

Chapter 15. Root Crop Production in Florida

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I. Beet, Carrot, Radish, and Sweetpotato Botany and Planting

Beet - *Beta vulgaris*, Chenopodiaceae

Carrot - *Daucus carota*, Apiaceae (Umbelliferae)

Radish – *Raphanus sativus*, Brassicaceae (Cruciferae)

Sweetpotato – *Ipomoea batatas*, Convolvulaceae

Table 15.1. Planting information for beet, carrot, radish and sweetpotato.

Planting Dates	Beet	Carrot	Radish	Sweetpotato
North Florida	Aug - Feb	Aug-Mar	Sept – Mar	Mar – June
Central Florida	Sept – Feb	Aug-Mar	Sept – Mar	Feb – June
South Florida	Oct - Jan	Sept-Mar	Oct – Mar	Dec – Sept (orange flesh type) Year round (boniato/batatas type)
Planting Information				
Distance between rows (in)	12 - 30	10 - 12	6	36 – 48
Distance between plants (in)	2 - 4	1 - 3	1	10 – 12
Seeding depth (in)	0.5 - 1.0	0.25	0.25	3 – 4
Seed per acre (lb)	10 - 15	2 - 4	10 – 20	9,000 – 15,000
Days to maturity from seed	50 - 70	70 - 120	20 – 30	85 - 130
Plant population (acre)	261,360	630,000	1 million+	9,000 – 15,000

Cultivars

Table 15.2. Common cultivars of beet, carrot, and sweetpotato.

Beet	Carrot	Radish	Sweetpotato
Bohan	Apache	Escala F1	Beauregard
Bulls Blood (tops)	Choctaw	Fuego1	Covington
Golden Beets (yellow)	Navajo	Red castle	Evangeline
Green Top	Top Notch	Red Satin F1	Hernandez
Pacemaker III		Red Silk2	Picadito (Boniato)
Red Ace		Rudi	
Red Cloud			

¹ Resistant to yellows; Tolerant to black root and rhizoctonia scurf

² Resistant to pithing; Intermediate resistance to black root, yellows, clubroots, rhizoctonia scurf.

II. Tropical Root Crops

Tropical root crops are planted primarily for their edible roots, corms or cormels. In this regard, tropical root crops require a longer period of time to mature than many other vegetable crops. Some root crops take as long as 14 months to reach maturity. Some people also eat the edible leaves of both cassava and taro. In the case of both these crops, plants grown for edible leaves can be grown in cooler locations than would otherwise be possible. For pest control products, these crops are included in root and tuber vegetables.

Botany and Planting

Table 15.3. Planting information for cassava, taro and malanga.

Planting dates	Cassava	Taro	Malanga
Miami-Dade County	Year-round (mainly February to April)	Year-round	Year-round
Planting information			
Distance between rows (in)	48	52	52
Distance between plants (ft)	2	1	1
Planting depth (in)	3 - 4	4 - 6	4 - 6
Propagules needed per acre	5,445	2,420-3,630	2,420-3,630
Minimum propagule size	10-12" stick or micro-propagules	2 oz	2 oz
Bedded	No	Yes	Yes
Months to harvest from planting	8-12	6-10	9-14
Plant populations (acre)	5,445	10,052	10,052

Cultivars

Cassava – known the world over by a variety of names including manioc, yuca, mandioca, balinghoy, kamoteng, kahoy (Philippines), mogo (Africa), tapioca-root (India) and manioc root in its native of South America. Though the exact origins of cassava are unknown, it was likely domesticated between 7,000 and 9,000 years ago in the Amazon. This root crop is grown throughout tropics and has become an important dietary staple in many parts of the world.

Varieties are often separated based of their cyanogenic glucoside (HCN) content into either low HCN, a.k.a. "sweet," or high HCN, a.k.a. "bitter," types. The term "bitter" comes from a bitter flavor that is commonly believed to accompany the HCN. Though no named varieties are currently known in southern Florida, 'Senorita' was locally popular in the 1980s and attempts were made to introduce the CIAT variety 'Mantiqueira' at that same time because it produced acceptable yields even with high levels of rootknot nematode infestation. The range of local genotypes covers a few unnamed clones that have been imported from various Caribbean basin countries. Federal regulations prohibit further importation of cuttings or botanical seed.

Root development may occur as early as 28 days after planting though it may take about six weeks before fibrous roots begin to thicken rapidly with starch granules. There does not appear to be any specific trigger to root thickening but the number of roots that will eventually thicken is determined early in the life of the crop with little change in the number of thickened roots after three months. A soil fertility analysis is conducted as a routine practice to ensure an adequate amount of potassium is maintained in the soil to improve root development for improved yield. The amount of nitrogen available to the crop is often limited because excessive nitrogen increases vegetative growth rather than the root development.

For people who are able to find cuttings, follow the technique developed by scientists at the International Institute for Tropical Agriculture (IITA) in Ibadan, Nigeria where one makes 2-node cuttings or ministakes that can provide a 5-fold increase in the production of propagules from each parent cassava plant. According to IITA, "[t]hese ministakes are easily moved and protected in plastic sacks until they can be grown on and hardened in individual plastic bags or nursery beds before being planted in the field."

It takes 8-12 months for cassava roots to reach maturity. Plants are often cut back two weeks prior to harvest resulting in increased tuber size and yields about 10% higher.

Preferences for specific varieties of cassava used for edible leaves may exist among consumers, though the ability to satisfy these requests is very limited given the very small number of varieties currently grown in the U.S.

Taro – 'Malanga Isleña,' produces one large white-fleshed central corm; a few unnamed Polynesian types are grown for the Asian market. The name taro is generally used to refer to *Colocasia esculenta*, one of several major root crops in the Araceae (Aroid) family.

There are several important crops throughout the tropical regions of the world related to taro and grown in certain Florida locations. These include the giant swamp taro, the giant taro, and cocoyam. Each of these Aroids has several other common names depending on the region of the world.

Information about taro in Florida is limited due to a small acreage. However taro can be cultivated under both wetland and dryland conditions with the latter referred to as 'dasheens' in Florida. Most will mature in 6 to 10 months with corms being dug up with modified potato harvesters in commercial production. The corms are washed of soil, sorted by size, and packed. The recommended cold room temperature for prolonged storage is 45-50 °F with a relative humidity of 85.

Tannia – is widely grown and used in the tropics and has been grown on a limited commercial sale since 1963 in south Florida where it typically planted in the spring since the crop requires 9 to 10 months to reach maturity and can be injured by frosts. Tannia can be propagated by several methods: (1) plant the top (head), (2) plant the whole main tuber, (3) plant pieces of the main tuber, or (4) plant individual secondary tubers. Propagative materials should be set 3 to 5 inches below the surface. 'South Dade White,' produces white-fleshed cormels; 'Malanga Amarilla,' produces a yellow-fleshed edible corm; and 'Vinola,' produces purple-fleshed cormels.

Tropical sweetpotato – 'Picadito' is the main variety grown in Miami-Dade County. It has deeply lobed leaves and wine colored skin.

It is illegal to import sweetpotatoes into the U.S. and there is no program to produce disease-free planting material of 'Picadito' in Florida. Other sweetpotato growing states have developed red-skinned, white-fleshed sweetpotatoes which may grow well in Florida and which may be available from those plant breeders or through certified slip producers.

Table 15.4. Herbicides approved for managing weeds in beets.

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
*** PREEMERGENCE ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW up to 2 fl. oz. (Aim) 2 EC up to 2 fl. oz.	14	Apply as a preplant burn down for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. Maximum rate of 0.096 lb. a.i./A per season. No pretransplant interval.
Glyphosate	(various formulations) consult labels	9	Emerged broadleaf and grass weeds. Apply as a preplant burn down. Consult labels for individual product directions.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v	27	Emerged broadleaf and grass weeds. Apply as a preplant burn down treatment. Scythe is a contact and nonresidual herbicide and can be tank mixed residual preemergence herbicides to lengthen control.
Pyraflufen 0.001 - 0.003	(ET Herbicide) 0.208 EC 0.5 - 2.0 fl. oz.	14	Emerged broadleaf weeds and grass weeds. Apply as a preplant burndown treatment.
*** POSTEMERGENCE ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW up to 2 fl. oz. (Aim) 2 EC up to 2 fl. oz.	14	Emerged broadleaf weeds. Apply as a hooded application to row middles only. Use crop oil concentrate or nonionic surfactant at recommended rates. May be tank mixed with other herbicides. Do not exceed 6.1 fl. oz. per cropping season. PHI 0 days.
Clethodim 0.09 - 0.13 0.07 - .25	(Select, Arrow) 2 EC 6 - 8 fl. oz. (Select Max) 1 EC 9 - 16 fl. oz.	1	Perennial and annual grass weeds. In fields with heavy grass pressure or larger grass weeds, use higher rates or repeat application 14 days apart. Use a crop oil concentrate at 1% v/v in the finished spray volume. Consult the label for necessary surfactant. PHI 30 days.
Pelargonic acid	(Sythe) 4.2 EC 3 - 10% v/v	27	Emerged broadleaf and grass weeds. Direct spray to row middles. Product is a contact, nonselective, foliar applied herbicide with no residual control. May be tank mixed with several soil residual compounds.
S-metolachlor	(Dual Magnum) 7.62 EC	15	Grass and broadleaf weeds and nutsedge. Label is a Third-Party Registration (TPR, Inc.). Use without a signed authorization and waiver of liability is a misuse of the product.
Sethoxydim 0.28 - 0.47	(Poast) 1.5 EC 1.5 - 2.5 pt.	1	Emerged grass weeds. A maximum of 5 pt./A applied in one season. Include a crop oil concentrate. Unsatisfactory results may occur if applied to grasses under stress. PHI 60 days.

Table 15.5. Herbicides approved for managing weeds in carrot.

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
*** PREEMERGENCE ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW up to 2 fl. oz. (Aim) 2.0 EC up to 2 fl. oz.	14	Apply as a preplant burn down for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. Maximum rate of 0.096 lb. a.i./A per season. No pretransplant interval.
Glyphosate	(various formulations) consult labels	9	Emerged broadleaf and grass weeds. Apply as a preplant burn down. Consult label for individual product directions.
Linuron 0.5 - 1.0	(Lorox DF) 50 DF 1 - 2 lb.	7	A single application after planting and before crop emergence. Plant seed at least 0.5 in. deep. Preemergence and postemergence application should not exceed 4 lb./A per season.
Paraquat 0.5 - 1.0	(Gramoxone) 2 SL 2.0 - 4.0 pt. (Firestorm) 3 SL 1.3 - 2.7 pt.	22	Emerged broadleaf and grass weeds. Apply as a preplant burn down treatment. Apply before crop emergence. Use a nonionic surfactant.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v	27	Emerged broadleaf and grass weeds. Apply as a preplant burn down treatment. Scythe is a contact and nonresidual herbicide and can be tank mixed with a residual preemergence herbicide to lengthen time of control.
Pendimethalin 0.95	(Prowl H20) 3.8 2.0 pt.	3	Broadleaf and grass control. Apply within 2 days of planting before the emergence of the crop. PHI 60 days.

