesticide and other alternative products labeled for disease management.</b>							
	3	Procure 480 SC (triflumizole)	8 oz	32 oz	1	0.5	Do not plant leafy vegetables within 30 days or root vegetables within 60 days or rotational crops not on label for one year after application
	3	Mettle 125 ME (tetraconazole)	5 fl oz	20 fl oz	0	0.5	Do not apply same product within 14 days. Do not apply more than 4 applications per season.
	3	Rhyme (flutriafol)	7 fl oz	28 fl oz	0	0.5	Do not apply more than 4 applications per year.
	3 + 9	Inspire Super (difenoconazole + cyprodinil)	20 fl oz	80 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to another fungicide with different mode of action
	3 + 11	Topguard (flutriafol + azoxystrobin)	8 fl oz	32 fl oz	0	0.5	Do not apply more than 4 applications per year.
	3 + 11	Quadris Top (difenoconazole + azoxystrobin)	14 fl oz	56 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to another fungicide group and no more than 4 appl/crop per year.
	3 + 11	Quilt Xcel (azoxystrobin + propiconazole)	14 oz	56 oz	0	0.5	Do not make more than 2 consecutive applications and no more than 4 appl/crop
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	0	0.5	Do not make more than 2 sequential applications before alternating to a fungicide from a different group
	7	Kenja 400 SC (isofetamid)	15.5 fl oz	54 fl oz	0	0.5	Do not plant other crops not registered within 30 days after last application
	7	Luna Privilege (fluopyram)	6.84 fl oz	13.7 fl oz	0	0.5	Apply through drip irrigation system preventatively. Do not make more than 2 sequential applications before alternating to a fungicide from a different group
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	27 fl oz	54.7 fl oz	1	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Luna Sensation (fluopyram + tryfloxystrobin)	7.6 fl oz	27.3 fl oz	0	0.5	Do not make more than 2 sequential applications before rotating with a fungicide from a different group.
	7 + 11	Merivon (pyraclostrobin + fluxapyroxad)	11 fl oz	33 fl oz	0	12 hr	Do not make more than 2 sequential applications before alternating to a another non-Group 7 or non-Group 11 fungicide
	7 + 11	Pristine (pyraclostrobin + boscalid)	23 oz	115 oz	0	0.5	Do not make more than 2 consecutive appl. and no more than 5 appl/ crop
	11	(azoxystrobin) <b>Many brands available:</b> Abound, Aframe, Azaka, Azoxy 2SC, Equation SC, Satori, Trevo	15.4 fl oz	1.92 qt	0	4 hr	Do not make more than 2 sequential appl. and no more than 4 appl/crop year. See label for instructions on dipping transplants
	11	Cabrio EG (pyraclostrobin)	14 fl oz	70 fl oz	0	0.5	Do not make more than 2 sequential applications and no more than 5 appl/crop year
	11	Flint (trifloxystrobin)	3.2 oz.	19.2 oz.	0	0.5	Do not apply more than 2 sequential applications of Flint or other Group 11 fungicides. Do not exceed more than 6 total applications of Group 11 fungicides per season
	11	Aftershock Evito (fluoxastrobin)	5.7 fl oz	22.8 fl oz	1	0.5	Do not make more than 2 sequential applications and no more than 4 applications per season, and a minimum interval of 14 days between applications
	11	Intuity (mandestrobin)	6 fl oz	12 fl oz	0	0.5	Do not make more than 2 applications per year. Do not apply at intervals of less than 14 days.

**Table 16.4.** Strawberry fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group <sup>1</sup>	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks <sup>2</sup>
			Applic.	Season	Harvest	Reentry	
<b>Labels change frequently. Be sure to read a current product label before applying any chemical. Refer to Table 19.2 for biopesticide and other alternative products labeled for disease management.</b>							
	13	Quintec (quinoxifen)	6 fl oz	24 fl oz	1	0.5	Do not make more than 2 consecutive applications or more than 4 applications per crop
	19	Affirm WDG, Ph-D, Oso, Veranda O (polyoxin-D)	SEE INDIVIDUAL LABELS		0	4 hr	Use in alternation with fungicides that have different modes of action. Do not make more than 3 applications per season.
	U6	Torino (cyflufenamid)	3.4 oz	6.8 oz	0	4 hr	Do not make more than 2 applications per year. Do not apply more than once every 14 days.
	U8	Prolivo (pyriofenone)	5 fl oz	16 fl oz	0	4 hr	Do not make more than 2 sequential applications of Group U8 fungicides before rotating to a fungicide with a different mode of action

<sup>1</sup> FRAC code (fungicide group): Number (1 through 46) and letters (U and P) are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with same number or letter) indicate same active ingredient or similar mode of action. This information must be considered for the fungicide resistance management decisions. U = unknown, or a mode of action that has not been classified yet and is typically associated with another number; P = host plant defense inducers. Source: FRAC Code List 2018; <http://www.frac.info/> (FRAC = Fungicide Resistance Action Committee).

