

# **Southeast Regional Strawberry Integrated Management Guide**

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Recommendations are based on information from the manufacturer's label and performance data from research and extension field tests.

Because environmental conditions and grower application methods vary widely, suggested use does not imply that performance of the pesticide will always conform to the safety and pest control standards indicated by experimental data.

This publication is intended for use only as a guide. Specific rates and application methods are on the pesticide label, and these are subject to change at any time. Always refer to and read the pesticide label before making any application! The pesticide label supercedes any information contained in this guide, and it is the legal document referenced for application standards.



# Strawberry Integrated Management Guide—Insect and Disease Control

Pre-planting: Disease Control						
Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Anthracnose Angular leaf spot Phytophthora crown rot Viruses	Certified plants		*****			Certified plants or plants produced in a similarly stringent program are the most important methods to prevent these diseases.
Nematodes	Sample soil  Crop rotation and cover crop selection		***  ***			Sample soils for nematode analysis through local state services to determine which fumigant may be required  Selected summer cover crops and roating fields to other crops for 2-3 years can suppress nematode populations.
Weeds Root and crown rot disorders (Black root rot; Phytophthora crown rot)	Pre-plant fumigation and laying down plastic mulch	Consult with custom applicators and/or extension agents	+++++			Methyl bromide plus chloropicrin (67:33) is available through a critical use exemption in most SE States for 2005. Alternative fumigants and combinations of fumigants are available. Contact your local extension program or custom applicators.

# Strawberry Integrated Management Guide (continued)

## Planting and Early Post-planting: Disease Control

Several products are registered for plant dips to kill pathogens or to protect plants just prior to field setting, but only a limited amount of research has been done. In general, these treatments are not recommended except under specific circumstances, for example, if a disease has been diagnosed to be on the transplants.

Abound (or Quadris) – Mix 5-8 fl. oz/100 gal of water. Dip plants for 2-5 minutes. Transplant treated plants as quickly as possible. This treatment has been developed for bare root transplants with a known problem of anthracnose. The dip is a whole plant dip, and some growers do not re-use the water for fear of spreading bacterial angular leaf spot and other diseases. It is reasonable to expect Abound to have some *Rhizoctonia* activity but there are no research results to demonstrate a benefit. For this purpose, a root dip should suffice, rather than dipping whole plants. *Rhizoctonia* (and the black root rot problem) builds up over time, and it is doubtful that a root dip would offer much benefit in early plant growth. Growers must ensure root dip waste is properly disposed of.

Phosphites – Dip plants in 2.5 lbs/100 gal (Aliette), 2 pints/100 gal (ProPhyt), or 2.5 pints/100 gal (Phostrol) for 15 to 30 minutes and plant within 24 hours after treatment. This treatment should help to suppress *Pythium* and *Phytophthora* problems.

Rovral: Dip the plants in a solution of 2 pints/100 gallons for 1-5 minutes and plant immediately. This is primarily for botrytis crown rot and will not improve root health. This treatment is not likely to offer a lot of benefit.

Products like Oxidate are registered for plant dip use. However, little data are available, and it is doubtful that they would offer management of root diseases. In most cases, root pathogens are internal to the tissue and these products are primarily surface disinfectants.

The \* and \*\* noted in the management option column throughout the disease control sections refer to the following fungicide resistance management recommendations:

\**Botrytis cinerea* historically has a high potential to develop resistance, therefore it is important to give these recommendations serious consideration:

1. Limit the number of times fungicides of the same class are applied in one year.
2. Tank mix a benzimidazole (Topsin-M) fungicide with a broad spectrum fungicide such as Captan or Thiram.
3. Apply fungicides of the same class in a block of sprays (2-3 sprays as specified on the label), then alternate to a fungicide of a different class in the next block of sprays.

\*\*It is currently suggested that you save the strobilurin fungicides (Quadris, Cabrio, and Pristine) for use in controlling anthracnose diseases during optimum disease conditions. Captan or Thiram should help to suppress anthracnose when utilized in botrytis or other disease control applications, but the strobilurin materials are currently the most efficacious materials for control of anthracnose. Some of these strobilurin materials may have activity against multiple pathogens other than anthracnose, but unless anthracnose occurs in conjunction with these other diseases of concern, it is suggested that the strobilurins not be used. With only five total applications of these materials, it is an imperative that they be utilized effectively. Also, resistance management is extremely important with the strobilurins; make sure to follow all resistance management guidelines.

# Strawberry Integrated Management Guide (continued)

## Planting and Early Post-planting: Disease Control (continued)

Powdery mildew—Monitor the field for the first signs of powdery mildew—leaf distortion and discoloration. The mildew in the fall does not appear to cause significant damage and may not reappear in the spring. *Therefore, most growers will not need to spray for powdery mildew.* However, fields have been observed in the fall with severe foliar disease incidence, and plant productivity may then be hampered, justifying control measures. Likewise, if powdery mildew pressure occurs in the spring and affects the fruit, the fruit will have a dull appearance and be unmarketable.

Anthracnose—Most plantings are not at risk for anthracnose. Thus, anthracnose fungicides may not be needed. In most cases, contaminated plant sources are identified before or soon after planting. Know your plant source. If present, anthracnose on plants can cause stunting and plant death. Fall fungicide applications have not been proven to be effective. In general, it is most effective to save the strobilurin (Group 11) chemistry for spring applications and protect the fruit if anthracnose (“acutatum” strain) is known to be present.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Red stele; Phytophthora and Pythium crown/root rots	mefenoxam (Ridomil Gold EC)	1.0 pt/treated acre	++++	12 hrs	0 days	Apply in sufficient water to move the fungicide into the root zone. Use proportionately less Ridomil Gold EC for band treatments (e.g. for drip applications) DO NOT EXCEED 1.5 QT/YEAR.
	Phosphites e.g. Aliette ProPhyt, Phostrol	Various rates, see label	++	12 hrs	0 days	The phosphite-based chemicals are not as effective as Ridomil Gold. Consider phosphites if the pathogen is known to be resistant to mefenoxam or if strawberry plants have poor root systems but sufficient foliage for chemical uptake.
Powdery mildew (only)	Procure 50WS	4.0-8.0 oz./A	+++++	12 hrs	1 day	Do not plant leafy vegetables within 30 days after application. Do not plant root vegetables within 60 days after application. Rotation to all other crops within one year after application, unless Procure 50WS is registered for use on those crops, is prohibited.
	Nova 40W	2.5-5.0 oz/A	+++++	24 hrs	0 days	Nova is registered for control of leaf spot, leaf blight, and powdery mildew. Do not apply more than 30 oz per year.
	sulfur	5 to 10 lb/acre	+++		1	Spray as needed. See label.
Anthracnose	Pristine WG**	18.5-23.0 oz/A	+++++	12 hrs	0 days	No more than 2 sequential applications of a Group 11 fungicide (Pristine, Quadris or Cabrio) should be made before alternating with fungicides that have a different
	Quadris FL**	6.2-15.4 fl. oz./A	+++++	4 hrs	0 days	

# Strawberry Integrated Management Guide (continued)

## Planting and Early Post-planting: Disease Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Anthracnose	Cabrio EG**	12.0-14.0 oz/A	+++++	12 hrs	0 days	mode of action. Do not apply more than five applications of Pristine or Cabrio or no more than four applications of Quadris per acre per crop year.