Table 15.5. Herbicides approved for managing weeds in carrot. (continued)

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
Prometryn 1.0 - 2.0	(Caparol) 4 L 2 - 4 pt.	5	Most annual broadleaf and grass weeds. Do not exceed one application. Consult label for rotational crop restrictions.
Pyraflufen 0.001 - 0.003	(ET Herbicide) 0.208 EC 0.5 - 2.0 fl. oz.	14	Emerged broadleaf and grass weeds. Apply as a preplant burndown treatment.
Trifluralin 0.5	(Treflan, Trifluralin) 4 EC 1 pt. (Treflan TR-10) 5 lb.	3	Annual broadleaf and grass weeds. Do not apply to muck soils. Mineral soils with 2 - 5% organic material, apply 0.75 lb. a.i./A. Incorporate 4 inches or less with 8 hr. of application. PHI 60 days.
*** POSTEMERGENCE ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW up to 2 fl. oz. (Aim) 2.0 EC up to 2 fl. oz.	14	Emerged broadleaf weeds. Apply as hooded application to row middles only. Use crop oil concentrate or nonionic surfactant at recommended rate. May be tank mixed with other herbicides. Do not exceed 6.1 fl. oz. per cropping season. PHI 0 days.
Clethodim 0.09 - 0.13 0.07 - 0.13	(Select, Arrow) 2 EC 6 - 8 fl. oz. (Select Max) 1 EC 9 - 16 fl. oz.	1	Perennial and annual grass weeds. In fields with heavy grass pressure or larger grass weeds, use higher rates or repeat applications 14 days apart. Use a crop oil concentrate at 1% v/v in the finished spray volume. Nonionic surfactant with Select Max. PHI 30 days.
Fluazifop 0.188	(Fusilade DX) 2 EC 12 fl. oz.	1	Actively growing grass weeds. Maximum is 48 fl. oz./A. per growing season. Withhold field flooding 45 to 60 days following application. In Palm Beach and Hendry counties a 60 day interval must be observed for flooding. PHI 45 days.
Linuron 0.5 - 1.0	(Lorox DF) 50 DF 1 - 2 lb.	7	Apply after carrots are 3 inches tall. Repeat applications may be made but do not exceed 4 lb./A. Can be applied following Stoddard Solvent provided that the applications are at least one day apart. Do not tank mix with Stoddard Solvent.
Metribuzin 0.25	(Metribuzin, Metri, Tricor) 75 DF 0.3 lb. (Metri, Tricor) 4 F 0.5 pt.	5	Broadleaf and grass control. Total amount applied in a season should not exceed 0.5 lb. a.i./A. Apply after carrots have 5 - 6 true leaves and weeds are less than 1 in. in height. If needed, a second application may be made after an interval of at least 3 wk. PHI 60 days.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v	27	Emerged broadleaf and grass weeds. Direct spray to row middles. Product is a contact, nonselective, foliar applied herbicide with no residual control. May be tank mixed with several soil residual compounds.
Prometryn 1.0 - 2.0	(Caparol) 4 L 2 - 4 pt.	5	Most annual broadleaf and grass weeds. Apply up to 6 leaf stage of carrot. One application of 4 pt./A or two application of 2 pt./A. For POST control of weeds, include NIS or COC. Consult label for rotational crop restrictions. PHI 30 days.
S-metolachlor	(Dual Magnum) 7.62 EC	15	Grass and broadleaf weeds and nutsedge. Label is a Third-Party Registration (TPR, Inc.). Use without a signed authorization and waiver of liability is a misuse of the product.
Sethoxydim 0.28 - 0.38	(Poast) 1.5 EC 1.5 - 2.0 pt.	1	Emerged grass weeds. A maximum of 5 pt./A applied in one season. Include a crop oil concentrate. Unsatisfactory results may occur if applied to grasses under stress. PHI 30 days

Table 15.6. Herbicides approved for managing weeds in radish.

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
*** PREPLANT / PREEMERGENCE ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW up to 2 fl. oz. (Aim) 2.0 EC up to 2 fl. oz.	14	Apply as a preplant burn down for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. Maximum rate of 0.096 lb. a.i./A per season. No pretransplant interval.
Glyphosate	(various formulations) consult labels	9	Emerged broadleaf and grass weeds. Apply as a preplant burndown. Consult label for individual product directions.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v	27	Emerged broadleaf and grass weeds. Apply as a preplant burndown before planting.
Pyraflufen 0.001 - 0.003	(ET Herbicide) 0.208 EC 0.5 - 2.0 fl. oz.	14	Emerged broadleaf weeds. Apply as a preplant burndown treatment.
Trifluralin 0.5 - 0.75	(Treflan HFP, Trifluralin, Trilin) 4 EC 1.0 - 1.5 pt. (Treflan) 4 L 1.0 - 1.5 pt.	3	Annual broadleaf and grass weeds. Incorporate or irrigate 4 in. within 8 hrs. Results in Florida are erratic on soils with low organic matter and clay contents.
S-metolachlor	(Dual Magnum) 7.62 EC	15	Grass, broadleaf weeds and nutsedge. Label is a Third-Party Registration (TPR, Inc.). Use without a signed authorization and waiver of liability is a misuse of the product.
*** POSTEMERGENCE ***			
Clethodim 0.09 - 0.13	(Select, Arrow) 2 EC 6 - 8 fl. oz. (Select Max) 1 EC	1	Emerged annual and perennial grass weeds. For repeat application, minimum of 14 days between applications. Do not exceed 0.25 lb. a.i./ha. PHI 15 days
0.07 - 0.13	9 - 16 fl. oz.		
Sethoxydim 0.47	(Poast) 1.5 EC 2.5 pt.	1	Emerged grass weeds. Do not exceed 3.0 pt./A. per season. Include a crop oil concentrate. Head lettuce and radicchio PHI 30 days. Leaf lettuce and endive PHI 15 day.

Table 15.7. Herbicides approved for managing weeds in sweetpotato.

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
*** PRETRANSPLANT ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW up to 2 fl. oz. (Aim) 2.0 EC up to 2 fl. oz.	14	Apply as a preplant burn down for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. Maximum rate of 0.096 lb. a.i./A per season. No pretransplant interval.
Clomazone 0.49 - 0.75	(Command) 3 ME 1.3 - 2.0 pt.	13	Annual broadleaf and grass weeds. Use lower rates on coarse soils. Apply within 5 days of transplanting.
DCPA 4.5 - 6.0	(Dacthal) W-75 6 - 8 lb. (Dacthal) 6 F 6 - 8 pt.	3	Annual broadleaf and grass weeds. Apply immediately after transplanting. May be applied as a layby later in the season for preemergence control.
Flumioxazin 0.096	(Valor) 51 WDG 3 oz.	14	Annual broadleaf weeds. Do not use transplants that were harvested 2 days before application. Severe injury occurs if applied after transplanting. Apply 2-5 days before transplant and minimize soil disturbance after application.
Glyphosate	(various formulations) consult labels	9	Emerged broadleaf and grass weeds. Apply as a preplant burndown. Consult label for individual product directions.
Napropamide 1.0 - 2.0	(Devrinol DF XT) 50 DF 2.0 - 4.0 lb.	15	Annual broadleaf and grass weeds. Apply immediately after transplanting. If rainfall does not occur within 24 hr. after application then incorporate or irrigate 2-4 in. deep.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v	27	Emerged broadleaf and grass weeds. Apply as a preplant burndown treatment. Product is a contact, nonselective, foliar applied herbicide with no residual control. May be tank mixed with soil residual compounds.

Table 15.7. Herbicides approved for managing weeds in sweetpotato. (continued)

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
Pyraflufen 0.001 - 0.003	(ET Herbicide) 0.208 EC 0.5 - 2.0 fl. oz.	14	Emerged broadleaf and grass weeds. Apply as a preplant burndown treatment.
*** POSTTRANSPLANT ***			
Carfentrazone up to 0.031	(Aim) 1.9 EW up to 2 fl. oz. (Aim) 2.0 EC up to 2 fl. oz.	14	Emerged broadleaf weeds. Apply as hooded application to row middles only. Use of COC or NIS at recommended rates. Contact with the leaves will cause injury. PHI 0 days.
Clethodim 0.09 - 0.25	(Arrow, Select) 2 EC 6 - 16 fl. oz. (Select Max) 1 EC	1	Perennial and annual grass weeds. Use higher rates under heavy grass pressure or larger grass weeds. Do not apply more than 0.5 lb. a.i./A. Consult the label for required adjuvant. PHI 30 days.
0.07 - 0.25	9 - 32 fl. oz.		
Fluazifop 0.1 - 0.25	(Fusilade DX) 2 EC 6 - 16 fl. oz.	1	Perennial and annual grass weeds. Include a NIS or COC in the spray solution. PHI 55 days.
Pelargonic acid	(Scythe) 4.2 EC 3 - 10% v/v	27	Emerged broadleaf and grass weeds. Apply as a hooded application to row middles only. Contact with the leaves will cause injury.
S-metolachlor	(Dual Magnum) 7.62 EC	15	Grass, broadleaf weeds and nutsedge. Label is a Third-Party Registration (TPR, Inc.). Use without a signed authorization and waiver of liability is a misuse of the product.
Sethoxydim 0.19 - 0.47	(Poast) 1.5 EC 1.0 - 2.5 pt.	1	Controls growing grass weeds. A total of 5.0 pt./A applied in one season. Include a COC. Unsatisfactory results may occur if applied to grasses under stress. PHI 30 days.

Table 15.8. Insecticides labeled for management of arthropod pests of carrots and garden beets.

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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
Aphids	1B	Malathion 5EC (malathion)	1.5-2.0 pt	beets: 12; carrots:24	7	Maximum number of applications is 3 for beets and 2 for carrots.
	1B	Malathion 8F (malathion)	1.25 pt	12	7	Beets only. Maximum number of applications is 3.
	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots, 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	Pyronyl Crop Spray (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	4A	Actara (thiamethoxam)	1.5-4.0 oz	12	7	Do not exceed 8 oz product/acre/season.
	4A	Admire Pro (imidacloprid)	4.4-10.5 fl oz-soil; 1.2 fl oz-foliar	12	soil: 21; foliar: 5	Limited to one soil application. If applied as a foliar spray, use no more than 3.7 fl oz per acre per season. Leaves may be used for food.
	4A	Platinum, 75SG (thiamethoxam)	5.0-12.0 fl oz; 75SG: 1.7-4.0 oz	12	at planting	Do not exceed 12 oz Platinum or 4.0 oz Platinum 75SG per acre per season.
	4C	Closer SC (sulfoxaflor)	1.5 - 2.0 fl. oz oz	12	7	Do not make more than 2 consecutive applications or apply more than four total applications per crop.
	4D	Sivanto Prime (flupyradifurone)	7-14 fl oz	4	7	Maximum allowed per year: 28 fl oz. Minimum interval between applications: 10 days. Foliar application only.
29	Beleaf 50 SG (fonicamid)	2.0-2.8 oz	12	3	Do not apply more than 3 times at high rate.	

Table 15.8. Insecticides labeled for management of arthropod pests of carrots and garden beets. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	--	Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	BotaniGard ES (<i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart per acre. Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.	0	4	
	-	Grandevo (<i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lb	4	0	Greens and roots. OMRI-listed
	--	M-Pede (potassium salts of fatty acids)	1-2% V/V	12	0	OMRI-listed.
	--	Mycotrol ESO (<i>Beauveria bassiana</i> strain GHA)	0.25 - 1 quart per acre. Apply in sufficient water to cover foliage, typically 5 - 100 gallons per acre.	0	4	
	--	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Acts as IGR and feeding repellent. OMRI-listed.
	--	Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed.
Beetles (includes blister beetles, cucumber beetles, flea beetles)	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb; XLR, 4F: 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	1B	Malathion 8F (malathion)	1.25 pt	12	7	Beets only. Maximum number of applications is 3.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. Carrots only.
	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots; 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	Pyronyl Crop Spray (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	4A	Actara (thiamethoxam)	1.5-4.0 oz	12	7	Do not exceed 8 oz product/acre/season.
	4A	Admire Pro (imidacloprid)	4.4-10.5 fl oz-soil; 1.2 fl oz-foliar	12	21-soil; 5-foliar	Limited to one soil application. If applied as a foliar spray, use no more than 3.7 fl oz per acre per season. Leaves may be used for food.
	4A	Platinum, 75SG (thiamethoxam)	5.0-12.0 fl oz; 75SG: 1.7-4.0 oz	12	at planting	Do not exceed 12 oz Platinum or 4.0 oz Platinum 75SG per acre per season.
	5	Entrust SC (spinosad)	roots: 3-6 fl oz, beet greens: 1.5-10 fl oz	4	3	Do not apply more than a total of 21 fl oz/acre per crop (29 for beet greens) or apply more than 4 times. OMRI-listed.
		--	Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
Caterpillars (includes beet armyworm, celery leaf-tier, corn earworm, cutworms, fall armyworm, loopers)	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb; XLR, 4F: 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	1B	*Diazinon AG500, *50W (diazinon)	AG500: 1-4 qt; 50W: 2-8 lb	72	preplant	Do not make more than one application per year.
	1B	Malathion 8F (malathion)	1.25 pt	12	7	Beets only. Maximum number of applications is 3.

