

Chapter 15. Root Crop Production¹

Julien M. Beuzelin, Peter J. Dittmar, Johan Desaegeer, Lincoln Zotarelli, Shouan Zhang, Qingren Wang, Craig Frey, and Anna Mészáros²

Beet, Carrot, Radish, and Sweetpotato Botany and Planting

Beet—*Beta vulgaris*, Chenopodiaceae

Carrot—*Daucus carota*, Apiaceae (Umbelliferae)

Radish—*Raphanus sativus*, Brassicaceae (Cruciferae)

Sweetpotato/Boniato—*Ipomoea batatas*, Convolvulaceae

Table 1. Planting dates for beet, carrot, radish, and sweetpotato/boniato.

Planting Region	Dates			
	Beet	Carrot	Radish	Sweetpotato/Boniato
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)

Table 2. Planting information for beet, carrot, radish, and sweetpotato/boniato.

Planting Parameters	Measurements			
	Beet	Carrot	Radish	Sweetpotato/Boniato
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 3. Common cultivars of beet, carrot, and sweetpotato/boniato.

Crop	Cultivars
Beet	Bohan, Boro, Bulls Blood (tops), Golden Beets (yellow), Green Top, Pacemaker III, Red Ace, Red Cloud
Carrot	Apache, Choctaw, Navajo, Top Notch
Radish	Diego, Escala F ¹ , Fuego ¹ , Red Castle, Red Pearl, Red Satin F ¹ , Red Silk ² , Rudi
Sweetpotato/Boniato	Beauregard, Covington, Evangeline, Hernandez, Picadito (Boniato)

¹ Resistant to yellows; tolerant to black root and rhizoctonia scurf.

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

Tropical Root Crops

Tropical root crops are planted primarily for their edible roots, tubers, 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 sweetpotato/boniato, cassava, and taro. In the case of 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 4. Planting dates for cassava, taro, and malanga.

Planting Region	Dates		
	Cassava	Taro	Malanga
Miami-Dade County	Year-round (mainly February to April)	Year-round	Year-round

Table 5. Planting information for cassava, taro, and malanga.

Planting Parameters	Measurements		
	Cassava	Taro	Malanga
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 micropropagules	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 over the world by a variety of names, including manioc, yuca, mandioca, balinghoy, kamoteng, kahoy (Philippines), mogo (Africa), tapioca root (India), and manioc root in its native 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 the 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 time because it produced acceptable yields even with high levels of root-knot nematode infestation. The range of local genotypes covers a few unnamed clones that have been imported from various Caribbean basin countries. However, 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 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 two-node cuttings, or ministakes, which can provide a five-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 United States.

Tannia is widely grown and used in the tropics. It has been grown since 1963 on a limited commercial scale in south Florida, where it is typically planted in the spring because the crop requires 9–10 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 3–5 in. below the surface. ‘South Dade White’ produces white-fleshed cormels; ‘Malanga Amarilla’ produces a yellow-fleshed edible corm. ‘Vinola’ produces purple-fleshed cormels.

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 in different regions 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 6–10 months, with corms being dug up using 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°F–50°F with a relative humidity of 85%.

Tropical sweetpotato or boniato—‘Picadito’ is the main variety grown in Miami-Dade County. Sweetpotato usually has shallow-lobed leaves and wine-colored skin with orange flesh. However, boniato, which is predominantly grown in Miami-Dade County, has deeply lobed leaves and wine-colored skin with white flesh.

It is illegal to import sweetpotato/boniato into the United States due to soil pests, such as sweetpotato weevils, 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 may be available from those plant breeders or through certified slip producers.

For other tropical root crops, such as daikon radish or turmeric, readers may refer to [chapter 5](#), “Ethnic Vegetable Production.”

The following tables list registered pesticides that should be integrated with other pest management methods. Additional information on integrated management methods can be requested from UF/IFAS Extension horticulture or agriculture agents. A list of local UF/IFAS Extension offices is available at <https://sfyl.ifas.ufl.edu/find-your-local-office/>.

Table 6. Herbicides approved for managing weeds in beet. **Labels change frequently. Be sure to read a current product label before applying any chemical.**
Contact: Peter J. Dittmar, UF/IFAS Department of Horticultural Sciences, Gainesville.