## Post-planting: Insect Control

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Cricket	carbaryl (Sevin) 80 WP 50 WP 4 XLR	2.5 lb 4 lb 1 to 2 qt	++	12 hr	1 day	Repeated use of carbaryl may cause spider mite problems.
	fenpropathrin (Danitol) 2.4 EC	10.67 to 21.33 fl oz	+++	24 hr	2 days	DO NOT make more than two applications. Apply in at least 100 gal of water per acre.
	malathion (several products) 57 EC	1.5 to 3 pt	+	12 hr	3 days	Most insecticides control crickets. Apply when damage is first noted.
Cutworms	carbaryl (Sevin) 80 WP 50 WP 4 XLR	2.5 lb 4 lb 1 to 2 qt	++	12 hr	1 day	Repeated use of carbaryl may cause spider mite problems. Cutworms are usually more of a problem in matted-row culture. Apply late in the day when plants clipped at the base are first noticed.
	fenpropathrin (Danitol) 2.4 EC	10.67 to 21.33 fl oz	+++	24 hr	2 days	DO NOT make more than two applications. Apply in at least 100 gal of water per acre.
Cyclamen mite	endosulfan (Phaser, Thiodan) 3 EC 50 WP	2.67 qt 4 lb	++	24 hr	4 days	Drench crowns using 800 gal of water per acre. Do not apply at intervals of less than 35 days when fruit is present.

# Strawberry Integrated Management Guide (continued)

## Post-planting: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Cyclamen mite	Dicofol (Kelthane) 35 WP 50 WSP	4 to 6.75 lb 3 to 4 lb		12 hr 48 hr	3 days	Apply 2 high-volume, drenching sprays 10 to 20 days apart when new growth begins. DO NOT make more than 2 applications per crop.
Strawberry aphid	diazinon (AG 500) 4 EC (50 W) 50 WP	1 pt 1 lb	+	24 hr	5 days	Apply as needed.
	endosulfan (Phaser, Thiodan) 3 EC 50 WP	1.33 qt 2 lb	++	24 hr	4 days	
	bifenthrin (Brigade) WSB	6.4 to 32 oz	++	12 hr	0	DO NOT apply more than 0.5 lb a.i. per acre per season.
	malathion (several products) 57 EC	1.5 pt	++	12 hr	3 days	
	naled (Dibrom) 8 EC	1 pt	++	48 hr	1 day	<b>REI - 72 hr if rate is greater than 1 pt.</b> Wash equipment thoroughly to avoid corrosion.
Strawberry clipper	chlorpyrifos (Lorsban) 4 E	1 qt	+++	24 hr	21 days	Prebloom only. Do not make more than two applications. Do not apply during high temperatures and drought stress.
Two-spotted spider mite	abamectin (Agri-Mek) 0.15 EC	8 to 16 fl oz	+++	12 hr	3 days	Make two applications 7 to 10 days apart when mites first appear. Do not exceed 64 fl oz per acre in a growing season. Do not apply in less than 100 gal of water per acre. Do not repeat treatment within 21 days of second application. For resistance management, do not use in strawberry nurseries.

# Strawberry Integrated Management Guide (continued)

## Post-planting: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Two-spotted spider mite	acequinocyl (Kanemite) 15 SC	31 fl oz	++++	12 hr	1 day	Allow 21 days between treatments. Do not make more than 2 applications per season.
	bifenazate (Acramite) 50WP	1 lb	++++	12 hr	1 day	Use only two applications per year. Use in a minimum of 100 gal/acre.
	bifenthrin (Brigade) WSB	16 to 32 oz	+++	12 hr	0	Do not apply more than 0.5 lb/acre per season. Do not use Brigade as a primary mite control.
	dicofol (Kelthane) 4 MF 35 WP	1 qt 1 to 3 lb	++	12 hr	2 days	A miticide may be needed in the fall before covers are placed.
	etoxazole (Zeal)	2 to 3 oz	+++	12 hr	1 day	Make only one application per crop. DO NOT apply more than 3 oz per acre per crop.
	fenpropathrin (Danitol) 2.4 EC	16 to 21.33 fl oz	+++	24 hr	2 days	Do not make more than two applications. Do not retreat within 30 days. Do not use Danitol as a primary mite control.
	hexakis (Vendex) 50 W	1 lb	++	48 hr	1 day	Consider use of predatory mites at first sign of mites. Do not make more than two applications per season.
	hexythiazox (Savey) 50 W	6 oz	+++	12 hr	3 days	Controls eggs and immature mites. DOES NOT kill adults. Use only once; DO NOT apply more than 6 oz per crop. DO NOT use in strawberry nurseries. If adult mites are medium to high, add a material effective on adult mites.
	insecticidal soap (M-Pede)	1 to 2 gal per 100 gal	(+)	12 hr	0	Very thorough coverage is needed. Use with caution; plant damage has been noted under some weather conditions.
spiromesifen (Oberon) SC	12 to 16 fl oz	++++	12 hr	3	Use only 3 applications per crop. Use in a minimum of 100 gal/acre.	