<sup>2</sup> Information provided in this table applies only to Florida. Be sure to read a current product label before applying any chemical. The use of brand names and any mention or listing of commercial products or services in the publication does not imply endorsement by the University of Florida Cooperative Extension Service nor discrimination against similar products or services not mentioned.

**Table 16.5.** Non-fumigant nematicides for crucifer crops in Florida.

Product	Application Rates and Procedures
Nimitz (a.i. fluensulfone)	All applications must be incorporated either physically or via drip or overhead irrigation. Make preplant applications at a rate of 3.5 to 7 pints, (56.0 to 80.0 fl. oz.) per acre, a minimum of seven days before planting. Do not plant any unlisted crops into treated land for 365 days after application of the product. Do not apply more than one application per crop, and no more than 112 fl. oz. of product per acre, per year (365 days). Provides control only for nematodes. Growers applying Nimitz must consult the product label to observe the plant-back (recropping) intervals for a variety of leafy vegetables and brassica crops, onions, bananas, sugarcane, and other crops.
Velum (a.i. fluopyram)	Apply max 6.84 fl oz/acre using only Chemigation into root-zone through low-pressure drip, trickle, micro-sprinkler or equivalent equipment. Observe minimum 7-day interval between soil applications. Do not apply more than 13.7 fl oz of Velum (0.446 lbs Fluopyram) per acre per year, regardless of formulation (Velum and/or Luna) or method of application (soil or foliar). For soil application, to limit the potential for development of disease resistance to this chemical class, the first foliar fungicide application after Velum should be a product from a different FRAC group.

Velum is a fungicide/nematicide; Nimitz is a true nematicide. Unlike fumigants, these products are not volatile and will move through the soil via water; depending on the water solubility, these products will have different recommendations as far as how to best apply them (see specific label recommendations); when nematode pressure is high, they may not be as consistently effective against root nematodes as the fumigants.



**Table 16.6.** Fumigant nematicides for strawberries in Florida.

Nematicide	Broadcast Application <sup>1</sup>		In the Row Applications
	Gallons or Lbs Per acre	Fl oz /1000 ft / chisel spaced 12" apart	
Telone II <sup>2,3</sup>	27 to 35 gal	79 to 102	For any row spacing, application rates given may be concentrated in the row, but shall never exceed the labeled maximum for broadcast applications. Consult the product label for additional detail.
Telone EC <sup>2,3</sup>			
Telone C-17 <sup>2,3</sup>	32.4 to 42 gal	95 to 123	For any row spacing, application rates given may be concentrated in the row, but shall never exceed the labeled maximum for broadcast applications. Consult the product label for additional detail.
Telone C-35 <sup>2,3</sup>	39 to 50 gal	114 to 146	For any row spacing, application rates given may be concentrated in the row, but shall never exceed labeled maximum for broadcast applications. Consult the product label for additional detail.
Telone InLine 2,3	29 to 56 gal	-	For drip fumigation, consult the product label for overall rate, drip concentration and flow modifying application directions.
Pic Clor 60 <sup>2,3</sup>	19.5 - 31.5 gal	57 to 90	Consult product label for overall rate and chisel flow modifying application directions.
Pic Clor 60 EC <sup>2,3</sup>	19.5 - 31.5 gal	-	For drip fumigation, consult product label for proportionately reduced overall rates, drip concentration and drip flow modifying directions and procedures.
Vapam HL	75 gal	-	For drip fumigation and crop termination, consult product label for proportionately reduced overall rates, drip concentration and flow modifying directions and procedures.
KPam HL	60 gal	-	For drip fumigation and crop termination, consult product label for proportionately reduced overall rates, drip concentration and flow modifying directions.
Dimethyl <sup>2</sup> Disulfide (DMDS)	51.3 gal	-	Compared to broadcast application, apply proportionately less for in the row applications based on the ratio of bed width to row spacing. Consult the product label for additional detail and rate modifying recommendation and mandatory requirements for totally impermeable mulch films (TIF)
Allyl Isothiocyanate (AITC)	40 gal	-	For drip or in-row fumigation and crop termination, consult product label for overall rates, drip concentration and flow modifying directions
Dominus			

<sup>1</sup> Gallons /acre and Fl oz / 1000 feet provided only for mineral soils. Higher rates may be possible for heavier textured (loam, silt, clay) or highly organic soils.

<sup>2</sup> All of the fumigants mentioned are for retail sale and use only by state certified applicators or persons under their direct supervision. New supplemental labeling for the Telone products must be in the hands of the user at the time of application. See label details for additional use restrictions based on soil characteristics, buffer zones, requirements for Personal Protective Equipment (PPE), mandatory good agricultural practices (GAP's), product and applicator training certification, and rate modifying recommendations with use of highly retentive Totally Impermeable mulch films (TIF).

<sup>3</sup> Higher application rates are possible in the presence of cyst-forming nematodes.

Rates are believed to be correct for products named, and similar products of other brand names, when applied to mineral soils. Higher rates are required for muck (organic) soils. However, the **grower** has the final responsibility to see that each product is used legally; **read the label** of the product to be sure that you are using it properly.