	Active Ingredient lb a.i./Acre	Trade Name Product/Acre	MOA Code	Weeds Controlled/Remarks
PREEMERGENCE	Carfentrazone up to 0.031	(Aim) 2 EC up to 2 fl oz	14	Apply as a preplant burndown for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. No more than 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 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 burndown treatment. Scythe is a contact and nonresidual herbicide and can be tank-mixed with residual preemergence herbicides to lengthen control.
	Pyraflufen ethyl 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) 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. No more than 6.1 fl oz per cropping season. PHI 0 days.
	Clethodim 0.09–0.13 0.07–0.25	(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	(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.
	Sethoxydim 0.28–0.47	(Poast) 1.5 EC 1.5–2.5 pt	1	Emerged grass weeds. No more than 5 pt/A per season. Include a crop oil concentrate. Unsatisfactory results may occur if applied to grasses under stress. PHI 60 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.

Table 7. Herbicides approved for managing weeds in carrot. **Labels change frequently. Be sure to read a current product label before applying any chemical.**
Contact: Peter J. Dittmar, UF/IFAS Department of Horticultural Sciences, Gainesville.

	Active Ingredient lb a.i./Acre	Trade Name Product/Acre	MOA Code	Weeds Controlled/Remarks
PREEMERGENCE	Carfentrazone up to 0.031	(Aim) 2 EC up to 2 fl oz	14	Apply as a preplant burndown for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. No more than 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.
	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 inches deep. Preemergence and postemergence applications 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 burndown 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 burndown 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 H2O) 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.
	Prometryn 1.0–2.0	(Caparol) 4 L 2–4 pt	5	Most annual broadleaf and grass weeds. No more than 1 application. Consult label for rotational crop restrictions.
	Pyraflufen ethyl 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 in. or less with 8 hr of application. PHI 60 days.
POSTEMERGENCE	Carfentrazone Up to 0.031	(Aim) 2 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. No more than 6.1 fl oz per cropping season. PHI 0 days.
	Clethodim 0.09–0.13 0.07–0.13	(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.

	Active Ingredient lb a.i./Acre	Trade Name Product/Acre	MOA Code	Weeds Controlled/Remarks
	Fluazifop 0.188	(Fusilade DX) 2 EC 12 fl oz	1	Actively growing grass weeds. No more than 48 fl oz/A per growing season. Withhold field flooding 45–60 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 in. tall. Repeat applications may be made but should not exceed 4 lb/A. Can be applied following Stoddard Solvent provided that the applications are at least 1 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. No more than 0.5 lb a.i./A per season. Apply after carrots have 5–6 true leaves and weeds are less than 1 in. tall. If needed, a second application may be made after an interval of at least 3 weeks. 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. 1 application of 4 pt/A or 2 applications of 2 pt/A. For POST control of weeds, include NIS or COC. Consult label for rotational crop restrictions. PHI 30 days.
	Sethoxydim 0.28–0.38	(Poast) 1.5 EC 1.5–2.0 pt	1	Emerged grass weeds. No more than 5 pt/A per season. Include a crop oil concentrate. Unsatisfactory results may occur if applied to grasses under stress. 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.

Table 8. Herbicides approved for managing weeds in radish. **Labels change frequently. Be sure to read a current product label before applying any chemical.**
Contact: Peter J. Dittmar, UF/IFAS Department of Horticultural Sciences, Gainesville.

	Active Ingredient lb a.i./Acre	Trade Name Product/Acre	MOA Code	Weeds Controlled/Remarks
PREPLANT/PREEMERGENCE	Carfentrazone up to 0.031	(Aim) 2 EC up to 2 fl oz	14	Apply as a preplant burndown for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. No more than 0.096 lb a.i./A per season. No pretransplant interval.
	Glyphosate	(various formulation) 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 ethyl 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.
	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.
	Trifluralin 0.5–0.75	(Treflan HFP, Trifluralin) 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 hr. Results in Florida are erratic on soils with low organic matter and clay contents.
POSTEMERGENCE	Clethodim 0.09–0.13 0.07–0.13	(Arrow) 2 EC 6–8 fl oz (Select Max) 1 EC 9–16 fl oz	1	Emerged annual and perennial grass weeds. Reapplications at least 14 days apart. No more than 0.25 lb a.i./A per season. PHI 15 days.
	Sethoxydim 0.47	(Poast) 1.5 EC 2.5 pt	1	Emerged grass weeds. No more than 3.0 pt/A per season. Include a crop oil concentrate. Head lettuce and radicchio PHI 30 days. Leaf lettuce and endive PHI 15 days.