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Bloom: Insect Control

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Aphids	diazinon (Spectracide) (AG 500) 4 EC (50 W) 50 WP	1 pt 1 lb	+	24 hr	5	The use of broad-spectrum insecticides during bloom will damage honeybee populations. Apply when bees are not foraging. Refer to label.
	endosulfan (Thiodan, Phaser) 50 WP 3 EC	2 lb 1.33 qt	+	24 hr	4	Apply at first sign of insects or damage. Do not use endosulfan more than twice during a 35 day period when fruit is present. See comment above about honeybees.
	malathion (several products) 57 EC	1.5 pt	++	12 hr		See comment above about honeybees.
Cutworms	carbaryl (Sevin) 80 WP 50 WP 4 XLR	2.5 lb 4 lb 1 to 2 qt	++	12 hr	1	Repeated use of carbaryl may cause spider mite problems. Cutworms are usually more of a problem in matted-row culture. Apply late in the day when plants clipped at the base are first noticed.
	fenpropathrin (Danitol) 2.4 EC	16.67 to 21.33 fl oz	++	24 hr	2	DO NOT make more than two applications. Apply in at least 100 gal of water per acre.
Flower thrips	endosulfan (Phaser, Thiodan) 3 EC 50 WP	1.33 qt 2 lb	+	24 hr	4 days	DO NOT reapply within 15 days or more than twice within a 35-day period when fruit is present.
	malathion (several products) 57 EC	1.5 pt	+	12 hr	3 days	Severe flower thrips infestations are necessary to cause yield loss in strawberry.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Bloom: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Flower thrips	methomyl (Lannate SP)	0.5 to 1 lb	++	48 hr	3 days	High toxicity. Severe flower thrips infestations are necessary to cause yield loss in strawberry. DO NOT apply when honeybees are foraging.
	pyrellin EC	1 to 2 pt	+	12 hr	0 days	May be used alone or in combination. Acts as an exciter. Foliar application as needed.
	spinosad (Spintor 2 SC Entrust)	4 to 6 oz 1.25 to 1.5 oz	++	4 hr	1 day	Rotate to a different class of insecticide after 2 successive applications. DO NOT apply more than 29 oz (Spintor) or 9 oz (Entrust) per acre per crop.
Slugs and snails	carbaryl (Sevin) 5 B	40 lb	+	12 hr	1 day	Apply bait to edges of beds at dusk. DO NOT contaminate fruit. Repeated applications are necessary. Controls many soil dwelling insects.
	Metaldehyde 4 % Bait (Deadline Bullets)	30 to 60 lbs	++	12 hr	6 days	Band around the edges of beds. DO NOT contaminate edible part of crop.
Strawberry clipper	carbaryl (Sevin) 50 WP 80 WP 4 XLR	2 to 4 lb 1.25 to 2.5 lb 1 to 2 qt	++	12 hr	1 day	Repeated use of carbaryl may cause spider mite problems.
Tarnished plant bug	bifenthrin (Brigade) WSB	6.4 to 32 oz	++	12 hr	0	The use of broad-spectrum insecticides during bloom will damage honeybee populations. Apply when bees are not foraging. Refer to label.
	fenpropathrin (Danitol) 2.4 EC	10.67 oz	++	24 hr	2 days	DO NOT make more than two applications
	malathion (several products) 57 EC	1.5 to 3 pt	+	12 hr	3 days	Apply when nymphs are present in first blossoms.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Bloom: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Two-spotted spider mite	abamectin (Agri-Mek) 0.15 EC	8 to 16 fl oz	+++	12 hr	3 days	Make two applications 7 to 10 days apart when mites first appear. Do not exceed 64 fl oz per acre in a growing season. Do not apply in less than 100 gal of water per acre. Do not repeat treatment within 21 days of second application. For resistance management, do not use in strawberry nurseries.
	acequinocyl (Kanemite) 15 SC	31 fl oz	++++	12 hr	1 day	Allow 21 days between treatments. Do not make more than 2 applications per season.
	bifenazate (Acramite)50WP	1 lb	++++	12 hr	1 day	Use only two applications per year. Use in a minimum of 100 gal/acre.
	bifenthrin (Brigade) WSB	16 to 32 oz	+++	12 hr	0	Do not apply more than 0.5 lb/acre per season. Do not use Brigade as a primary mite control.
	dicofol (Kelthane) 4 MF 35 WP	1 qt 1 to 3 lb	++	12 hr	2 days	A miticide may be needed in the fall before covers are placed.
	etoxazole (Zeal)	2 to 3 oz	+++	12 hr	1 day	Make only one application per crop. DO NOT apply more than 3 oz per acre per crop.
	fenpropathrin (Danitol) 2.4 EC	16 to 21.33 fl oz	+++	24 hr	2 days	Do not make more than two applications. Do not retreat within 30 days. Do not use Danitol as a primary mite control.
	hexakis (Vendex) 50 W	1 lb	++	48 hr	1 days	Consider use of predatory mites at first sign of mites. Do not make more than two applications per season.
	hexythiazox (Savey) 50 W	6 oz	+++	12 hr	3 days	Controls eggs and immature mites. DOES NOT kill adults. Use only once; DO NOT apply more than 6 oz per crop. DO NOT use in strawberry nurseries. If many adult mites are present, use a material effective on adult mites such as Brigade.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Bloom: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Two-spotted spider mite	insecticidal soap (M-Pede)	1 to 2 gal per 100 gal	(+)	12 hr	0	Very thorough coverage is needed. Use with caution; plant damage has been noted under some weather conditions.
	spiromesifen (Oberon) SC	12 to 16 fl oz	++++	12 hr	3 days	Use only 3 applications per crop. Use in a minimum of 100 gal/acre

## Pre-harvest—Early Bloom: Disease Control

Botrytis crown rot may occur during warm winter periods after early bloom is frost killed and colonized by Botrytis. The pathogen typically grows down the flower stem (peduncle) and colonizes the upper crown tissue causing death of the leaf petioles, particularly if plants are large or planted densely.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Botrytis crown rot	iprodione (Rovral) 50 W or	1.5 to 2 lb/acre	++++	24 hrs	NA	Do not apply after first fruiting flower, and do not make more than one application of Rovral per season. Crown rot control may be the most effective use of the one Rovral application allowed in strawberries.
	Switch 62.5WG* or	11-14 oz.	++++	12 hrs.	0 days	See notes below.
	Elevate 50WDG or	1.5 lbs	+++	4 hrs	0 days	See notes below.
	CaptEvote 68 WDG	3.5-5.25 lbs/A	+++	24 hrs	0 days	See notes below.
	Captan 50W or	5 lbs.	++	1 day	1 day	See notes below.
	Captec 4L	2.5 qts	++	1 day	1 day	See notes below.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—New Growth to Pre-bloom: Disease Control

Phomopsis and the various leaf spots and blights generally do not become economically important diseases in the fall or early spring. Thus, fungicides are generally not required for these problems. Thresholds have not been established so the need for fungicides should be determined on a farm-by-farm basis depending on the disease pressure present. Phomopsis and leaf spot may be associated with plant sources – therefore disease incidence can vary from year to year. Warm wet weather favors disease progress.