Table 15.8. Insecticides labeled for management of arthropod pests of carrots and garden beets. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	3A	*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. Carrots only.
	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots, 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	Pyronyl Crop Spray (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	5	Entrust SC (spinosad)	roots: 3-6 fl oz, beet greens: 1.5-10 fl oz	4	3	Do not apply more than a total of 21 fl oz/acre per crop (29 for beet greens) or apply more than 4 times. OMRI-listed.
	5	Radiant SC (spinetoram)	leaves, 5-10 oz; roots, 6-8 fl oz	4	3	Maximum of 4 applications per year. If roots will be harvested, lower rate must be used.
	11A	Agree WG (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	Apply when larvae are small for best control. Leaves and roots. OMRI-listed.
	11A	Biobit HP (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse.
	11A	Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	Use high rate for armyworms. Treat when larvae are young.
	11A	Deliver (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-1.5 lb	4	0	Use higher rates for armyworms. OMRI-listed.
	11A	DiPel DF (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. Can be used for organic production.
	11A	Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.50 lb	4	0	Treat when larvae are young. Thorough coverage is essential. OMRI-listed.
	11A	Xentari DF (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.
	18	Intrepid 2F (methoxyfenozide)	4-16 for leaves, 8-16 fl oz for roots	4	leaves: 1; roots: 14	Do not apply more than 64 fl oz per acre per season.
	22	Avant (indoxacarb)	3.5-6.0 oz	12	7	Do not use adjuvants. Do not apply more than 24 oz per acre per crop. Beets only.
	28	Coragen (chlorantraniliprole)	3.5-5.0 fl oz	4	1	Do not apply more than 15.4 fl oz product per acre per year. Make no more than 4 applications.
	--	Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Grandevo (<i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lb	4	0	Greens and roots. OMRI-listed
	--	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Acts as IGR and feeding repellent. OMRI-listed.
Fire ants	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots, 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days

Table 15.8. Insecticides labeled for management of arthropod pests of carrots and garden beets. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	3A	Pyronyl Crop Spray (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	7A	Extinguish Fire Ant Bait ((S)-methoprene)	1.0-1.5 lb	4	0	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks.
Grasshoppers	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
Leafhoppers	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb; XLR, 4F: 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	1B	Malathion 5EC (malathion)	1.5-2.0 pt	beets: 12; carrots:24	7	Maximum number of applications is 3 for beets and 2 for carrots.
	3A	*Asana XL (0.66EC) (esfenvalerate)	5.8-9.6 fl oz	12	7	Do not apply more than 0.5 lb ai/acre per season. Carrots only.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. Carrots only.
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	Pyronyl Crop Spray (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	4A	Actara (thiamethoxam)	1.5-4.0 oz	12	7	Do not exceed 8 oz product/acre/season.
	4A	Admire Pro (imidacloprid)	4.4-10.5 fl oz-soil; 1.2 fl oz-foliar	12	21-soil; 5-foliar	Limited to one soil application. If applied as a foliar spray, use no more than 3.7 fl oz per acre per season. Leaves may be used for food.
	4A	Platinum, 75SG (thiamethoxam)	5.0-12.0 fl oz; 75SG: 1.7-4.0 oz	12	at planting	Do not exceed 12 oz Platinum or 4.0 oz Platinum 75SG per acre per season.
	4C	Closer SC (sulfoxaflor)	2.75-5.75 oz	12	7	Do not make more than 2 consecutive applications or apply more than four total applications per crop.
	4D	Sivanto Prime (flupyradifurone)	7-14 fl oz	4	7	Maximum allowed per year: 28 fl oz. Minimum interval between applications: 10 days. Foliar application only.
	--	Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Grandevo (<i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lb	4	0	Greens and roots. OMRI-listed
Leafminers	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	5	Entrust SC (spinosad)	roots: 3-6 fl oz, beet greens: 1.5-10 fl oz	4	3	Do not apply more than a total of 21 fl oz/acre per crop (29 for beet greens) or apply more than 4 times. OMRI-listed.
	5	Radiant SC (spinetoram)	leaves, 5-10 oz; roots, 6-8 fl oz	4	3	Maximum of 4 applications per year. If roots will be harvested, lower rate must be used.
	--	Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.

Table 15.8. Insecticides labeled for management of arthropod pests of carrots and garden beets. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	--	M-Pede (potassium salts of fatty acids)	1-2% V/V	12	0	OMRI-listed.
	--	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Acts as IGR and feeding repellent. OMRI-listed.
Mole crickets and wireworms	1B	*Diazinon AG500, *50W (diazinon)	AG500: 1-4 qt; 50W: 2-8 lb	72	preplant	Do not make more than one application per year.
Plant bugs	29	Beleaf 50 SG (flonicamid)	2.0-2.8 oz	12	3	Do not apply more than 3 times at high rate.
Stink bugs	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb; XLR, 4F: 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	--	Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
Tarnished plant bug	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63-2.5 lb; XLR, 4F: 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
Weevils	3A	*Asana XL (0.66EC) (esfenvalerate)	5.8-9.6 fl oz	12	7	Do not apply more than 0.5 lb ai/acre per season. Carrots only.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. Carrots only.
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	--	Aza-Direct (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.

¹ 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.

² 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 15.9. Insecticides labeled for management of arthropod pests of radish.

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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
Aphids	1B	Malathion 5EC, 8F (malathion)	5EC: 1.5 pt; 8F: 1.0 pt	12	7	Maximum of 3 application per year.
	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21	Do not apply more than 0.5 lb ai/acre per season.
	3A	*Mustang (zeta-cypermethrin)	3.4-4.3 fl oz	12	1	Maximum of 25.8 fl oz/acre per season.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	4A	Actara (thiamethoxam)	1.5-3.0 oz	12	7	Maximum of 4 oz/acre per year.
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz; Soil: 4.4-10.5 fl oz	12	Foliar: 7; Soil: 21	Maximum of 1.2 fl oz (foliar) or 10.5 fl oz (soil) /acre per year.
	4A	Platinum 75 SG (thiamethoxam)	1.7-2.17 oz	12	at planting	Maximum of 2.17 oz/acre per crop.
	4C	Closer SC (sulfoxaflor)	1.5-2.0 fl oz	24	7	Maximum of 17 fl oz/acre per year.
	4D	Sivanto Prime (flupyradifurone)	7-14 fl oz	4	7	Maximum of 28 fl oz/acre per year.
	28	Exirel (cyantraniliprole)	13.5-20.5 fl oz	12	1	Maximum of 0.4 lb ai/acre per year of cyantraniliprole including all application types. For best performance, use an adjuvant.
	29	Beleaf 50 SG (flonicamid)	2.0-2.8 oz	12	3	Maximum of 8.4 oz/acre per season.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	BotaniGard ES, Mycotrol ESO (<i>Beauveria bassiana</i> strain GHA)	0.25-1 qt	4	0	Apply in sufficient water to cover foliage, typically 5-100 gallon/acre. Compatible in tank mix with some fungicides. Mycotrol ESO OMRI-listed ² .
	-	M-Pede 49% EC Soap, insecticidal	1-2% v/v	12	0	OMRI-listed.
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed ² .
	-	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
	-	Suffoil-X, Sun Spray 98.8%, others Oil, insecticidal	1-2 gal/100 gal	4	0	Suffoil-X OMRI-listed.
-	Trilogy (extract of neem oil)	1.0-2.0% v/v	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed.	
Caterpillars (includes cutworms, armyworms, corn earworm, hornworm, loopers, webworms, saltmarsh caterpillar)	1A	*Lannate SP, *LV (methomyl)	SP: 0.5 lb; LV: 1.5 pt	48	3	SLN [24(c)] label for Florida.
	1A	Sevin 4F, XLR Plus (carbaryl)	1-2 qt	12	7	Maximum of 6 qt/acre per year.
	1B	Lorsban 15G, *Advanced (chlorpyrifos)	15G: 3.3 oz per 1000 ft of row (at planting in-furrow); Advanced: 1.6-3.3 fl oz/1000 ft of row (at planting or postplant), 5.5 pt (preplant incorporated)	24	15G: 7; Advanced: 30	One application per season. At planting: root maggot. Preplant incorporated application of Lorsban Advanced: cutworms.
	1B	*Diazinon AG-500, *50 W (diazinon)	AG500: 2-4 qt; 50W: 4-8 lb	72	preplant	No more than one application per year.
	3A	*Asana XL (0.66 EC) (esfenvalerate)	5.8-9.6 fl oz	12	7	Do not apply more than 0.1 lb active ingredient (19.2 oz of product) per acre per season.

Table 15.9. Insecticides labeled for management of arthropod pests of radish. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	3A	*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not consume tops. Maximum of 14.0 fl oz/acre per season.
	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21	Do not apply more than 0.5 lb ai/acre per season.
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 fl oz	12	1	Maximum of 25.8 fl oz/acre per season.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GH4)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	5	Entrust SC (spinosad)	3-6 fl oz	4	3	3 applications per year. No more than 18 fl oz per acre per crop. OMRI-listed.
	5	Radiant SC (spinetoram)	Foliage harvest: 5-10 fl oz, root harvest: 6-8 fl oz	4	3	Maximum of 34 fl oz (foliage harvest) or 24 fl oz (root harvest) /acre per year.
	11A	Biobit HP (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse. Can be used in organic production.
	11A	Agree WG (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	Apply when larvae are small for best control. OMRI-listed.
	11A	Crymax WDG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	Use high rate for armyworms. Treat when larvae are young. Not for organic production.
	11A	Deliver (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.25-1.5 lb	4	0	Use higher rates for armyworms. OMRI-listed.
	11A	DiPel DF (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.5-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. Can be used in organic production.
	11A	Javelin WG (<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i>)	0.12-1.5 lb	4	0	Treat when larvae are young. Thorough coverage is essential. OMRI-listed.
	11A	Xentari DF (<i>Bacillus thuringiensis</i> subspecies <i>aizawai</i>)	0.5-2.0 lb	4	0	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.
	18	Intrepid 2F (methoxyfenozide)	4-16 fl oz for leaves, 8-16 for roots	4	leaves: 1, roots: 14	Do not apply more than 64 fl oz per acre/season.
	28	Coragen (chlorantraniliprole)	3.5-7.5 fl oz	4	1	Maximum of 15.4 fl oz/acre per crop or 4 applications/acre per year.
	28	Exirel (cyantraniliprole)	10.0-20.5 fl oz	12	1	Maximum of 0.4 lb ai/acre per year of cyantraniliprole including all application types. For best performance, use an adjuvant.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Grandevo (<i>Chromobacterium subsugae</i> strain PRAA4-1)	1-3 lb	4	0	OMRI-listed.
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed.
	-	Neemix 4,5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed.

Table 15.9. Insecticides labeled for management of arthropod pests of radish. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
Beetles (includes cucumber beetle, flea beetles) and weevils	1A	Sevin 4F, XLR Plus (carbaryl)	0.5-1.0 qt	12	7	Maximum of 6 qt/acre per year.
	1B	Malathion 8F (malathion)	1.0 pt	12	7	Maximum of 3 application per year. Flea beetles only.
	3A	*Asana XL (0.66 EC) (esfenvalerate)	5.8-9.6 fl oz	12	7	Do not apply more than 0.1 lb active ingredient (19.2 oz of product) per acre per season.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not consume tops. Maximum of 14.0 fl oz/acre per season.
	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21	Do not apply more than 0.5 lb ai/acre per season.
	3A	*Mustang (zeta-cypermethrin)	1.9-4.3 fl oz	12	1	Maximum of 25.8 fl oz/acre per season.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	4A	Actara (thiamethoxam)	1.5-3.0 oz	12	7	Maximum of 4 oz/acre per year. Flea beetles only.
	4A	Admire Pro (imidacloprid)	1.2 fl oz	12	7	Maximum of 1.2 fl oz/acre per year. Toxic to bees.
	4A	Platinum 75 SG (thiamethoxam)	1.7-2.17 oz	12	at planting	Do not exceed 2.17 oz per acre per crop.
	5	Entrust SC (spinosad)	3-6 fl oz	4	3	3 applications per year. No more than 18 fl oz per acre per crop. OMRI-listed.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	-	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellant. OMRI-listed.
Stink bugs, plant bugs, meadow spittlebug	1A	Sevin 4F, XLR Plus (carbaryl)	1-2 qt	12	7	Maximum of 6 qt/acre per year.
	3A	*Mustang (zeta-cypermethrin)	3.4-4.3 fl oz	12	1	Maximum of 25.8 fl oz/acre per season.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
Fire ants	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21	Do not apply more than 0.5 lb ai/acre per season.
	7A	Extinguish ((S)-methoprene)	1-1.5 lb	4	0	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
Grasshoppers, mole crickets	1B	*Diazinon AG-500, *50 W (diazinon)	AG500: 1 qt; 50W: 2 lb	72	preplant	No more than one application per year.
	3A	*Mustang (zeta-cypermethrin)	3.4-4.3 fl oz	12	1	Maximum of 25.8 fl oz/acre per season.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed

Table 15.9. Insecticides labeled for management of arthropod pests of radish. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
Leafhoppers	1A	Sevin 4F, XLR Plus (carbaryl)	0.5-1.0 qt	12	7	Maximum of 6 qt/acre per year.
	1B	Malathion 8F (malathion)	1.0 pt	12	7	Maximum of 3 application per year.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not consume tops. Maximum of 14.0 fl oz/acre per season.
	3A	*Mustang (zeta-cypermethrin)	1.9-4.3 fl oz	12	1	Maximum of 25.8 fl oz/acre per season.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed.
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	4A	Actara (thiamethoxam)	1.5-3.0 oz	12	7	Maximum of 4 oz/acre per year.
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz; Soil: 4.4-10.5 fl oz	12	Foliar: 7; Soil: 21	Maximum of 1.2 fl oz (foliar) or 10.5 fl oz (soil) /acre per year.
	4A	Platinum 75 SG (thiamethoxam)	1.7-2.17 oz	12	at planting	Do not exceed 2.17 oz per acre per crop.
	4C	Closer SC (sulfoxaflor)	2.75-5.75 fl oz	24	7	Maximum of 17 fl oz/acre per year.
	4D	Sivanto Prime (flupyradifurone)	7-14 fl oz	4	7	Maximum of 28 fl oz/acre per year.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Grandevo (<i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lb	4	0	OMRI-listed.
	-	M-Pede 49% EC Soap, insecticidal	1-2% v/v	12	0	OMRI-listed.
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed.
-	Suffoil-X, Sun Spray 98.8%, others Oil, insecticidal	1-2 gal/100 gal	4	0	Suffoil-X OMRI-listed.	
Leafminers	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed.
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	5	Entrust SC (spinosad)	3-6 fl oz	4	3	3 applications per year. No more than 18 fl oz per acre per crop. OMRI-listed.
	5	Radiant SC (spinetoram)	Foliage harvest: 6-10 fl oz, root harvest: 6-8 fl oz	4	3	Maximum of 34 fl oz (foliage harvest) or 24 fl oz (root harvest) /acre per year.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed.