Table 9. Herbicides approved for managing weeds in sweetpotato. **Labels change frequently. Be sure to read a current product label before applying any chemical.** Contact: Peter J. Dittmar, UF/IFAS Department of Horticultural Sciences, Gainesville.

	Active Ingredient lb a.i./Acre	Trade Name Product/Acre	MOA Code	Weeds Controlled/Remarks
PRETRANSPLANT	Carfentrazone up to 0.031	(Aim) 2 EC up to 2 fl oz	14	Apply as a preplant burndown for emerged broadleaf weeds. Use crop oil concentrate, methylated seed oil, or nonionic surfactant at recommended rates. No more than 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.
	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 transplanting and minimize soil disturbance after application.
	Glyphosate	(various formulations) consult labels	9	Emerged broadleaf and grass weeds. Apply as a preplant burndown. Consult labels 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. Scythe is a contact and nonresidual herbicide and can be tank-mixed with 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.
POSTTRANSPLANT	Carfentrazone up to 0.031	(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. No more than 6.1 fl oz per cropping season. PHI 0 days.
	Clethodim 0.09–0.25 0.07–0.25	(Select, Arrow) 2 EC 6–16 fl oz (Select Max) 1 EC 9–16	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. Consult the label for the necessary surfactant. PHI 30 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.
	Sethoxydim 0.28–0.47	(Poast) 1.5 EC 1.5–2.5 pt	1	Emerged grass weeds. No more than 5 pt/A per season. Include a crop oil concentrate. Unsatisfactory results may occur if applied to grasses under stress. PHI 60 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.

Table 10. Insecticides labeled for management of arthropod pests of carrot and beet. **Labels change frequently. Be sure to read a current product label before applying any chemical. Please refer to chapter 19 for information on biopesticides, including materials labeled for certified organic production.** Contact: Julien Beuzelin, UF/IFAS Everglades Research and Education Center.

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
Aphids	1B	Malathion 5EC (malathion)	1.5–2.0 pt	–	Beets: 12 Carrots: 24	7	No more than 3 applications for beets and 2 applications for carrots.
	1B	Malathion 8F (malathion)	1.25 pt	–	12	7	No more than 3 applications. Beets only.
	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	Beets: 25.6 fl oz per year Carrots: 32 fl oz per year	12	Beets: 1 Carrots: 21	–
	3A	*Fastac CS (alpha-cypermethrin)	3.2–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	4A	Actara (thiamethoxam)	1.5–4.0 oz	8 oz	12	7	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 3.7 fl oz Soil: 10.5 fl oz	12	Foliar: 5 Soil: 21	Leaves may be used for food.
	4A	Platinum 75SG (thiamethoxam)	1.7–4.0 oz	4.0 oz	12	At planting	–
	4C	Transform WG (sulfoxaflor)	Leaf production: 0.75–1.0 oz Root production: 0.75–1.5 oz	8.5 oz per year	24	7	–
	4D	Sivanto Prime (flupyradifurone)	7–14 fl oz	28 fl oz per year	4	7	–
	29	Beleaf 50 SG (flonicamid)	2.0–2.8 oz	8.4 oz per year	12	3	–
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	No more than 6 applications.
	1B	Malathion 8F (malathion)	1.25 pt	–	12	7	No more than 3 applications. Beets only.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6–2.8 fl oz	14 fl oz	12	0	Carrots only.
	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	Beets: 25.6 fl oz per year Carrots: 32 fl oz per year	12	Carrots: 21 Beets: 1	–