See previous notes on powdery mildew under “Planting and Early Post-planting: Disease Management” (page 3). In the spring, monitor fields closely observing the underside of strawberry leaves to determine if powdery mildew is present.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Phomopsis leaf blight	Captan 50W or	5 lbs.	++	1 day	1 day	When foliar symptoms appear, make one or two Captan applications plus Topsin-M at a 10 to 14 day interval for better control than Captan products alone would provide. Do not apply more than 48 lbs. Captan 50W or 24 qts. Captec 4L per acre per year.
	Captec 4L or	2.5 qts.	++	1 day	1 day	
	Topsin-M 70WP* or	1 lb.	++	12 hrs	1 day	See note (page 2) on resistance management.
	Nova 40W	2.5-5.0 oz/A	++++	24 hrs	0	Nova is registered for control of leaf spot, leaf blight, and powdery mildew. Do not apply more than 30 oz. per acre.
	Rovral 4FL	1.5-2.0 pts/A	++	24 hrs	see remarks	Do not make more than one application per season. Do not apply after the first fruiting flower.
Common leaf spot Leaf scorch Leaf blight	Captan 50W plus Topsin-M 70WP* or	4 lbs. 1 lb.	++++	1 day 12 hrs	1 day 1 day	When foliar symptoms appear, make one or two Captan applications plus Topsin-M at a 10 to 14 day interval for better control than Captan products alone would provide. Do not apply more than 48 lbs. Captan 50W or 24 qts. Captec 4L per acre per year. Do not tank mix Captan products with highly alkaline pesticides, such as Bordeaux mixture.
	Captan 50W (alone) or	6 lbs.	++	1 day	1 day	
	Thiram 65WP (alone) or	4-5 lbs.	++	1 day	3 days	Make 3 to 5 applications of Thiram 65WP at 10-day intervals.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—New Growth to Pre-bloom: Disease Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Common leaf spot Leaf scorch Leaf blight	Syllit 65WP or	1 2 - 2 lbs.	+++	2 days	14 days	Syllit 65WP provides control of fungal leaf spot diseases and should be applied early in the season. Syllit 65WP can sometimes cause leaf burn. Captan mixed with Syllit 65WP reduces the potential of leaf burn. If leaf burn occurs discontinue use of Syllit 65WP.
	Nova 40W	2.5-5.0 oz/A	++++	24 hrs	0 days	Nova is registered for control of leaf spot, leaf blight, and powdery mildew. Do not apply more than 30 oz per year.
	Rovral 4FL	1.5-2.0 pts/A	++	24 hrs	see remarks	Do not make more than one application per season. Do not apply after the first fruiting flower.
Powdery mildew (only)	Procure 50WS	4.0-8.0 oz./A	+++++	12 hrs	1 day	Do not plant leafy vegetables within 30 days after application. Do not plant root vegetables within 60 days after application. Rotation to all other crops within one year after application, unless Procure 50WS is registered for use on those crops, is prohibited.
	Nova 40W	2.5-5.0 oz/A	+++++	24 hrs	0 days	Nova is registered for control of leaf spot, leaf blight, and powdery mildew. Do not apply more than 30 oz per year.
Angular (bacterial) leaf spot	Basic Copper Sulfate or	2-3 lbs/ 100 gal	+	1 day	12 hrs	Angular (bacterial) leaf spot can be a serious problem during cool, wet conditions. These compounds provide some control if started when disease first appears. Repeat applications at 7 to 10 day intervals. Discontinue when phytotoxicity appears, usually after 4-5 applications.
	KOP 300 or	a-2 gal/ 100 gal	+	12 hrs	2 days	
	Champion 77WP or	2-3 lbs/A	+	2 days	2 days	
	Champion 2F or	1a-2 pts./A	+	2 days	2 days	(continued)

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—New Growth to Pre-bloom: Disease Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Angular (bacterial) leaf spot	Kocide 101 or	2-3 lbs/A	+	1 day	1 day	NOTE: All copper sulfate and copper hydroxide products labeled for strawberry can be used but check label for the proper rate because different products will contain different percents of activity ingredient.
	KOP-Hydroxide	2b-4 pts/ 100 gal	+	2 days	2 days	
Red stele; Phytophthora and Pythium crown/root rots	mefenoxam (Ridomil Gold EC)	1.0 pt/treated acre	++++	12 hrs	0 days	Strawberry plants initiate considerable root growth in the early spring. Time control applications in problem fields when new growth begins in the spring. Apply in sufficient water to move the fungicide into the root zone. Use proportionately less Ridomil Gold EC for band treatments (e.g. for drip applications) DO NOT EXCEED 1.5 QT/YEAR.
	Phosphites e.g. Aliette ProPhyt, Phostrol	Various rates, see label	++	12 hrs	0 days	The phosphite-based chemicals are not as effective as Ridomil Gold. Consider phosphites if the pathogen is known to be resistant to mefenoxam or if strawberry plants have poor root systems but sufficient foliage for chemical uptake.
Botrytis	Remove dead and dying leaves just before bloom		**			Pruning leaves may suppress Botrytis, especially in systems where fungicides are not used. Leaf removal does not appear economically beneficial where fungicides are used for Botrytis management. If anthracnose is present, hand pruning plants creates more disease problems.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Early Bloom (10%) and into Harvest: Disease Control

The primary diseases of concern at early bloom and into harvest are botrytis fruit rot and anthracnose ripe fruit rot. Most growers do not experience anthracnose problems and may not need an anthracnose management program. Several key principles should be kept in mind:

1. Quadris (or Abound), Cabrio and Pristine all have the same family of chemicals (strobilurins; Group 11 chemistry) and are equally effective against anthracnose. A strobilurin should not be used more than 2 times in a row and not more than 5 times in a season. These products also have moderate powdery mildew and leaf blight/spot activity.
2. Pristine also has a second chemical (boscalid) that has good broad spectrum activity against a number of diseases, especially botrytis.
3. Captan, thiram, and Switch also offer a broad spectrum of disease control.
4. Elevate may be not be used in more than 2 consecutive sprays. It is very good against botrytis but nothing else.
5. CaptEvate is a premix of Captan and Elevate and when combined has good broad spectrum activity.
6. Bloom sprays are the most important for managing botrytis because 90% of fruit infection occurs through the flower at bloom.
7. Fruit rot diseases develop rapidly during wet periods or in poorly ventilated locations. Control is easier when initiated before the problem develops. Spray coverage is important and dependent on nozzle condition, tractor speed, pressure and plant density. Spray coverage can be checked with water sensitive cards that can be obtained from your local county agent.

For growers who adopt a conservative (low risk) fungicide program, apply sprays every 7 to 10 days according to ONE of the following suggested schedules.

### **SCHEDULE 1: For cases when there is no risk of anthracnose and growers need to focus on gray mold control (most fields).**

Application 1: at 10 % bloom apply captan + Topsin-M

OR

Switch

Application 2 : Elevate

OR

Pristine

Application 3: same as Application 1 if there is a “full bloom” situation

Application 4 and weekly: Rotate two or more of the following: captan, CaptEvate, Elevate, Switch, Pristine

Options: For a reduced fungicide program initiate applications at 10% bloom as above but apply subsequent sprays before predicted wet weather that favors Botrytis and end applications about 26 – 30 days before expected final harvests.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Early Bloom (10%) and into Harvest: Disease Control (continued)

**SCHEDULE 2: For cases where some insurance is desired against anthracnose but the focus remains on gray mold control.**

Application 1: at 10 % bloom apply captan + Topsin-M

Application 2: CaptEvate

OR

Elevate + (Quadris OR Cabrio)

OR

Pristine

Application 3: same as Application 1 if there is a “full bloom” situation

Application 4 and weekly: Rotate two or more of the following: captan, Elevate + (Quadris OR Cabrio) OR Pristine OR Switch + (Quadris OR Cabrio).