Table 15.9. Insecticides labeled for management of arthropod pests of radish. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	-	Sun Spray 98.8%, others Oil, insecticidal	1-2 gal/100 gal	4	0	
Mites: carmine spider mite, twospotted spider mite	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21	Do not apply more than 0.5 lb ai/acre per season.
	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed.
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	-	M-Pede 49% EC Soap, insecticidal	1-2% v/v	12	0	OMRI-listed.
	-	Suffoil-X, Sun Spray 98.8%, others Oil, insecticidal	1-2 gal/100 gal	4	0	Suffoil-X OMRI-listed.
	-	Trilogy (extract of neem oil)	1.0-2.0% v/v	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed.
Thrips (check label for species controlled)	3A	Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed.
	3A, -	BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
	4A	Admire Pro (imidacloprid)	4.4-10.5 fl oz	12	21 (soil application)	Maximum of 10.5 fl oz (soil) /acre per year.
	5	Entrust SC (spinosad)	3-6 fl oz	4	3	3 applications per year. No more than 18 fl oz per acre per crop. OMRI-listed.
	5	Radiant SC (spinetoram)	Foliage harvest: 6-10 fl oz, root harvest: 6-8 fl oz	4	3	Maximum of 34 fl oz (foliage harvest) or 24 fl oz (root harvest) /acre per year.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	BotaniGard ES, Mycotrol ESO (<i>Beauveria bassiana</i> strain GHA)	0.25-1 qt	4	0	Apply in sufficient water to cover foliage, typically 5-100 gallon/acre. Compatible in tank mix with some fungicides. Mycotrol ESO OMRI-listed ² .
	-	M-Pede 49% EC Soap, insecticidal	1-2% v/v	12	0	OMRI-listed.
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed.
	-	Suffoil-X, Sun Spray 98.8%, others Oil, insecticidal	1-2 gal/100 gal	4	0	Suffoil-X OMRI-listed.
	-	Trilogy (extract of neem oil)	1.0-2.0% v/v	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed.
	Whiteflies	3A	*Brigade 2EC (bifenthrin)	5.12-6.4 fl oz	12	21
3A		Pyganic Crop Protection EC 5.0 (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed.
3A, -		BotaniGard Maxx (pyrethrins, <i>Beauveria bassiana</i> strain GHA)	Ground app.: 0.25-2.00 qt; Aerial app.: 0.25-1.00 qt	12	0	Apply in sufficient water to cover foliage. Compatible in tank mix with some fungicides. May not be compatible with adjuvants.
4A		Actara (thiamethoxam)	3.0-4.0 oz	12	7	Maximum of 4 oz/acre per year.

Table 15.9. Insecticides labeled for management of arthropod pests of radish. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz; Soil: 4.4-10.5 fl oz	12	Foliar: 7; Soil: 21	Maximum of 1.2 fl oz (foliar) or 10.5 fl oz (soil) /acre per year.
	4A	Platinum 75 SG (thiamethoxam)	1.7-2.17 oz	12	at planting	Do not exceed 2.17 oz per acre per crop.
	4C	Closer SC (sulfoxaflor)	4.25-5.75 fl oz	24	7	Maximum of 17 fl oz/acre per year.
	4D	Sivanto Prime (flupyradifurone)	10.5-14.0 fl oz	4	7	Maximum of 28 fl oz/acre per year.
	29	Beleaf 50 SG (flonicamid)	2.8 oz	12	3	Maximum of 8.4 oz/acre per season.
	-	Aza-Direct (azadirachtin)	1-2 pts, up to 3.5 , if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed.
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	BotaniGard ES, Mycotrol ESO (<i>Beauveria bassiana</i> strain GHA)	0.25-1 qt	4	0	Apply in sufficient water to cover foliage, typically 5-100 gallon/acre. Compatible in tank mix with some fungicides. Mycotrol ESO OMRI-listed ² .
	-	Grandevo (<i>Chromobacterium subsugae</i> strain PRAA4-1)	1-3 lb	4	0	OMRI-listed.
	-	M-Pede 49% EC Soap, insecticidal	1-2% v/v	12	0	OMRI-listed.
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed.
	-	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed.
	-	Suffoil-X, Sun Spray 98.8%, others Oil, insecticidal	1-2 gal/100 gal	4	0	Suffoil-X OMRI-listed.
	-	Trilogy (extract of neem oil)	1.0-2.0% v/v	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed.
Wireworms	1B	*Lorsban Advanced (chlorpyrifos)	4.5 pt (preplant incorporated)	24	30	One application per season.

¹ 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.

² 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 15.10. Insecticides labeled for management of arthropod pests of sweetpotato.

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 ¹	Trade Name (Active Ingredient) <i>*Restricted</i>	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
Aphids	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A, 28	*Besiege (lambda-cyhalothrin, chlorantraniliprole)	5-9 oz	24	14	Do not apply more than 27.0 fl. oz of product per acre per season. Supplemental label.
	4A	Actara (thiamethoxam)	1.5-3.0 oz	12	14	Toxic to bees. Do not use after Platinum.
	4A	Admire Pro (imidacloprid)	soil: 4.4-10.5 fl oz foliar: 1.2 fl oz	12	soil: 125 foliar: 7	One application to soil per season. If using as a foliar spray, no more than 3.7 fl oz per acre per season.
	4A	Assail 30SG (acetamiprid)	1.5-4.0 oz	12	7	Whiteflies not on label for sweet potatoes but are for other crops on label. No more than 4 applications per season.
	4A	Belay Insecticide (clothianidin)	in-furrow or side dress: 9-12 fl oz, foliar: 2-3 fl oz	12	foliar: 14	In-furrow or side-dress application, including chemigation up to 50% ground cover. Do not apply more than 12 fl oz per acre per year.
	4A	Platinum 75SG (thiamethoxam)	1.66-2.67 oz	12	Applied at planting	To manage resistance, avoid using other Group 4A insecticides in conjunction with Platinum. Highly toxic to bees. Do not allow to drift to blooming weeds or crops.
	4D	Sivanto Prime (flupyradifurone)	7-14 fl oz	4	7	Minimum interval between applications=7 days. Maximum allowed per acre per year=28 fl oz.
	9B	Fulfill (pymetrozine)	2.75-5.5 oz	12	14	Allow a minimum of 7 days between applications. Do not exceed 11 oz/acre per season.
	23	Movento (spirotetramat)	4.0-5.0 fl oz	24	7	Maximum of 10 fl oz/acre per season.
	28	Verimark (cyantraniliprole)	6.75-13.5 fl oz	4	at planting	pH of application solution should be between 4 and 6.
	29	Beleaf 50 SG (flonicamid)	2.0-2.8 oz	12	7	Do not apply more than 8.4 oz per acre per season.
	--	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed ² . Antifeedant, repellent, insect growth regulator.
	--	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed ² .
	--	Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .
	-	Mycotrol ESO (<i>Beauveria bassiana</i> strain GHA)	0.25-1 quart per acre. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.	4	0	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Compatible as a tank mix with some fungicides.
	--	BotaniGard ES (<i>Beauveria bassiana</i> strain GHA)	0.25-1 quart per acre. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.	4	0	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Compatible in tank mix with some fungicides.
	-	Grandevo (<i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lb	4	0	OMRI-listed ² .
-	Suffoil-X (mineral oil)	1-2% v/v	4	0	OMRI-listed ² .	
-	M-Pede 49% EC (Soap, insecticidal)	1-2 % V/V	12	0	OMRI-listed ² .	
Beetles (including cucumber beetle, Japanese beetle, tortoise beetle, flea beetle, whitefringed beetle)	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 1.25-2.5 lb 4F: 1-2 qt	XLR, 12	7	Do not apply more than 10 lb (80S) per acre per crop or 8 qt (4F, XLR). See label for preplant dip treatment.
	1B	Imidan 70 W (phosmet)	1.3 lb	4 days for seedbed treatment, 5 days for foliar	7	No more than 5 applications per season. Do not apply through irrigation system. Crop must be mechanically harvested.

Table 15.10. Insecticides labeled for management of arthropod pests of sweetpotato. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	1B	Lorsban 15G, 75WG, *Advanced (chlorpyrifos)	See labels for rates	24	preplant broadcast treatment, 125 days before harvest	See label. Must be incorporated into soil. Only one application per season.
	1B	*Mocap 15 G, *EC (ethoprop)	See labels	48	preplant, see labels	Two to three weeks before planting.
	3A	*Baythroid XL (beta-cyfluthrin)	0.8-2.8 fl oz	12	0	No more than 16.8 fl oz/acre per season.
	3A	*Brigade 2 EC (bifenthrin)	soil: 9.6-19.2 oz at-plant and 3.2-9.6 oz at lay-by foliar: 2.1-6.4 oz	12	21	No more than 2 foliar applications, at least 21 days apart. Do not apply more than 0.5 lb active ingredient per acre per season, including soil applications.
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	0.96-1.92 fl oz	24	7	Do not apply more than 7.68 fl oz of product per acre per season.
	4A	Actara (thiamethoxam)	1.5-3.0 oz	12	14	Toxic to bees. Do not use after Platinum.
	3A, 28	*Besiege (lambda-cyhalothrin, chlorantraniliprole)	5-9 oz	24	14	Do not apply more than 27.0 fl. oz of product per acre per season. Supplemental label.
	3A, 4A	*Endigo ZC (lambda-cyhalothrin, thiamethoxam)	3.5-4.5 fl oz	24	14	Do not exceed a total of 10 fl oz of product per acre per growing season. Do not use with other Group 4A insecticides.
	4A	Admire Pro (imidacloprid)	soil: 4.4-10.5 fl oz foliar: 1.2 fl oz	12	soil: 125 foliar: 7	One application to soil per season. If using as a foliar spray, no more than 3.7 fl oz per acre per season. Flea beetles only
	4A	Assail 30SG (acetamiprid)	1.5-4.0 oz	12	7	Whiteflies not on label for sweet potatoes but are for other crops on label. No more than 4 applications per season.
	4A	Belay Insecticide (clothianidin)	in-furrow or side dress: 9-12 fl oz foliar: 2-3 fl oz	12	foliar: 14	In-furrow or side-dress application, including chemigation up to 50% ground cover. Do not apply more than 12 fl oz per acre per year. Flea beetles only.
	4A	Platinum 75SG (thiamethoxam)	1.66-2.67 oz	12	Applied at planting	To manage resistance, avoid using other Group 4A insecticides in conjunction with Platinum. Highly toxic to bees. Do not allow to drift to blooming weeds or crops. Flea beetles only.
	4A	Scorpion 35 SL (dinotefuran)	foliar: 2.0-2.75 fl soil: 11.5-13.25 fl oz	12	foliar: 7 soil: apply preplant, pre-emergence or at ground crack	Do not apply more than 8 fl oz per acre per season as foliar sprays, or more than 13.25 fl oz as a soil application. Highly toxic to bees for 38 hours after application. Do not apply to crops in bloom or allow to drift to weeds or other crops in bloom. Flea beetles only.
	4A, 28	Voliam Flexi (thiamethoxam and chlorantraniliprole)	4 oz	12	14	Do not exceed a total of 8 oz of product per acre per season.
	-	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed ² .
Caterpillars (including armyworms, loopers, corn earworms, hornworms, webworms, saltmarsh caterpillars)	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 1.25-2.5 lb XLR, 4F: 1-2 qt	12	7	Do not apply more than 10 lb (80S) per acre per crop or 8 qt (4F, XLR). See label for preplant dip treatment.
	3A	*Baythroid XL (beta-cyfluthrin)	0.8-2.8 fl oz	12	0	No more than 16.8 fl oz/acre per season.
	3A	*Brigade 2 EC (bifenthrin)	soil: 9.6-19.2 oz at-plant and 3.2-9.6 oz at lay-by foliar: 2.1-6.4 oz	12	21	No more than 2 foliar applications, at least 21 days apart. Do not apply more than 0.5 lb active ingredient per acre per season, including soil applications.
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	0.96-1.92 fl oz	24	7	Do not apply more than 7.68 fl oz of product per acre per season.