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	3A	*Fastac CS (alpha-cypermethrin)	1.8–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	4A	Actara (thiamethoxam)	1.5–4.0 oz	8 oz	12	7	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 3.7 fl oz Soil: 10.5 fl oz	12	Foliar: 5 Soil: 21	Leaves may be used for food.
	4A	Platinum 75SG (thiamethoxam)	1.7–4.0 oz	4.0 oz	12	At planting	–
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	No more than 6 applications.
	1B	*Diazinon AG500 *Diazinon (diazinon)	AG500: 2–4 qt 50W: 4–8 lb	AG500: 4 qt per year 50W: 8 lb per year	72	Preplant	–
	1B	Malathion 8F (malathion)	1.25 pt	–	12	7	No more than 3 applications. Beets only.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6–2.8 fl oz	14 fl oz	12	0	Carrots only.
	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	Carrots: 32 fl oz per year Beets: 25.6 fl oz per year	12	Carrots: 21 Beets: 1	–
	3A	*Fastac CS (alpha-cypermethrin)	1.3–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.28–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	5	Radiant SC (spinetoram)	Leaves: 5–10 fl oz Roots: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 28 fl oz per year (carrots) and 32 fl oz per year (beets)	4	Leaves: 3 Roots: 3 (carrots) and 7 (beets)	–
	18	Intrepid 2F (methoxyfenozide)	Leaves: 4–16 fl oz Roots: 8–16 fl oz	64 fl oz	4	Leaves: 1 Roots: 14	–
	22	Avaunt Evo (indoxacarb)	3.5–6.0 oz	24 oz	12	7	Beets only.
	28	Coragen (chlorantraniliprole)	3.5–7.5 fl oz	15.4 fl oz	4	1	–
	28	Exirel (cyantraniliprole)	10–20.5 fl oz	0.4 lb a.i. per year	12	1	–

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	28	Vantacor (chlorantraniliprole)	1.2–2.5 fl oz	5.1 fl oz	4	1	–
	28	Verimark (cyantraniliprole)	10–13.5 fl oz	13.5 fl oz at planting or 0.4 lb a.i. per year	4	At planting	–
	32	Spear-Lep (GS-omega/kappa-Hxtx-Hv1a)	1–2 pt	10 gal per year	4	0	Must be tank-mixed with a <i>Bacillus thuringiensis</i> (Bt) product.
Grasshoppers	3A	*Fastac CS (alpha-cypermethrin)	3.2–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
Leafhoppers	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63–2.5 lb XLR, 4F: 0.5–2 qt	–	12	7	No more than 6 applications.
	1B	Malathion 5EC (malathion)	1.5–2.0 pt	–	Beets: 12 Carrots: 24	7	No more than 3 applications for beets and 2 applications for carrots.
	3A	*Asana XL (esfenvalerate)	5.8–9.6 fl oz	96 fl oz	12	7	Carrots only.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6–2.8 fl oz	14 fl oz	12	0	Carrots only.
	3A	*Fastac CS (alpha-cypermethrin)	1.8–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	4A	Actara (thiamethoxam)	1.5–4.0 oz	8 oz	12	7	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 3.7 fl oz Soil: 10.5 fl oz	12	Foliar: 5 Soil: 21	Leaves may be used for food.
	4A	Platinum 75SG (thiamethoxam)	1.7–4.0 oz	4.0 oz	12	At planting	–
	4C	Transform WG (sulfoxaflor)	1.5–2.75 oz	8.5 oz per year	24	7	–
	4D	Sivanto Prime (flupyradifurone)	7–14 fl oz	28 fl oz per year	4	7	–

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
Leafminers	5	Radiant SC (spinetoram)	Leaves: 5–10 fl oz Roots: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 28 fl oz per year (carrots) and 32 fl oz per year (beets)	4	Leaves: 3 Roots: 3 (carrots) and 7 (beets)	–
Mole crickets and wireworms	1B	*Diazinon AG500 *50W (diazinon)	AG500: 1–4 qt 50W: 2–8 lb	AG500: 4 qt per year 50W: 8 lb per year	72	Preplant	–
Plant bugs	3A	*Fastac CS (alpha-cypermethrin)	3.2–3.8 fl oz	11.4 fl oz	12	1	–
	29	Beleaf 50 SG (flonicamid)	2.0–2.8 oz	8.4 oz per year	12	3	–
Stink bugs	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63–2.5 lb XLR, 4F: 0.5–2 qt	–	12	7	No more than 6 applications.
Tarnished plant bug	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 0.63–2.5 lb XLR, 4F: 0.5–2 qt	–	12	7	No more than 6 applications.
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
Weevils	3A	*Asana XL (esfenvalerate)	9.6 fl oz	96 fl oz	12	7	Carrots only.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6–2.8 fl oz	14 fl oz	12	0	Carrots only.
	3A	*Fastac CS (alpha-cypermethrin)	1.8–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.