**SCHEDULE 3: Aggressive program to manage anthracnose if disease is known to be present.**

Application 1: at 10 % bloom apply captan + Pristine

Application 2: captan + (Quadris OR Cabrio)

OR

Pristine

Application 3: CaptEvate

Application 4 and weekly: Rotate the following combinations: captan + (Quadris OR Cabrio), CaptEvate, Pristine. In other words, there should be continuous coverage with Captan or a strobilurin, or the combination. Follow principle Key Principle 1 above (page 14). During periods of cool wet weather and during bloom, incorporate Elevate or Switch for better Botrytis control.

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Botrytis blight	Captan 50W or	5 lbs.	+++	1 day	1 day	For better control and resistance management, use Captan applications plus Topsin-M (see label). See suggested schedule above. Do not apply more than 48 lbs. Captan 50W or 24 qts. Captec 4L per acre per year.
	Captec 4L or	2.5 qts.	+++	1 day	1 day	
	Topsin-M 70WP* or	1 lb.	++++	12 hrs	1 day	See note above (page 2) on resistance management. Research has demonstrated Topsin-M is helpful if used one to two times, after which time resistant populations seem to predominate.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Early Bloom (10%) and into Harvest: Disease Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Botrytis blight	Thiram 65WP or	4-5 lbs.	+++	1 day	3 days	Make 3 to 5 applications at 10-day intervals. Thiram is a broad spectrum fungicide similar to captan.
	Elevate 50WDG  or	1.5 lbs	+++++	4 hrs	0 days	Do not apply more than 6 pounds of Elevate per season per acre. Avoid making more than two consecutive applications. After the second application, use an alternative Botrytis material for two consecutive applications before reapplying Elevate. Under light pressure, reduced rates plus Captan may be used (see label).
	Switch 62.5WG*  or	11-14 oz.	+++++	12 hrs.	0 days	Begin application at or before bloom and continue on a 7-10 day interval. Do not exceed 56 ounces of product per acre per year. Do not plant rotational crops other than strawberries or onions for 12 months following the last application of Switch.
	CaptEstate 68 WDG or	3.5-5.25 lbs/A	+++++	24 hrs	0 days	CaptEstate is a combination product of Captan plus Elevate. Do not make more than two consecutive applications before switching to a fungicide with a different mode of action. Do not apply more than 21.0 lbs/A/season. With plastic mulch, do not apply within 16 feet of naturally vegetated or aquatic areas.
	Scala	18 fl. oz/A or 9 fl. oz/A	+++	12	24	Use lower rate only in a tank mix with another fungicide active against gray mold (e.g. captan or thiram).
Botrytis blight and Anthracnose	Pristine WG**	18.5-23.0 oz/A	+++++	12 hrs	0 days	No more than two sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than five applications of Pristine per acre per crop year.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Early Bloom (10%) and into Harvest: Disease Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Botrytis blight and Anthracnose	Captan 50W or	5 lbs.	+++	1 day	1 day	For better control and resistance management, use Captan applications plus Topsin-M (see label). See suggested schedule above. Do not apply more than 48 lbs. Captan 50W or 24 qts. Captec 4L per acre per year.
	Captan 50W or	5 lbs.	+++	1 day	1 day	
Anthracnose	Quadris FL	6.2-15.4 fl. oz./A	++++	4 hrs	4 hrs	No more than 2 sequential applications of Quadris should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Quadris per acre per crop year.
	Pristine WG	18.5-23.0 oz/A	++++	12 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than five applications of Pristine per acre per crop year.
	Cabrio EG	12.0-14.0 oz/A	++++	12 hrs	0 days	No more than 2 sequential applications of Cabrio should be made before alternating with fungicides that have a different mode of action. Do not apply more than five applications of Cabrio per acre per crop year.
Powdery mildew (only)	Procure 50WS	4.0-8.0 oz./A	+++++	12 hrs	1 day	Do not plant leafy vegetables within 30 days after application. Do not plant root vegetables within 60 days after application. Rotation to all other crops within one year after application, unless Procure 50WS is registered for use on those crops, is prohibited.
	Nova 40W	2.5-5.0 oz/A	+++++	24 hrs	0 days	Nova is registered for control of leaf spot, leaf blight, and powdery mildew. Do not apply more than 30 oz per year.

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Early Bloom (10%) and into Harvest: Disease Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Powdery mildew and Anthracnose	Quadris FL**	6.2-15.4 fl. oz./A	++++	4 hrs	4 hrs	No more than 2 sequential applications of Quadris should be made before alternating with fungicides that have a different mode of action. Do not apply more than four applications of Quadris per acre per crop year.
	Pristine WG**	18.5-23.0 oz/A	++++	12 hrs	0 days	No more than 2 sequential applications of Pristine should be made before alternating with fungicides that have a different mode of action. Do not apply more than five applications of Pristine per acre per crop year.
	Cabrio EG**	12.0-14.0 oz/A	++++	12 hrs	0 days	No more than 2 sequential applications of Cabrio should be made before alternating with fungicides that have a different mode of action. Do not apply more than five applications of Cabrio per acre per crop year.
Red stele, Phytophthora and Pythium crown/root rots	mefenoxam (Ridomil Gold EC)	1.0 pt/treated acre	++++	12 hrs	0 days	Under heavy disease pressure conditions, an in season application may be helpful. Apply in sufficient water to move the fungicide into the root zone. Use proportionately less Ridomil Gold EC for band treatments (e.g. for drip applications). DO NOT EXCEED 1.5 QT/YEAR.
	Phosphites e.g. Aliette ProPhyt, Phostrol	Various rates, see label	++	12 hrs	0 days	The phosphite-based chemicals are not as effective as Ridomil Gold. Consider phosphites if the pathogen is known to be resistant to mefenoxam or if strawberry plants have poor root systems but sufficient foliage for chemical uptake.
Angular (bacterial) leaf spot	Basic Copper Sulfate or	2-3 lbs/100 gal	+	1 day	12 hrs	In most cases angular (bacterial) leaf spot will dry up during warmer weather. However, if cool wet weather persists during bloom and fruit development, the