Table 15.10. Insecticides labeled for management of arthropod pests of sweetpotato. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	3A, 28	*Besiege (lambda-cyhalothrin, chlorantraniliprole)	5-9 oz	24	14	Do not apply more than 27.0 fl. oz. of product per acre per season. Supplemental label.
	5	Entrust SC (spinosad)	4.5-10 fl oz	4	7	Do not make applications less than 7 days apart or apply more than 4 times per crop. Do not apply more than 21 fl oz/acre per crop. OMRI-listed ²
	5	Radiant SC (spinetoram)	6-8 fl oz	4	7	Do not make more than 4 applications per year.
	11A	DiPel DF (<i>Bacillus thuringiensis</i> subspecies kurstaki)	0.5-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. Can be used in organic production.
	11A	Xentari DF (<i>Bacillus thuringiensis</i> subspecies aizawai)	0.5-2.0 lb	4	0	Catepillars only. Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.
	15	Rimon 0.83 EC (novaluron)	6-12 fl oz	12	14	Do not apply more than 24 oz per acre per season. Limited to two applications for whiteflies (12-oz rate).
	18	Intrepid 2F (methoxyfenozide)	6-10 fl oz	4	7	Do not apply more than 64 fl oz of product per acre per year or apply more often than every 14 days.
	22	Avaunt (indoxacarb)	2.5-6.0 oz	12	7	Do not apply more than 24 oz/acre per crop.
	28	Coragen (chlorantraniliprole)	3.5-5.0 fl oz	4	1	Foliar only. No more than 4 applications per crop. Do not make more than 2 successive applications in a 30-day period. Do not apply more than 15.4 fl oz per acre per crop.
	28	Verimark (cyantraniliprole)	6.75-13.5 fl oz	4	at planting	pH of application solution should be between 4 and 6.
	–	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed ² . Antifeedant, repellent, insect growth regulator.
	–	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
	–	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	–	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed ² .
	–	Grandevo (<i>Chromobacterium subtsugae</i> strain PRAA4-1)	1-3 lb	4	0	OMRI-listed ² .
Fire ants	1B	*Mocap 15 G, *EC (ethoprop)	See labels	48	preplant, see labels	Two to three weeks before planting.
	7A	Extinguish ((S)-methoprene)	1.0-1.5 lb	4	0	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks.
	7D	Esteem Ant Bait (pyriproxyfen)	1.5-2.0 lb	12	1	Do not exceed a total of 0.109 lb pyriproxyfen per acre (all formulations, i.e., Knack IGR). Ant Bait contains 0.5% ai, or 0.10 lb at 2-lb rate.
Leafhoppers	1B	Malathion 5 EC (malathion)	5EC: 1.5-2.5 pt 8F: 1-1.5 pt	12	5EC: 0 8F: 3	Maximum of two applications per year.
	3A	*Baythroid XL (beta-cyfluthrin)	0.8-2.8 fl oz	12	0	No more than 16.8 fl oz/acre per season.
	3A	*Warrior II (lambda-cyhalothrin)	0.96-1.92 fl oz	24	7	Do not apply more than 7.68 fl oz of product per acre per season.
	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A, 28	*Besiege (lambda-cyhalothrin, chlorantraniliprole)	5-9 oz	24	14	Do not apply more than 27.0 fl oz of product per acre per season. Supplemental label.
	3A, 4A	*Endigo ZC (lambda-cyhalothrin, thiamethoxam)	3.5-4.5 fl oz	24	14	Do not exceed a total of 10 fl oz of product per acre per growing season. Do not use with other Group 4A insecticides.

Table 15.10. Insecticides labeled for management of arthropod pests of sweetpotato. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
	4A	Admire Pro (imidacloprid)	soil: 4.4-10.5 fl oz foliar: 1.2 fl oz	12	soil: 125 foliar: 7	One application to soil per season. If using as a foliar spray, no more than 3.7 fl oz per acre per season.
	4A	Assail 30SG (acetamiprid)	1.5-4.0 oz	12	7	Whiteflies not on label for sweet potatoes but are for other crops on label. No more than 4 applications per season.
	4A	Platinum 75SG (thiamethoxam)	1.66-2.67 oz	12	Applied at planting	To manage resistance, avoid using other Group 4A insecticides in conjunction with Platinum. Highly toxic to bees. Do not allow to drift to blooming weeds or crops.
	4A	Scorpion 35 SL (dinotefuran)	foliar: 2.0-2.75 fl oz soil: 11.5-13.25 fl oz	12	foliar: 7 soil: apply preplant, pre-emergence, or at ground crack	Do not apply more than 8 fl oz per acre per season as foliar sprays, or more than 13.25 fl oz as a soil application. Highly toxic to bees for 38 hours after application. Do not apply to crops in bloom or allow to drift to weeds or other crops in bloom.
	4A, 28	Voliam Flexi (thiamethoxam, chlorantraniliprole)	4 oz	12	14	Do not exceed a total of 8 oz of product per acre per season.
	4C	Closer (sulfoxaflor)	0.75-2.25 oz	24	7	Do not make more than 2 consecutive or 4 total applications per year. No bloom restrictions.
	4D	Sivanto Prime (flupyradifurone)	7-14 fl oz	4	7	Minimum interval between applications=7 days. Maximum allowed per acre per year=28 fl oz.
	23	Movento (spirotetramat)	4.0-5.0 fl oz	24	7	Maximum of 10 fl oz/acre per season.
	-	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
	-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Suffoil-X (mineral oil)	1-2% v/v	4	0	OMRI-listed ² .
	-	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed ² .
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed ² . Antifeedant, repellent, insect growth regulator.
	-	Grandevo (Chromobacterium subtsugae strain PRAA4-1)	1-3 lb	4	0	OMRI-listed ² .
Liriomyza Leafminers	1B	Malathion 5 EC (malathion)	5EC: 1.5-2.5 pt 1-1.5 pt	8F: 12	5EC: 0 8F: 3	Maximum of two applications per year.
	4A	Actara (thiamethoxam)	1.5-3.0 oz	12	14	Toxic to bees. Do not use after Platinum.
	5	Entrust SC (spinosad)	4.5-10 fl oz	4	7	Do not make applications less than 7 days apart or apply more than 4 times per crop. Do not apply more than 21 fl oz/acre per crop. OMRI-listed ²
	5	Radiant SC (spinetoram)	6-8 fl oz	4	7	Do not make more than 4 applications per year.
	6	*Agri-Mek SC (abamectin)	1.75-3.5 fl oz	12	14	Must be used with a non-ionic activator type wetting, spreading and/or penetrating adjuvant, not a binder sticker type adjuvant.
	15	Rimon 0.83 EC (novaluron)	6-12 fl oz	12	14	Do not apply more than 24 oz per acre per season. Limited to two applications for whiteflies (12-oz rate).
	--	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed ² . Antifeedant, repellent, insect growth regulator.
	--	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed ² .
	--	Oil, insecticidal	1-2 gal/100 gal	12	Up to day of harvest	

Table 15.10. Insecticides labeled for management of arthropod pests of sweetpotato. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²
Mites	6	*Agri-Mek SC (abamectin)	1.75-3.5 fl oz	12	14	Must be used with a non-ionic activator type wetting, spreading and/or penetrating adjuvant., not a binder sticker type adjuvant.
	23	Oberon 2SC (spiromesifen)	8-16 fl oz	12	7	Maximum amount per crop: 32 oz/acre. No more than 2 applications.
	--	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
	--	Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .
	--	Suffoil-X (mineral oil)	1-2% v/v	4	0	OMRI-listed ² .
	--	Oil, insecticidal	1-2 gal/100 gal	12	Up to day of harvest	
Stink bugs, plant bugs	3A	*Mustang (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	0.96-1.92 fl oz	24	7	Do not apply more than 7.68 fl oz of product per acre per season.
	3A, 28	*Besiege (lambda-cyhalothrin, chlorantraniliprole)	5-9 oz	24	14	Do not apply more than 27.0 fl. oz of product per acre per season. Supplemental label.
	3A, 4A	*Endigo ZC (lambda-cyhalothrin, thiamethoxam)	3.5-4.5 fl oz	24	14	Do not exceed a total of 10 fl oz of product per acre per growing season. Do not use with other Group 4A insecticides.
	29	Beleaf 50 SG (flonicamid)	2.0-2.8 oz	12	7	Do not apply more than 8.4 oz per acre per season.
	--	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
Thrips (check label for species controlled)	5	Entrust SC (spinosad)	4.5-10 fl oz	4	7	Do not make applications less than 7 days apart or apply more than 4 times per crop. Do not apply more than 21 fl oz/acre per crop. OMRI-listed ²
	5	Radiant SC (spinetoram)	6-8 fl oz	4	7	Do not make more than 4 applications per year.
	--	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
	--	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed ² . Antifeedant, repellent, insect growth regulator.
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
	--	Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .
	--	Suffoil-X (mineral oil)	1-2% v/v	4	0	OMRI-listed ² .
	--	Mycotrol ESO (<i>Beauveria bassiana</i> strain GHA)	0.25-1 quart per acre. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.	4	0	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Compatible as a tank mix with some fungicides.
	--	BotaniGard ES (<i>Beauveria bassiana</i> strain GHA)	0.25-1 quart per acre. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.	4	0	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Compatible in tank mix with some fungicides.
Sweetpotato weevil	1B	Imidan 70 W (phosmet)	1.3 lb	4 days for seedbed treatment, 5 days for foliar	7	No more than 5 applications per season. Do not apply through irrigation system. Crop must be mechanically harvested.
	3A	*Baythroid XL (beta-cyfluthrin)	0.8-2.8 fl oz	12	0	No more than 16.8 fl oz/acre per season. Adults only
	4A	Belay Insecticide (clothianidin)	9-12 fl oz			In furrow or side dressing

Table 15.10. Insecticides labeled for management of arthropod pests of sweetpotato. (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 ¹	Trade Name (Active Ingredient) *Restricted	Rate (Product/acre)	REI (hours)	Days to Harvest	Remarks ²	
	--	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .	
	--	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.	
	--	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed ² .	
Whitefly	1B	Malathion 5 EC (malathion)	5EC: 1.5-2.5 pt 8F: 1-1.5 pt	12	5EC: 0 8F: 3	Maximum of two applications per year. Tank mix with pyrethroid for best control	
	3A	*Brigade 2 EC (bifenthrin)	2.1-6.4 oz	12	21	Foliar only. No more than 2 foliar applications, at least 21 days apart. Do not apply more than 0.5 lb active ingredient per acre per season, including soil applications. Tanksmix with Malathion for best control.	
	3A	*Warrior II (lambda-cyhalothrin)	0.96-1.92 fl oz	24	7	Do not apply more than 7.68 fl oz of product per acre per season. Tanksmix with Malathion for best control.	
	3A, 4A	*Endigo ZC (lambda-cyhalothrin, thiamethoxam)	3.5-4.5 fl oz	24	14	Do not exceed a total of 10 fl oz of product per acre per growing season. Do not use with other Group 4A insecticides.	
	4A	Admire Pro (imidacloprid)	soil: 4.4-10.5 fl oz foliar: 1.2 fl oz	12	soil: 125 foliar: 7	One application to soil per season. If using as a foliar spray, no more than 3.7 fl oz per acre per season.	
	4A	Assail 30SG (acetamiprid)	1.5-4.0 oz	12	7	Whiteflies not on label for sweet potatoes but are for other crops on label. No more than 4 applications per season.	
	4D	Sivanto Prime (flupyradifurone)	7-14 fl oz	4	7	Minimum interval between applications=7 days. Maximum allowed per acre per year=28 fl oz.	
	15	Rimon 0.83 EC (novaluron)	6-12 fl oz	12	14	Do not apply more than 24 oz per acre per season. Limited to two applications for whiteflies (12-oz rate).	
	23	Movento (spirotetramat)	4.0-5.0 fl oz	24	7	Maximum of 10 fl oz/acre per season.	
	23	Oberon 2SC (spiromesifen)	8-16 fl oz	12	7	Maximum amount per crop: 32 oz/acre. No more than 2 applications.	
		-	Aza-Direct (azadirachtin)	1-2 pt, up to 3.5 pt, if needed	4	0	Antifeedant, repellent, insect growth regulator. OMRI-listed ² .
		-	Azatin XL (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellent, insect growth regulator.
		-	Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	Does not kill adult insects. IGR and feeding repellent. OMRI-listed ² .
		-	Trilogy (extract of neem oil)	0.5-2.0% V/V	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed ² .
		-	Molt-X (azadirachtin)	10 fl oz	4	0	OMRI-listed ² . Antifeedant, repellent, insect growth regulator.
		-	Mycotrol ESO (<i>Beauveria bassiana</i> strain GHA)	0.25-1 quart per acre. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.	4	0	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Compatible as a tank mix with some fungicides.
		--	BotaniGard ES (<i>Beauveria bassiana</i> strain GHA)	0.25-1 quart per acre. Apply in sufficient water to cover foliage, typically 5-100 gallons per acre.	4	0	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Compatible in tank mix with some fungicides.
		-	Grandevo (Chromobacterium subtsugae strain PRAA4-1)	1-3 lb	4	0	OMRI-listed ² .
		-	Suffoil-X (mineral oil)	1-2% v/v	4	0	OMRI-listed ² .
		--	Oil, insecticidal	1-2 gal/100 gal	12	Up to day of harvest	