¹ Mode of Action (MOA) codes for plant pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 11.1 January 2024. Number codes are used to distinguish the main insecticide mode of action groups, with additional letters for certain subgroups within each main group. All insecticides within the same group (with the same number) indicate the same active ingredient or a similar mode of action. This information must be considered for the insecticide resistance management decisions.

² Always double-check labels regarding maximum application limits. Many labels are changing from a maximum rate per season (or crop cycle) to a maximum rate per year.

³ 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 UF/IFAS Extension nor discrimination against similar products or services not mentioned.

*Restricted use insecticide.

Table 11. Insecticides labeled for management of arthropod pests of radish. **Labels change frequently. Be sure to read a current product label before applying any chemical. Please refer to chapter 19 for information on biopesticides, including materials labeled for certified organic production.** Contact: Julien Beuzelin, UF/IFAS Everglades Research and Education Center.

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
Aphids	1B	Malathion 5EC, 8F (malathion)	5EC: 1.5 pt 8F: 1.0 pt	–	12	7	No more than 3 applications per year.
	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	32 fl oz per year	12	21	–
	3A	*Fastac CS (alpha-cypermethrin)	3.2–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	–
	4A	Actara (thiamethoxam)	1.5–3.0 oz	4 oz	12	7	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 1.2 fl oz Soil: 10.5 fl oz	12	Foliar: 7 Soil: 21	–
	4A	Platinum 75 SG (thiamethoxam)	1.7–2.17 oz	2.17 oz	12	At planting	–
	4C	Transform WG (sulfoxaflor)	Leaf production: 0.75–1.0 oz Root production: 0.75–1.5 oz	8.5 oz per year	24	7	–
	4D	Sivanto Prime (flupyradifurone)	7–14 fl oz	28 fl oz per year	4	7	–
	28	Exirel (cyantraniliprole)	13.5–20.5 fl oz	0.4 lb a.i. per year	12	1	–
	29	Beleaf 50 SG (flonicamid)	2.0–2.8 oz	8.4 oz per year	12	3	–
Beetles (includes cucumber beetle, flea beetles) and weevils	1A	Sevin 4F, XLR Plus (carbaryl)	0.5–1.0 qt	6 qt per year	12	7	–
	1B	Malathion 8F (malathion)	1.0 pt	–	12	7	No more than 3 applications per year. Flea beetles only.
	3A	*Asana XL (esfenvalerate)	5.8–9.6 fl oz	19.2 fl oz	12	7	–
	3A	*Baythroid XL (beta-cyfluthrin)	1.6–2.8 fl oz	14.0 fl oz	12	0	–
	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	32 fl oz	12	21	–