# Strawberry Integrated Management Guide (continued)

## Pre-harvest—Early Bloom (10%) and into Harvest: Disease Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Angular (bacterial) leaf spot	KOP 300 or	a-2 gal/ 100 gal	+	12 hrs	2 days	(continued) pathogen can colonize the calyx and cause a brown discoloration. These compounds provide some control if started prior to such predicted weather patterns. Repeat applications at 7 to 10 day intervals. Discontinue when phytotoxicity appears, usually after 4-5 applications.  NOTE: All copper sulfate and copper hydroxide products labeled for strawberry can be used but check label for the proper rate because different products will contain different percents of activity ingredient.
	Champion 77WP or	2-3 lbs/A	+	2 days	2 days	
	Champion 2F or	1 a-2 pts./A	+	2 days	2 days	
	Kocide 101 or	2-3 lbs/A	+	1 day	1 day	
	KOP-Hydroxide	2b-4 pts/ 100 gal	+	2 days	2 days	

## Harvest: Insect Control

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Aphids	bifenthrin (Brigade) WSB	6.4 to 32 oz	+++	12 hr	0	The use of broad-spectrum insecticides during bloom will damage honeybee populations. Apply when bees are not foraging. Refer to label.
	malathion (several products) 57 EC	1.5 pt	+	12 hr	3 days	
Leaf rolling caterpillar	carbaryl (Sevin) 50 WP 80 WP 4 L	2 lbs 1.25 lbs 1 qt		12 hr	1 day	If noted during harvest, treat when more than two larvae per plant are found.
	malathion (several products) 57 EC	1.5 pt		12 hr	3 days	

# Strawberry Integrated Management Guide (continued)

## Harvest: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Sap beetle	bifenthrin (Brigade) WSB	6.4 to 32 oz	++	12 hr	0	Apply when bees are not foraging. Refer to label.
	carbaryl (Sevin) 50 WP 80 WP 4 XLR	2 to 4 lb 1.25 to 2.5 lb 1 to 2 qt	++	12 hr	1 day	Repeated use of carbaryl may cause spider mite problems.
	malathion (several products) 57 EC	1.5 pt	++	12 hr	3 days	Sap beetles are attracted to the smell of overripe fruit. Keeping ripe fruit picked clean will reduce problems with sap beetles. Dispose of culls by burying or hauling off.
Slugs and snails	carbaryl (Sevin) 5 B	40 lb	+	12 hr	1 day	Apply bait to edges of beds at dusk. DO NOT contaminate fruit. Repeated applications are necessary. Controls many soil dwelling insects.
	iron phosphate 1%	40 lb	+	0	0	Follow label directions. Avoid contact with fruit.
	Metaldehyde 4 % Bait (Deadline Bullets)	30 to 60 lbs	++	12 hr	6 days	Band around the edges of beds. DO NOT contaminate edible part of crop.
Spittlebug	endosulfan (Phaser, Thiodan) 3 EC 50 WP	1.33 qt 2 lb		24 hr	4 days	DO NOT reapply within 15 days or more than twice within a 35 day period when fruit is present.
	fenpropathrin (Danitol) 2.4 EC	10.67 oz		24 hr	2 days	DO NOT make more than two applications
	malathion (several products) 57 EC	1.5 pt		12 hr	3 days	

# Strawberry Integrated Management Guide (continued)

## Harvest: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Tarnished plant bug	bifenthrin (Brigade) WSB	6.4 to 32 oz	++	12 hr	0	The use of broad-spectrum insecticides during bloom will damage honeybee populations. Apply when bees are not foraging. Refer to label.
	fenpropathrin (Danitol) 2.4 EC	10.67 oz	++	24 hr	2 days	DO NOT make more than two applications
	malathion (several products) 57 EC	1.5 to 3 pt	+	12 hr	3 days	Apply when nymphs are seen.
Two-spotted spider mite	abamectin (Agri-Mek) 0.15 EC	8 to 16 fl oz	+++	12 hr	3 days	Make two applications 7 to 10 days apart when mites first appear. Do not exceed 64 fl oz per acre in a growing season. Do not apply in less than 100 gal of water per acre. Do not repeat treatment within 21 days of second application. For resistance management, do not use in strawberry nurseries.
	acequinocyl (Kanemite) 15 SC	31 fl oz	++++	12 hr	1 day	Allow 21 days between treatments. Do not make more than 2 applications per season.
	bifenazate (Acramite)50WP	1 lb	++++	12 hr	1 day	Use only two applications per year. Use a minimum of 100 gal/acre.
	bifenthrin (Brigade) WSB	16 to 32 oz	+++	12 hr	0	Do not apply more than 0.5 lb/acre per season. Do not use Brigade as a primary mite control.
	dicofol (Kelthane) 4 MF 35 WP	1 qt 1 to 3 lb	++	12 hr	2 days	A miticide may be needed in the fall before covers are placed.
	etoxazole (Zeal)	2 to 3 oz	+++	12 hr	1 day	Make only one application per crop. DO NOT apply more than 3 oz per acre per crop.

# Strawberry Integrated Management Guide (continued)

## Harvest: Insect Control (continued)

Pest/Problem	Management Options	Amount of Formulation per Acre	Effectiveness (+) or Importance (*)	REI	PHI	Comments
Two-spotted spider mite	fenpropathrin (Danitol) 2.4 EC	16 to 21.33 fl oz	+++	24 hr	2 days	Do not make more than two applications. Do not retreat within 30 days. Do not use Danitol as a primary mite control.
	hexakis (Vendex) 50 W	1 lb	++	48 hr	1 day	Consider use of predatory mites at first sign of mites. Do not make more than two applications per season.
	hexythiazox (Savey) 50 W	6 oz	+++	12 hr	3 days	Controls eggs and immature mites. DOES NOT kill adults. Use only once; DO NOT apply more than 6 oz per crop. DO NOT use in strawberry nurseries. If many adult mites are present, use a material effective on adult mites such as Brigade.
	insecticidal soap (M-Pede)	1 to 2 gal per 100 gal	(+)	12 hr	0	Very thorough coverage is needed. Use with caution; plant damage has been noted under some weather conditions.
	spiromesifen (Oberon) SC	12 to 16 fl oz	++++	12 hr	3 days	Use only 3 applications per crop. Use in a minimum of 100 gal/acre.
Whiteflies	malathion (several products) 57 EC	1.5 pt		12 hr	3 days	
	Fenpropathrin (Danitol) 2.4 EC + malathion (various products) 57 %	10.67 oz 1 – 2 pt	++	24 hr	3 days	DO NOT make more than two applications.
	Pyrellin EC	1 – 2 pt		12 hr	12 hr	May be used alone or in combination as an “exciter.”