¹ 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

² 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 15.11. Beet fungicides ordered by disease and then FRAC group according to their mode of action.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
Alternaria Powdery mildew	9 & 12	Switch 62.5WDG (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.
	19	OSO (polyoxin D zinc salts)	13 fl oz	84 fl oz	0	4 hr	See label for details.
	7	Fontelis SC (pentiopyrad)	30 fl oz	61 fl oz	0	0.5	Apply no more than 2 sequential applications without alternating to dissimilar chemistry.
	7 & 11	Merivon SC (fluxapyroxad + pyraclostrobin)	5.5 fl oz	16.5 fl oz	7	0.5	Apply no more than 2 sequential applications without alternating to dissimilar chemistry.
Cercospora	M1	(copper compounds) Many brands available: Americop 40 DF, Badge SC, Badge X2, Basic Copper 53, C-O-C-S WDG, Champ DP, Champ WG, Champ Formula 2, Champ WP, COC DF, COC WP, Copper Count N, Cueva, Cuprofix Ultra, Kentan DF, Kocide DF, Kocide 2000, Kocide 3000, Kocide 4.5 LF, Kop-hydroxide, Mastercop, Nordox 75 WG, NuCop 50WP, NuCop 3L, NuCop HB, NuCop DF, Top Cop w/ Sulfur	SEE INDIVIDUAL LABELS		1	Varies by product from 4 hr to 2 days	
	M2	(sulfur) Many brands available: Kumulus DF, Micro Sulf, Microthiol Disperss, Sulfur 90W, Top Cop w/ Sulfur, Wettable Sulfur	SEE INDIVIDUAL LABELS		1	1	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
	3	(propiconazole) Many brands available: Bumper EC, Propi-Star EC, Propiconazole 3.6 EC, Propicure 3.6 F, Tilt 3.6 EC	See label	See label	7	0.5	Do not apply more than 4 appl/season.
	3	(tebuconazole) Many brands available: Folicur 3.6F, Monsoon 3.6F, Onset 3.6L, Orius 3.6F, Tebusha 3.6L, Toledo 3.6F, Tebuzol 3.6F, Tebustar 3.6L	7.2 fl oz	28.8 fl oz	7	0.5	Do not apply more than 4 appl/season.
	7	Fontelis SC (pentiopyrad)	30 fl oz	61 fl oz	0	0.5	Apply no more than 2 sequential applications without alternating to dissimilar chemistry.
	7 & 11	Merivon SC (fluxapyroxad + pyraclostrobin)	5.5 fl oz	16.5 fl oz	7	0.5	Apply no more than 2 sequential applications without alternating to dissimilar chemistry.
	11	Cabrio EG (pyraclostrobin)	16 oz	48 oz	0	0.5	Limit is 3 appl./crop & alternate chemistry.
	11	Flint (trifloxystrobin)	3 oz	12 oz	7	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	11	Gem 500SC (trifloxystrobin)	2.9 fl oz	11.6 fl oz	7	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	11	Quadris (azoxystrobin)	15.4 fl oz	3.75 qt	0	4 hr	Alternate every other application with a fungicide of dissimilar mode of action.
	11	Reason (fenamidone)	8.2 fl oz	24.6 fl oz	2	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
Damping-off	M3	Defiant 75WP (thiram)	5.3 oz/100 lbs of seed			1	Seed treatment only.
	M3	Signet (thiram)	5.0 oz/100 lb of seed			1	Seed treatment only.
Downy mildew	33	(mono- and di-potassium salts of phosphorous acids) Many brands available: Confine Xtra, Fosphite, Fungi-phite, K-phite, Oxiphos, Rampart	3 qt		0	4 hr	See label for details.

Table 15.11. Beet fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
	43	Presidio (fluopicolide)	4 fl oz	12 fl oz	7	0.5	Do not exceed more than 2 sequential applications.
Pythium seedling blight	4	(metalaxyl) Various brands available: Acquire, Alliegiance FL, Dyna-shield, Metalaxyl 318 FS	0.75 fl oz/ 100 lb seed			0.5	Seed treatment only.
	4	Apron XL LS (mefenoxam)	0.64 fl oz/ 100 lb seed			2	Seed treatment only.
	4	Metastar 2E AG (metalaxyl)	8 pt			1	Apply as a broadcast soil application and incorporate into top 2 inches. See label for directions.
	4	Sebring 2.65 ST (metalaxyl)	0.7 fl oz/ 100 lb seed			1	Seed treatment only.
Pythium seedling diseases	4	Ridomil Gold EC (mefenoxam)	2 pt			2	Apply at seeding in a 7-12" band on soil over seed furrow.
	4	Ridomil Gold GR (mefenoxam)	40 lb			2	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.
	4	Ultra Flourish (mefenoxam)	4 pt			2	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.
Various seedling diseases	12	Maxim 4FS (fludioxonil)	0.16 fl oz/ 100 lb of seed			0.5	Seed treatment only.
	12	Spirato 480 FS (fludioxonil)	0.16 fl oz/100 lb of seed			0.5	Seed treatment only.
	4 & 11	Uniform SC (mefenoxam + azoxystrobin)	0.34 fl oz/ 1000' of row	1 appl.		0	Soil incorporated.
Various Diseases	7 & 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	Do not make more than 2 sequential applications without rotating to a fungicide of dissimilar mode of action.
	7 & 11		5.8 fl oz	23 fl oz	7	0.5	Do not make more than 2 sequential applications without rotating to a fungicide of dissimilar mode of action.

¹ 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).

² 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 15.12. Carrot fungicides ordered by disease and then FRAC group according to their mode of action.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
Alternaria blight	M1	(copper compounds) Many labels available: Badge SC, Badge X2, Basic Copper 53, COCS WDG, Champ DP, Champ WG, Champ Formula 2, Champ WP, COC DF, COC WP, Copper Count N, Cueva, Cuprofix Ultra, Cuproxat, Kentan DF, Kocide DF, Kocide 2000, Kocide 3000, Kocide 4.5 LF, Kop-hydroxide, Mastercop, Nordox 75 WG, NuCop 50WP, NuCop 3L, NuCop HB, NuCop DF, Previsto, Stretch, Tenn-Cop 5E, Top Cop w/ Sulfur	SEE INDIVIDUAL LABELS		1	Varies by product from 4 hr to 2 day	
	M5	(chlorothalonil) Many labels available: Bravo Ultrex, Bravo Weather Stik, Bravo ZN, Chloronil 720, Chlorothalonil 720SC, Echo 720, Echo 90DF, Echo ZN, Equus 720SST, Equus DF, Initiate 720, Initiate ZN, Praiz	SEE INDIVIDUAL LABELS		7	0.5	
	M5/33	Catamaran (Chlorothalonil/phosphite)	4 pt	50 pt	0	0.5	
	2	(iprodione) Many labels available: Enclosure 4F, Iprodione 4L AG, Meteor, Nevado 4F, Rovral 4F	2 pt	8 pt	0	1	
	3	(propiconazole) Many labels available: Amtide Propiconazole, Bumper 41.8EC, Fitness, Propicure, Propimax, Propi-Star EC, Shar-Shield PPZ, Tide Propiconazole, Tilt 3.6E, Topaz, Willowood Azoxy	4 fl oz	16 fl oz	14	0.5 Do not exceed 4 total appls.	
	3 & 9	Inspire Super (difenoconazole & cyprodinil)	20 fl oz	80 fl oz	7	0.5 Alternate with fungicides of dissimilar modes of action.	
	4 & M5	Ridomil Gold Bravo WP (mefenoxam + chlorothalonil)	2 lb		7	2	
	4 & M5	Ridomil Gold Bravo SC (mefenoxam + chlorothalonil)	2.5 pt		7	2	
	7	Endura (boscalid)	4.5 oz	22.5 oz	0	0.5 Alternate with non-FRAC code 7 fungicide. See label for directions.	
	7	Fontelis (penthiopyrad)	30 fl oz	61 fl oz	0	0.5 Alternate with non-FRAC code 7 fungicide. See label for directions.	
	7 & 11	Merivon SC (pyraclostrobin & fluxapyroxad)	5.5 fl oz	16.5 fl oz	7	0.5 Alternate with fungicides of dissimilar modes of action.	
	9 & 12	Switch 62.5WDG (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5 Do not exceed 1 sequential and 4 total appl. of Amistar or other Qol fungicides. See label for soil appl.	
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	2.4 pt	14.4 pt	0	0.5 Do not exceed 2 sequential and 6 total appl. of Quadris Opti. or rotate with non Qol fungicides.	
	11 & 3	Quilt (azoxystrobin + propiconazole)	14 fl oz	55 fl oz	14	0.5 Alternate every other application with a fungicide of dissimilar mode of action.	
11 & 3	Quilt XCEL (azoxystrobin + propiconazole)	14 fl oz	56 fl oz	14	0.5 Alternate every other application with a fungicide of dissimilar mode of action.		
Botrytis rot	1	Mertect 340F (thiabendazole)	41 fl oz/ 100 gal water		0.5		
Sclerotinia white mold							
Black crown rot	2	(iprodione) Many labels available: Enclosure 4F, Iprodione 4L AG, Nevado 4F, Rovral 4F	2 pt	8 pt	0	1	

Table 15.12. Carrot fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²	
			Applic.	Season	Harvest	Reentry		
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.								
Cavity spot	4	Metastar 2E AG (metalaxyl)	8 pt			2	Apply as a broadcast soil application and incorporate into top 2 inches. See label for directions.	
	4	Ridomil Gold EC, Ultra Flourish (mefenoxam)	2 pt			7	2	Apply at seeding in a 7-12" band on soil over seed furrow.
	4	Ridomil Gold SL (mefenoxam)	2 pt				2	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.
	4 & M1	Ridomil Gold Copper (mefenoxam + copper hydroxide)	2 lb	8 lb	7	2		
	4 & M5	Ridomil Gold Bravo WP (mefenoxam + chlorothalonil)	2 lb			7	2	
	4 & M5	Ridomil Gold Bravo SC (mefenoxam + chlorothalonil)	2.5 pt			7	2	
	11	Reason (fenamidone)	8.2 fl oz	24.6 fl oz	14	0.5	Alternate every other application with a fungicide of dissimilar mode of action.	
	21	Ranman (cyazofamid)	6 fl oz	30 fl oz	14	0.5	Alternate with fungicides of dissimilar chemistry.	
	43	Presidio (fluopicolide)	4 fl oz	12 fl oz	7	0.5	Must be applied with a fungicide of different mode of action.	
	M5	(chlorothalonil) Many labels available: Bravo Ultrex, Bravo Weather Stik, Bravo ZN, Chloronil 720, Chlorothalonil 720SC, Echo 720, Echo 90DF, Echo ZN, Equus 720SST, Equus DF, Initiate 720, Initiate ZN	SEE INDIVIDUAL LABELS			7	0.5	
Cercospora leaf spot	M1	(copper compounds) Many labels available: Badge SC, Badge X2, Basic Copper 53, COCS WDG, Champ DP, Champ WG, Champ Formula 2, Champ WP, COC DF, COC WP, Copper Count N, Cueva, Cuprofix Ultra, Cuproxat, Kentan DF, Kocide DF, Kocide 2000, Kocide 3000, Kocide 4.5 LF, Kop-hydroxide, Mastercop, Nordox 75 WG, NuCop 50WP, NuCop 3L, NuCop HB, NuCop DF, Nu-Cop XLR, Stretch, Tenn-Cop 5E, Top Cop w/ Sulfur	SEE INDIVIDUAL LABELS			1	Varies by product from 4 hr to 2 day	
	3	(propiconazole) Many labels available: Amtide Propiconazole, Bumper 41.8EC, Fitness, Propimax, Propi-Star EC, Shar-Shield PPZ, Tide Propiconazole, Tilt 3.6E, Topaz	4 fl oz	16 fl oz	14	0.5	Do not exceed 4 total appls.	
	3 & 9	Inspire Super (difenoconazole & cyprodinil)	20 fl oz	80 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action.	
	4 & M5	Ridomil Gold Bravo WP (mefenoxam + chlorothalonil)	2 lb			7	2	
	4 & M5	Ridomil Gold Bravo SC (mefenoxam/ chlorothalonil)	2.5 pt			7	2	
	7	Fontelis (penthiopyrad)	30 fl oz	61 fl oz	0	0.5	Alternate with non-FRAC code 7 fungicide. See label for directions.	
	7 & 11	Merivon SC (pyraclostrobin & fluxapyroxad)	5.5 fl oz	16.5 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action	
	7 & 11	Luna Sensation (fluopyram + trifloxystobin)	7.6 fl oz	230fl oz	7	0.5	Do not make more than 2 sequential applications without rotating to a fungicide of dissimilar mode of action.	
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	Do not exceed 1 sequential and 4 total appl. of Amistar or other QoI fungicides. See label for soil appl.	

Table 15.12. Carrot fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
Damping Off	M3	Defiant 75WP (thiram)	5.3 oz/100 lbs of seed			1	Seed treatment only.
Powdery mildew	M2	(sulfur compounds) Many brands available: Dusting Sulfur – Crusade, IAP, Kumulus DF, Micro Sulf, Microfine Sulfur, Microthiol Disperss, Sulfur 90W, Super-Six, Top Cop w/ Sulfur, Yellow Jacket Wettable Sulfur	SEE INDIVIDUAL LABELS		1	1	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
	3	(propiconazole) Many labels available: Amicide Propiconazole, Bumper 41.8EC, Fitness, Propimax, Propi-Star EC, Shar-Shield PPZ, Tilt 3.6E	4 fl oz	16 fl oz	14	0.5	Do not exceed 4 total appls.
	3 & 9	Inspire Super (difenoconazole & cyprodinil)	20 fl oz	80 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action.
	7	Fontelis (penthiopyrad)	30 fl oz	61 fl oz	0	0.5	Alternate with non-FRAC code 7 fungicide. See label for directions.
	7 & 11	Merivon SC (pyraclostrobin & fluxapyroxad)	5.5 fl oz	16.5 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action
	9 & 12	Switch 62.5WDG (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	2.4 pt	14.4 pt	0	0.5	Do not exceed 2 sequential and 6 total appl. of Quadris Opti. or rotate with non Qol fungicides.
	11 & 3	Avaris, Quilt, Willowood Azoxy (azoxystrobin + propiconazole)	14 fl oz	55 fl oz	14	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	11 & 3	Quilt XCEL (azoxystrobin + propiconazole)	14 fl oz	56 fl oz	14	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	33 & M2	Sanction (potassium phosphate and sulfur)	6 pt			2	
Pythium	21	Ranman (cyazofamid)	6 fl oz	30 fl oz	14	0.5	Alternate with fungicides of dissimilar chemistry.
	43	Presidio (fluopicolide)	4 fl oz	12 fl oz	7	0.5	Must be applied with a fungicide of different mode of action.
Pythium damping-off	4	Acquire, Sebring 2.65ST, Metalaxyl 4.0 ST (metalaxyl)	0.7 fl oz/100 lbs of seed			1	Seed treatment only.
Pythium seedling blight	4	Apron XL LS (mefenoxam)	0.64 fl. oz./100 lb seed			2	Seed treatment only.
	4	Metastar 2E AG (metalaxyl)	8 pt			2	Apply as a broadcast soil application and incorporate into top 2 inches. See label for directions.
	4	Ridomil Gold EC (mefenoxam)	2 pt			2	Apply at seeding in a 7-12" band on soil over seed furrow.
	4	Ridomil Gold SL, Ultra Flourish (mefenoxam)	2 pt			2	See label for specifics regarding preplant incorporated applications and surface applications at the time of planting.
Various (see label)	7 & 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	Do not make more than 2 sequential applications without rotating to a fungicide of dissimilar mode of action.
	7 & 11	Pristine (boscalid + pyraclostrobin)	10.5 oz	63 oz	0	0.5	Limit is 6 appl/crop and alternate chemistry.
	7 & 11	Merivon SC (pyraclostrobin & fluxapyroxad)	5.5 fl oz	16.5 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action
	7 & 11	Luna Sensation (fluopyram + trifloxystrobin)	7.6 fl oz	23 fl oz	7	0.5	Do not make more than 2 sequential applications without rotating to a fungicide of dissimilar mode of action.

Table 15.12. Carrot fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
	11	Amistar 80DF (azoxystrobin)	5 oz or 0.25 oz/1000 row ft	20 oz	0	4 hr	Do not exceed 1 sequential and 4 total appl. of Amistar or other QoI fungicides. See label for soil appl.
	11	Flint (trifloxystrobin)	3 oz	12 oz	7	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	11	Gem 500SC (trifloxystrobin)	2.9 fl oz	11.6 fl oz	7	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	11	Heritage (azoxystrobin)	10.5 oz	4 lb	0	4 hr	Do not apply more than 3 sequential applications without alternating to a fungicide of dissimilar mode of action.
	11	(azoxystrobin) Many labels available: Azoxystar, Azoxyzone, Equation SC, Quadris, Satori, Trevo, Willowood Azoxy	15.4 fl oz or 0.8 fl oz/1000 row ft	3.75 qt	0	4 hr	Do not exceed 1 sequential and 4 total appl. of QoI fungicides. See label for soil appl.
	11 & M5	Quadris Opti (azoxystrobin + chlorothalonil)	2.4 pt	14.4 pt	0	0.5	Do not exceed 2 sequential and 6 total appl. of Quadris Opti. or rotate with non QoI fungicides.
	11 & 3	Quadris Top (azoxystrobin + difenconazole)	14 fl ozq	56 fl oz	7	0.5	Do not exceed 1 sequential and 4 total appl. Quadris Top
	11 & 3	Quilt (azoxystrobin + propiconazole)	14 fl oz	55 fl oz	14	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	11 & 3	Quilt XCEL (azoxystrobin + propiconazole)	14 fl oz	56 fl oz	14 day	0.5	Alternate every other application with a fungicide of dissimilar mode of action.
	19	OSO 5%SC (polyoxin D zinc salt)	13 fl oz	84 fl oz	0	4 hr	See label for details.
	33	(mono- and di-potassium salts of phosphorous acid) Many brands available: Alude, Confine Extra, Fosphite, Fungiphite, K-Phite, Oxiphos, Phiticide, Phostrol, Prophyt, Rampart	3 qt		0	4 hr	See label for details.
	29	Omega (fluzinam)	1 pt	4 pt	7 day	0.5	For southern blight, apply 45 days prior to harvest
Various seedling diseases	12	Maxim 4FS, Spirato 480 FS (fludioxonil)	0.16 fl oz/100 lb of seed			0.5	Seed treatment only.

¹ 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).

² 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 15.13. Radish fungicides ordered by disease and then FRAC group according to their mode of action.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
Alternaria leaf spot	7	Fontelis	30 fl oz	61 fl oz	0	0.5	
	7 & 11	Merivon SC	5.5 fl oz	16.5 fl oz	7	0.5	
	9 & 12	Switch 62.5WDG	14 oz	56 oz	7	0.5	
	11	Cabrio EG	12 oz	48 oz	0	0.5	Do not exceed 1 sequential and 4 total appl. of Qol fungicides.
	11	(Azoxystrobin)	15.4 fl oz	62 fl oz	0	0.5	
Various brands available: Quadris, Satori, Willowood Azoxy							
Cercospora leaf spot	3	Tilt (propiconazole)	4 fl oz	16 fl oz	14	0.5	
	3 & 11	Quilt (propiconazole + azoxystrobin)	14 fl oz	56 fl oz	14	0.5	
	7	Fontelis (penthiopyrad)	30 fl oz	61 fl oz	0	0.5	
	7 & 11	Merivon SC	5.5 fl oz	16.5 fl oz	7	0.5	
	7 & 11	Luna Sensation (fluopyram + trifloxystrobin)	5.8 fl oz	23 fl oz	7	0.5	
	9 & 12	Switch 62.5WDG (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	
	11	Cabrio EG	12 oz	48 oz	0	0.5	
	11	(Azoxystrobin)	15.4 fl oz	62 fl oz	0	0.5	
	Various brands available: Quadris, Satori, Willowood Azoxy						
Damping Off	11	Flint (trifloxystrobin)	3 oz	12 oz	0	0.5	Alternate with fungicides of dissimilar modes of action.
	M3	Defiant 75WP (thiram)	5.3 oz/ 100 lbs of seed			1	
Downy mildew	4 & M1	Ridomil Gold Copper	2 lb	8 lb	7	2	
	33	(mono- and di-potassium salts of phosphorous acid)	3 qt		0	4 hr	
	Many brands available: Confine Extra, Fosphite, Fungi-phite, K-Phite, Oxiphos, Phiticide, Rampart						
Powdery mildew	43	Presidio (fluopicolide)	4 fl oz	16 fl oz	7	0.5	
	M2	(sulfur compounds)	SEE INDIVIDUAL LABELS		1	1	
Many brands available: Micro Sulf, Microthiol Disperss, Sulfur 90W, Top Cop w/ Sulfur							
Pythium	7	Fontelis (penthiopyrad)	30 fl oz	61 fl oz	0	0.5	
	7 & 11	Merivon SC (pyraclostrobin + fluxapyroxad)	5.5 fl oz	16.5 fl oz	7	0.5	
	9 & 12	Switch 62.5WDG (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	
	11	(Azoxystrobin)	15.4 fl oz	62 fl oz	0	0.5	
Various brands available: Quadris, Satori, Willowood Azoxy							
Pythium damping-off	21	Presidio (fluopicolide)	4 fl oz	16 fl oz	7	0.5	
Pythium damping-off	4	Acquire, Sebring 2.65ST (metalaxyl)	0.7 fl oz/ 100 lbs of seed			1	

Table 15.13. Radish fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
Pythium seedling blight	4	Apron XL LS (mefenoxam)	0.64 fl. oz./100 lb seed			2	
	4	Metastar 2E AG (metalaxyl)	8 pt			2	
	4	Ridomil Gold EC (mefenoxam)	2 pt			2	
	4	Ridomil Gold SL (mefenoxam)	2 pt			2	
White rust	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	
	11	(Azoxystrobin) Various brands available: Quadris, Satori, Willowood Azoxy	15.4 fl oz	62 fl oz	0	0.5	
Various (see label)	7 & 11	Merivon SC (pyraclostrobin & fluxapyroxad)	5.5 fl oz	16.5 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action
	11	(Azoxystrobin) Various brands available: Quadris, Satori, Willowood Azoxy	15.4 fl oz or 0.8 fl oz /1000 row ft	62 fl oz	0	0.5	
	7 & 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	
	33	(mono- and di-potassium salts of phosphorous acid) Many brands available: Confine Extra, Fosiphite, Fungi-phite, K-Phite, Oxiphos, Rampart	3 qt		0	4 hr	
Various seedling diseases	12	Various brands available: Dynashield, Maxim 4FS, Spirato 480 FS, (fludioxonil)	0.16 fl oz/100 lb of seed			0.5	

¹ 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).

² 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 15.14. Sweet potato fungicides ordered by disease and then FRAC group according to their mode of action.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
Septoria leaf spot	M2	Micro Sulf (sulfur)	5 lb/treated acre		0	1	Do not use within 2 weeks of an oil spray treatment
	11 & 3	Quadris TOP (azoxystrobin; difenoconazole)	14 fl oz	55.3 fl oz	14	12 hr	Make no more than 2 consecutive applications; Adding adjuvant may enhance the efficacy
Powdery mildew	11	Aframe	15.5 fl oz	123 fl oz	14	4 hr	Make no more than 2 sequential applications or with other Group 11 fungicides before alternation with non-Group 11 fungicides
		Azoxystar					
		Azoxystar					
		Equation					
		Quadris					
		Satori Fungicide					
		Tetran					
	Trevo						
	Willowood Azoxy 2SC						
			Azteroid FC (azoxystrobin)	19.5 fl oz	155 fl oz	0	4 hr
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	12 hr	
	11	Headline (pyraclostrobin)	12 fl oz	72 fl oz	3	12 hr	Do not make more than 2 sequential applications or with other Group 11 fungicides
	7	Luna Privilege (fluopyram)	6.84 fl oz	13.7 fl oz	7	12 hr	Do not make more than 2 sequential applications or with other Group 7 fungicides
	7	Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	12 hr	May be used with adjuvants; other crops cannot be planted until 120 days after the last application of Vertisan.
	M2	Micro Sulf	5 lb			1	Do not apply within 14 days of an oil spray
		Microthiol Disperss	10 lb			1	
		Sulfur 90W (sulfur)	20 lb			1	For greenhouse use
	11 & 3	Quadris TOP (azoxystrobin; difenoconazole)	14 fl oz	55.3 fl oz	14	12 hr	Make no more than 2 sequential applications or with other Group 11 fungicides Adding adjuvant may enhance the efficacy
	3	Quash (metconazole)	4 oz	16 oz	1	12 hr	Do not make more than 2 sequential applications
	9 & 12	Switch 62.5WG (cyprodinil; fludioxonil)	14 oz	56 oz	7	12 hr	Alternate with another labeled fungicide for 2 applications after 2 applications of Switch WG
Black rot	1	Mertect 340-F Thiabendazole 4L ST (thiabendazole)	107 fl oz/ 100 gal water			12 hr	One application only - dip seed roots for 1-2 min
Scurf	14	Botran 5F (DCNA dicloran)	Seed dip -0.6 qt/ 7.5 gal water; Plant bed spray - 5.73 oz /1000 linear ft bed (42 in)	3.2 qt		12 hr	Do not plant tomatoes as a follow-up crop.
	1	Mertect 340-F Thiabendazole 4L ST (thiabendazole)	107 fl oz /100 gal water			12 hr	Dip seed roots for 1-2 min and plant immediately
Pythium damping-off	4	Acquire	1.5 fl oz/ 100 lb. seed			1	Seed treatment
		Allegiance FL	0.75 fl oz/ 100 lb. seed				
		Dyna-Shield Metalaxyl 318 FS	0.75 fl oz/ 100 lb. seed				
		Metalaxyl 265 ST	0.75 fl oz/ 100 lb. seed				