# Strawberry Integrated Management Guide (continued)

## Seasonal “At-a-glance” Arthropod Control Spray Schedule

Developmental Stage <sup>1</sup>	Post-planting (Fall/early to mid-winter)	Pre-harvest—Bloom (Late winter to early spring) <sup>3</sup>	Harvest
<b>Pests Controlled (Insecticides/Miticides)</b>	Crickets and cutworms (carbaryl, Danitol) Cyclamen mite (endosulfan, Kelthane) Strawberry aphid (Bridgade, diazinon, Dibrom, endosulfan) Strawberry clipper (Lorsban) Two-spotted spider mite <sup>2</sup> (Agri-Mek, Kelthane, Vendex), (Acramite, Kanemite, Oberon, Zeal), (Brigade, Danitol)	Aphids <sup>3</sup> (endosulfan, malathion) Flower thrips <sup>3</sup> (endosulfan, malathion, Lannate, Spintor) Slugs/Snails (baits containing carbaryl and/or metaldehyde) Strawberry clipper (carbaryl) Tarnished plant bug <sup>4</sup> (Brigade, endosulfan, malathion) Two-spotted spider mite <sup>5</sup> (Agri-Mek, Kelthane, Vendex), (Acramite, Kanemite, Oberon, Zeal), (Brigade, Danitol)	Sap beetles <sup>6</sup> (Brigade, carbaryl, malathion) Slugs/snails (baits containing carbaryl and/or metaldehyde) Two-spotted spider mite (Agri-Mek, Kelthane, Vendex), (Acramite, Kanemite, Oberon, Zeal), (Brigade, Danitol)

<sup>1</sup> Management of strawberry pests is a reactive program based on the detection of pests in the field. There are no established preventive spray programs as there are in other fruit crops. Thorough scouting is necessary to detect pests early before infestations build to damaging levels.

<sup>2</sup> A thorough inspection of planting material is necessary to avoid introducing mites from the nursery into production fields. Scouting to determine the extent of infestation and the presence of eggs is necessary. Multiple applications of the older materials (first group) will be necessary to eliminate adult mites. These materials aren't effective against eggs. Resistance to these materials may be a problem, particularly if you have had problems with mites previously or the transplants or plugs were infested with mites. The second group of materials is effective against eggs as well as older life stages of the two-spotted spider mite, however these materials would be the primary tools for spring infestations. Fall use could affect the number of applications allowed in the spring. Please follow resistance management guidelines stated on the labels. Brigade or Danitol can be used against adult and immature mites, but resurgence may occur. Post-application scouting when these materials are used is critical.

<sup>3</sup> Aphid or flower thrips populations have to be very high to cause yield loss in strawberry. Spraying broad spectrum insecticides during bloom can kill honeybees; follow instructions on pesticide labels to minimize damage to honeybees.

<sup>4</sup> Tarnished plant bugs begin to feed early in the spring on flowers and developing seeds of various weeds. Wild radish, often called “wild mustard,” is a favored late winter host. Keeping weeds down in and around fields will reduce populations. See note above about honeybees.

<sup>5</sup> As weather begins to warm, scout well for any over-wintered mites. Follow label instructions about resistance management carefully when using miticides. Mites are found often on wild brambles and morningglory; when possible, eliminate these plants from field borders.

<sup>6</sup> Sap beetles are attracted to overripe fruit. Keeping this type of fruit picked and removed from the field will reduce problems with sap beetles. Insecticides are not very effective in killing larvae after they are inside the fruit.

# Strawberry Integrated Management Guide—Weed Control

## Plasticulture Weed Control

### Pre-planting

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI	Comments
Annual broadleaf weeds including Carolina geranium and cutleaf eveningprimrose	<b>Oxyfluorfen</b> Goal 2 XL	1 to 2 pt	Apply to soil surface of preformed beds at least 30 days before transplanting.	24 hr	Plastic mulch should be applied soon after Goal application. Best results occur when plastic is applied immediately after herbicide application. Incorporation is not necessary but it may result in less crop injury.
Annual grasses and broadleaf weeds	<b>Methyl bromide</b> Various brands and concentrations	240 lb active ingredient	Apply at least 2 weeks prior to planting.	48 hr see label for detail	Inject into soil at a depth of 4 to 6 inches and cover with a tarp. Soil moisture should be near field capacity and soil temperature should be at least 50° F. Allow 2 weeks after application before transplanting. Disking after tarp removal will facilitate aeration.

### Pre-emergence

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI	Comments
Annual grasses and small seeded broadleaf weeds	<b>DCPA</b> Dacthal Flowable Dacthal 75-W	8 to 12 pt 8 to 12 lb	Direct to middles between plastic.	12 hr	Apply for pre-emergence weed control in the middles. Fall application can injure ryegrass seeded in row middles for erosion prevention. Small grain will be controlled if applied prior to emergence. Rainfall or overhead irrigation is needed within 24 hours of application for herbicide activation.

## Plasticulture Weed Control (continued)

### Post-emergence

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI	Comments
Nonselective weed control	<b>Glyphosate</b> Roundup WeatherMax 5.5 SL	11 to 22 oz	Apply with hooded spray or wiper applicator	12 hr	To prevent SEVERE crop injury use application equipment and technique that will prevent contact with any portion of the crop or plastic. Do not apply within 14 days of harvest.
	<b>Paraquat</b> Gramoxone Max	1.3 pt	Apply with hood spray or shields to protect crop	12 hr	Contact kill of all green foliage. Do not allow drift or spray solution to contact crop or severe injury or crop death will occur. The addition of a non-ionic surfactant at 0.25 % v/v (1 pt/50 gal. of spray solution) is required for optimum results. Apply in a minimum spray volume of 20 gal. per acre. Do not make more than 3 applications per year.
Broadleaf weeds including ragweed, clover, vetch, dock, cocklebur, dandelion, sowthistle, thistle, and nightshade.	<b>Clopyralid</b> Stinger 3 EC	0.33 to 0.67 pt	Broadcast application	12 hr	<b>The Stinger use in strawberry is issued on a state by state basis therefore it may NOT be registered for use in all states using this guide.</b> Apply in the spring before harvest or post-harvest. Do not apply within 30 days of harvest. Do not use a surfactant or apply in combination with other pesticides.
Annual and perennial grasses	<b>Clethodim</b> Select 2EC or Arrow 2 EC	6 to 8 oz	Newly planted or established plantings.	12 hr	Use high rate and sequential applications are for perennial grasses (bermudagrass or johnsongrass). The addition of a non-ionic surfactant at 0.25 % v/v (1 qt/100 gal. of spray solution) or crop oil concentrate at 1% v/v (1 gal per 100 gal. of spray solution) is required. Total use during season can not exceed 32 oz per acre per year. Do not apply within 4 days of harvest.

## Plasticulture Weed Control (continued)

### Post-emergence (continued)

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI	Comments
Annual and perennial grasses	<b>Sethoxydim</b> Poast	1 to 1.5 pt	Newly planted and established plantings	12 hr	Sequential applications will be necessary for perennial grass control. The addition of a non-ionic surfactant (1 qt/100 gal of water) or crop oil concentrate (1 gal/100 gal. of water) is necessary for optimum results. Do not apply within 7 days of harvest. Total use cannot exceed 2.5 pt per acre per year.