Table 15.14. Sweet potato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
Phytophthora		Sebring 318 FS (metalaxyl)	0.75 fl oz /100 lb. seed				
	4	Apron XL (mefenoxam)	0.64 fl. oz./ 100 lb seed			2	See label
	11	Quadris (azoxystrobin)	0.8 fl oz /1000 row feet				4 hr
	11 & 4	Uniform Fungicide (azoxystrobin; mefenoxam)	0.34 fl oz /1000 ft. row				0 Make only 1 application per crop season as an in-furrow spray
	4	MetaStar 2E Fungicide (metalaxyl)	See label			1	2 See label
	43	Presidio Fungicide (fluopicolide)	4 fl oz	12 fl oz	7	12 hr	
Sclerotinia white mold	7	Endura (boscalid)	10 oz	20 oz	10	12 hr	Do not make more than 2 sequential applications or with other Group 7 fungicides
Early blight	11	Aftershock Evito 480 SC	3.8 fl oz	22.8 fl oz	7	12 hr	See label
		Tepera (fluoxastrobin)	8.4 fl oz	50.4 fl oz	7	12 hr	Do not apply more than 6 applications of product per acre per year, with a minimum retreatment interval of 7 days between applications .
	11	Flint Extra (trifloxystrobin)	3.8 fl oz	23 fl oz	7	12 hr	
	7	Endura (boscalid)	10 oz	20 oz	10	12 hr	
	7	Luna Privilege	6.84 fl oz	13.7 fl oz	7	12 hr	Do not make more than 2 sequential application or with Group 7 fungicides Post-planting drench or hill drench
		Velum Prime (fluopyram)					
	7 & 9	Luna Tranquility (fluopyram; pyrimethanil)	11.2 fl oz	54.7 fl oz	7	12 hr	Do not make more than 2 sequential application or with Group 7 or 9 fungicides
	11 & 3	Quadris TOP (azoxystrobin; difenoconazole)	14 fl oz	55.3 fl oz	14	12 hr	Addition of non-ionic surfactant or crop oil concentrate or blend is recommended
	3	Quash (metconazole)	4.0 oz	16 oz	1	12 hr	
	11	Reason 500 SC (fenamidone)	8.2 fl oz	16.4 fl oz	14	12 hr	
	9	Scala SC (pyrimethanil)	7 fl oz	35 fl oz	7	12 hr	See label.
	7	Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	12 hr	
Botrytis	7	Luna Privilege (fluopyram)	6.84 fl oz	13.7 fl oz	7	12 hr	Do not make more than 2 sequential application or with Group 7 fungicides
	7 & 9	Luna Tranquility (fluopyram; pyrimethanil)	11.2 fl oz	54.7 fl oz	7	12 hr	Do not make more than 2 sequential application or with Group 7 or 9 fungicides
	3	Quash (metconazole)	4.0 oz	16 oz	1	12 hr	
	9	Scala SC (pyrimethanil)	7 fl oz	35 fl oz	7	12 hr	See label.
	7	Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	12 hr	
Alternaria leaf blight	11	Aframe	15.5 fl oz	123 fl oz	14	4 hr	Make no more than 2 sequential applications or with other Group 11 fungicides
		Azoxystar	20 fl oz	123 fl oz	14	4 hr	
		Azoxyzone	20 fl oz	123 fl oz	14	4 hr	
		AZteroid FC	25.6 fl oz	155 fl oz	0	4 hr	
		Equation	15.5 fl oz	123 fl oz	14	4 hr	
		Quadris	15.5 fl oz	123 fl oz	14	12 hr	Make no more than 1 consecutive applications

Table 15.14. Sweet potato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²	
			Applic.	Season	Harvest	Reentry		
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.								
		Satori Fungicide	20 fl oz	123 fl oz	14	4	Do not make more than 1 sequential applications or with other Group 11 fungicides	
		Tetraban	15.5 fl oz	123 fl oz	14	4 hr		
		Trevo	20 fl oz	123 fl oz	14	4 hr	Make no more than 2 sequential applications or with other Group 11 fungicides before alternation	
		Willowood Azoxy 2SC (azoxystrobin)	15.5 f oz	123 fl oz	14	4 hr		
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	12 hr	Make no more than 1 consecutive application	
	11	Headline (pyraclostrobin)	12 fl oz	72 fl oz	3	12 hr	Do not make more than 2 sequential applications or with other Group 11 fungicides	
	9 & 12	Switch 62.5WG (cyprodinil; fludioxonil)	14 oz	56 oz	7	12 hr	Alternate with another labeled non-Group 9 or 12 fungicide for 2 applications after 2 applications of Switch WG	
Rust/White rust (<i>Albugo</i> spp.)	11	Aframe	15.5 fl oz	123 fl oz	14	4 hr		
		Azoxystar	20 fl oz	123 fl oz	14	4 hr		
		Azoxystar	20 fl oz	123 fl oz	14	4 hr		
		AZteroid FC	25.6 fl oz	155 fl oz	0	4 hr		
		Equation	15.5 fl oz	123 fl oz	14	4 hr	36 days plant back interval	
		Equation SC	15.5 fl oz	123 fl oz	14	4 hr	36 days plant back interval	
		Quadris	15.5 fl oz	123 fl oz	14	4 hr	Do not make more than 1 application before alternating with a different mode of action.	
		Satori Fungicide	20 fl oz	123 fl oz	14	4 hr	36 days plant back interval	
		Tetraban	15.5 fl oz	123 fl oz	14	4 hr		
		Trevo	20 fl oz	123 fl oz	14	4 hr	Do not apply more than 1 application or with other Group 11 fungicides before alternation	
		Willowood Azoxy 2SC (azoxystrobin)	15.5 fl oz	123 fl oz	14	4 hr		
		11	Cabrio EG	16 oz	48 oz	0	12 hr	Alternate with other labeled fungicides after each application
			Headline	12 fl oz	72 fl oz	3	12 hr	
			Headline SC (pyraclostrobin)	12 fl oz	72 fl oz	3	12 hr	
		M2	Sulfur 90W	20 lb			1	For greenhouse use
	11 & 3	Quadris TOP (azoxystrobin; difenoconazole)	14 fl oz	55.3 fl oz	14	12 hr	Make no more than 2 consecutive applications; adding adjuvant may enhance the efficacy	
	11	Reason 500SC (fenamidone)	8.2 fl oz	16.4 fl oz	14	0		
Rhizopus rot	14	Botran 5F (DCNA dicloran)	0.6 qt in 100 gal water for post-harvest or for root dip 5-10 seconds			12 hr	See label.	
	12	Scholar SC (fludioxonil)	32 fl oz /100 gal water for post-harvest dip; 16 fl oz / 200,000 lb sweet potatoes for spray application				Do not make more than one post-harvest application.	
Pink rot	11	Azoxystar	0.6 fl oz/ton tubers			4 hr	Do not make more than 1 post-harvest application to the tubers	
		Equation SC	0.6 fl oz/ton tubers			4 hr	Post-harvest use in-line aqueous application method; do not use on seed pieces.	
		Satori Fungicide	0.6 fl oz/ton tubers			4 hr		
		Tetraban (azoxystrobin)	0.6 fl oz/ton tubers			4 hr		

Table 15.14. Sweet potato fungicides ordered by disease and then FRAC group according to their mode of action. (continued)

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (active ingredients)	Max. Rate/Acre		Min. Days to		Remarks ²
			Applic.	Season	Harvest	Reentry	
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.							
	21	Ranman 400SC Fungicide	At planting - 0.42 fl oz /1000 linear ft; Lay-by/Hilling - 2.75 fl oz/A	27.5 fl oz	7	12 hr	
		Ranman Fungicide (cyazofamid)	At planting - 0.42 fl oz / 1000 linear ft; Lay-by/Hilling - 2.75 fl oz/A	27.5 fl oz	7	12 hr	
	22	Elumin (ethaboxam)	8 fl oz	16 fl oz		12 hr	
	49	Orondis Gold 200 (oxathiapiprolin)	9.6 fl oz	19.2 fl oz	5	4 hr	Apply as an in-furrow application at planting.
Various soil-borne diseases	11	200 (azoxystrobin)	Various, See label	Various, See label	See label	4 hr	See label.
Seed decay, damping-off, seedling blight caused by soil pathogens	12	Maxim 4FS (fludioxonil)	0.16 fl oz /100 lb seed		0	12 hr	Not effective against <i>Pythium</i> ; tank mix with others for <i>Pythium</i> control

¹ FRAC code (fungicide group): Number (1 through 45) 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).

² 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 15.15. Non-fumigant nematicides for carrots in Florida.

Product	Application Directions
Vydate L (a.i. oxamyl)	Apply within one week before planting or before emergence if post plant, either broadcast (2 gal/A, (incorporate 2" at least), in the seed furrow (1-2 gal/A), or via chemigation (1 gal/A). Do not apply more than 4 gal/A per season. Minimum retreatment interval is 14 days. No more than 8 applications per season.
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.

Vydate is an insecticide/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 15.16. Non-fumigant nematicides for sweet potatoes in Florida.

Product	When to Apply	Application Pattern	Incorporation Depth	Rate
Mocap 15G (a.i. ethoprop)	2 to 3 wks preplant	Row, 12 to 15" band	2 to 4" with rotary hoe, tiller, etc. or by bedding over the band	20 to 26 lbs/A or 1.6 to 2.1 per 1000 ft of row (min. row spacing 42")
Mocap EC (a.i. ethoprop)	2 to 3 wks preplant	Row, 12 to 15" band	2 to 4" deep	5.1 to 6.9 fl oz/1000 ft row
Vydate L* (a.i. oxamyl)	Within one week before planting	Broadcast, band, or in-furrow transplant drench	4 to 6" deep	2 gal/A broadcast or 1 to 2 gals/A in-furrow (Consult table for specific instructions and other uses.)
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 as an in-furrow spray during planting directed on or below seed; or using overhead chemigation equipment; or for transplanted crops, as a post-planting drench, or hill drench. 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.			

Mocap and Vydate are insecticide/nematicides; 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. *Vydate L has registration for nematode control on sweet potatoes only as a broadcast or in-furrow treatment. Foliar applications are registered for insect control only. For broadcast or in-furrow treatments, Vydate L should be applied in a minimum of 20 gals of water. As a broadcast treatment thoroughly incorporate to a soil depth of 4-6".

Table 15.17. Fumigant nematicides for sweet potatoes in Florida.

Nematicide	Broadcast Application ¹		In the Row Applications
	Gallons or Lbs Per acre	Fl oz /1000 ft / chisel spaced 12" apart	
Telone II ^{2,3}	9 to 12 gal	26 to 35	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-17 ^{2,3}	10.8 to 17.1 gal	31.8 to 50.2	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 ^{2,3}	13 to 20.5 gal	38 to 60	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.
Pic-Clor 60	19 to 31.5 gal	57 to 90	For any row spacing, application rates should never exceed the labeled maximum for broadcast applications. Consult the product label for additional detail.
Vapam HL	75 gal	-	For drip or in-row chisel fumigation, consult product label for proportionately reduced overall rates, drip concentration and flow modifying directions and procedures.
KPam HL	60 gal	-	For drip or in-row chisel fumigation, consult product label for proportionately reduced overall rates, drip concentration and flow modifying directions.
Allyl Isothiocyanate (AITC) Dominus	40 gal	-	For drip or in-row fumigation and crop termination, consult product label for overall rates, drip concentration and flow modifying directions

¹ 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.

² 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 new label details for additional use restrictions based on soil characteristics, buffer zones, requirements for Fumigant Management Plans (FMP) and Personal Protective Equipment (PPE), mandatory good agricultural practices (GAP's), product and applicator training certification, and other use and rate modifying recommendations.

³ 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.