## Matted Row Weed Control

### Pre-planting

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI	Comments
Annual grass and broadleaf weeds	<b>Methyl bromide</b> Various brands and concentrations	240 lb active ingredient	Apply at least 2 weeks prior to planting.	48 see label for detail	Inject into soil at a depth of 4 to 6 inches and cover with a tarp. Soil moisture should be near field capacity and soil temperature should be at least 50°F. Allow 2 weeks after application before transplanting. Disking after tarp removal will facilitate aeration.
Annual broadleaf weeds including Carolina geranium and cutleaf eveningprimrose	<b>Oxyfluorfen</b> Goal 2 XL	1 to 2 pt	Apply to soil surface of preformed beds at least 30 days before transplanting.	24	Plastic mulch should be applied soon after Goal application. Best results occur when plastic is applied immediately after herbicide application. Incorporation is not necessary, but it may result in less crop injury. Registered for use in N.C., S.C., Ga., and Va., only.

## Matted Row Weed Control (continued)

### Pre-emergence

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI	Comments
Annual grasses and small-seeded broadleaf weeds	<b>DCPA</b> Dacthal Flowable Dacthal 75-W	8 to 12 pt 8 to 12 lb	Newly planted and established plantings before bloom.	12	Apply over the top of newly planted strawberries after transplanting. Apply to established plantings in the fall to early spring prior to bloom. Overhead irrigation or rainfall within 24 hr of application is necessary for activation.
	<b>Napropamide</b> Devrinol 50 WDG or Devrinol 10 G	8 lb 40 lb	Established strawberries.	12	Apply any time prior to weed emergence except for the interval between bloom and harvests. Rainfall, overhead irrigation, or cultivation within 3 to 7 days is necessary for activation and optimum herbicide performance.
Annual broadleaf weeds and grasses	<b>Terbacil</b> Sinbar 80 WP	2 to 6 oz or 4 to 8 oz	Newly planted and established plantings.	12	For winter weed control, apply 2 to 6 oz per acre in late summer or early fall. If crop is not dormant, the application must be followed immediately by 0.5 to 1 in. of overhead irrigation. For extended control through harvest the following year, apply 2 to 4 oz per acre prior to mulching in late fall.  In established plantings, apply 4 to 8 oz post-harvest renovation and before new growth begins in mid-summer. For extended weed control through harvest the following year, apply 4 to 6 oz per acre prior to mulching in late fall. Do not apply within 110 days of harvest. See label for more information.

## Matted Row Weed Control (continued)

### Post-emergence

Weed/Timing	Material	Amount of Formulation per Acre	Crop Age Restrictions	REI	Comments
Broadleaf weeds including ragweed, clover, vetch, dock, cocklebur, dandelion, sowthistle, thistle, and nightshade.	<b>Clopyralid</b> Stinger 3 EC	0.33 to 0.67 pt	Newly planted and established plantings	12	<b>The Stinger use in strawberry is issued on a state-by-state basis. Therefore, it may NOT be registered for use in all states using this guide.</b> Apply in the spring before harvest or post-harvest. Do not apply within 30 days of harvest. Do not use a surfactant or apply in combination with other pesticides.
Broadleaf weeds	<b>2, 4-D amine</b> Amine 4 SL Various brands	1 to 2 pt	Established plantings	12	2, 4-D can be applied to established strawberry plants that are dormant or immediately after the completion of final harvest. Apply in a spray volume of 25 to 50 gallons per acre.
Annual and perennial grasses	<b>Clethodim</b> Select	6 to 8 oz	Newly planted or established plantings.	12	Use high rate and sequential applications are for perennial grasses (bermudagrass or johnsongrass). The addition of a non-ionic surfactant at 0.25 % v/v (1 qt/100 gal. of spray solution) or crop oil concentrate at 1% v/v (1 gal per 100 gal. of spray solution) is required. Total use during season cannot exceed 32 oz per acre per year. Do not apply within 4 days of harvest.
	<b>Fluazifop</b> Fusilade DX	12 to 24 oz	Newly planted (non-bearing only)	12	Sequential applications will be necessary for perennial grass control. The addition of a non-ionic surfactant (1 qt/100 gal of water) or crop oil concentrate (1 gal./100 gal. of water) is necessary for optimum control.
	<b>Sethoxydim</b> Poast	1 to 1.5 pt	Newly planted and established plantings	12	Sequential applications will be necessary for perennial grass control. The addition of a non-ionic surfactant (1 qt/100 gal of water) or crop oil concentrate (1 gal/100 gal. of water) is necessary for optimum results. Do not apply within 7 days of harvest. Total use cannot exceed 2.5 pt/A.

# Strawberry Integrated Management Guide—Suggested Herbicide Schedule

<b>Plasticulture</b>			
<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer</b>
Methyl Bromide (pre-plant)	Stinger (use if vetch, clover, or other legumes are a problem); paraquat directed to middles	Select or Poast followed by Dacthal (directed to row middles); paraquat directed to middles	
Methyl Bromide (pre-plant)	Stinger (use if vetch, clover, or other legumes are a problem); paraquat directed to middles	Roundup WeatherMax + Dacthal (apply with hooded equipment); paraquat directed to middles	
Goal (apply at least 30 days pre-plant)	Stinger (use if vetch, clover, or other legumes are a problem); paraquat directed to middles	Select or Poast followed by Dacthal (directed to row middles); paraquat directed to middles	
<b>Matted Row—Establishment Year</b>			
<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer</b>
		Sinbar or Dacthal (after transplanting)	Fusilade, or Poast, or Select; Cultivation and hand hoeing.
<b>Matted Row—Established Planting</b>			
<b>Fall</b>	<b>Winter</b>	<b>Spring</b>	<b>Summer</b>
Stinger (if needed)	Sinbar or Devrinol		2,4-D (if needed) followed by Sinbar (post-harvest renovation application); Select or Poast (if needed)
Stinger (if needed); Sinbar	Devrinol		2,4-D (if needed) followed by Sinbar (post-harvest renovation application); Select or Poast (if needed)

*Beautiful.  
Flawless.  
In a word,  
Captivating.*



In this business, looks are everything.

So it makes sense to protect the beauty of  
your berries with the broad-spectrum disease  
control of CAPTEVATE™ Fungicide.

Only CAPTEVATE offers you the proven performance of  
Captan and ELEVATE® fungicides in a new, premium  
quality formulation. The result: outstanding  
control of Anthracnose fruit rot and *Botrytis gray*  
mold plus control of mummy berry in blueberries.  
All in one convenient, low-dust product.

But there's more to like about CAPTEVATE,  
including two unique modes of action for built-in  
resistance management. Exceptional crop safety  
for added peace of mind. And excellent tank-mix  
compatibility for added versatility. Add it all up and  
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