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	3A	*Fastac CS (alpha-cypermethrin)	1.8–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	–
	4A	Actara (thiamethoxam)	1.5–3.0 oz	4 oz	12	7	Flea beetles only.
	4A	Admire Pro (imidacloprid)	1.2 fl oz	1.2 fl oz	12	7	–
	4A	Platinum 75 SG (thiamethoxam)	1.7–2.17 oz	2.17 oz	12	At planting	–
Caterpillars (includes cutworms, armyworms, corn earworm, hornworm, loopers, webworms, saltmarsh caterpillar)	1A	*Lannate SP, *LV (methomyl)	SP: 0.5 lb LV: 1.5 pt	SP: 4 lb LV: 12 pt	48	3	Label is a 24(c) local indemnified label for beet armyworm control in Florida, and a waiver of liability must be signed for use.
	1A	Sevin 4F, XLR Plus (carbaryl)	1–2 qt	6 qt per year	12	7	–
	1B	*Diazinon AG-500 *Diazinon 50W (diazinon)	AG500: 2–4 qt 50W: 4–8 lb	AG500: 4 qt per year 50W: 8 lb per year	72	Preplant	–
	3A	*Asana XL (esfenvalerate)	5.8–9.6 fl oz	19.2 fl oz	12	7	–
	3A	*Baythroid XL (beta-cyfluthrin)	1.6–2.8 fl oz	14.0 fl oz	12	0	–
	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	32 fl oz per year	12	21	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.28–4.0 fl oz	24 fl oz	12	1	–
	5	Radiant SC (spinetoram)	Foliage harvest: 5–10 fl oz Root harvest: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 24 fl oz per year	4	3	–
	18	Intrepid 2F (methoxyfenozide)	Leaves: 4–16 fl oz Roots: 8–16 fl oz	64 fl oz	4	Leaves: 1 Roots: 14	–
	28	Coragen (chlorantraniliprole)	3.5–7.5 fl oz	15.4 fl oz	4	1	–
	28	Exirel (cyantraniliprole)	10.0–20.5 fl oz	0.4 lb a.i. per year	12	1	–
	28	Vantacor (chlorantraniliprole)	1.2–2.5 fl oz	5.1 fl oz	4	1	–

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	28	Verimark (cyantraniliprole)	10–13.5 fl oz	13.5 fl oz at planting or 0.4 lb a.i. per year	4	At planting	–
	32	Spear-Lep (GS-omega/kappa-Htxx-Hv1a)	1–2 pt	10 gal per year	4	0	Must be tank-mixed with a <i>Bacillus thuringiensis</i> (Bt) product.
Grasshoppers, mole crickets	1B	*Diazinon AG-500 *Diazinon 50W (diazinon)	AG500: 1 qt 50W: 2 lb	AG500: 4 qt per year 50W: 8 lb per	72	Preplant	–
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	–
Leafhoppers	1A	Sevin 4F, XLR Plus (carbaryl)	0.5–1.0 qt	6 qt per year	12	7	–
	1B	Malathion 8F (malathion)	1.0 pt	–	12	7	No more than 3 applications per year.
	3A	*Baythroid XL (beta-cyfluthrin)	1.6–2.8 fl oz	14.0 fl oz	12	0	Do not consume tops.
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	–
	4A	Actara (thiamethoxam)	1.5–3.0 oz	4 oz	12	7	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 1.2 fl oz Soil: 10.5 fl oz	12	Foliar: 7 Soil: 21	–
	4A	Platinum 75 SG (thiamethoxam)	1.7–2.17 oz	2.17 oz	12	At planting	–
	4C	Transform WG (sulfoxaflor)	1.5–2.75 oz	8.5 oz per year	24	7	–
	4D	Sivanto Prime (flupyradifurone)	7–14 fl oz	28 fl oz per year	4	7	–
Leafminers	5	Radiant SC (spinetoram)	Foliage harvest: 6–10 fl oz Root harvest: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 24 fl oz per year	4	3	–
Mites (includes carmine spider mite, twospotted spider mite)	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	32 fl oz per year	12	21	–

Insect or Mite Pest	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
Stink bugs, plant bugs, meadow spittlebug	1A	Sevin 4F, XLR Plus (carbaryl)	1–2 qt	6 qt per year	12	7	–
	3A	*Fastac CS (alpha-cypermethrin)	3.2–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	–
Thrips (check label for species controlled)	4A	Admire Pro (imidacloprid)	Soil: 4.4–10.5 fl oz	10.5 fl oz	12	Soil: 21	–
	5	Radiant SC (spinetoram)	Foliage harvest: 6–10 fl oz Root harvest: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 24 fl oz per year	4	3	–
Whiteflies	3A	*Brigade 2EC (bifenthrin)	5.12–6.4 fl oz	32 fl oz per year	12	21	–
	4A	Actara (thiamethoxam)	3.0–4.0 oz	4 oz	12	7	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 1.2 fl oz Soil: 10.5 fl oz	12	Foliar: 7 Soil: 21	–
	4A	Platinum 75 SG (thiamethoxam)	1.7–2.17 oz	2.17 oz	12	At planting	–
	4C	Transform WG (sulfoxaflor)	2–2.75 oz	8.5 oz per yea	24	7	–
	4D	Sivanto Prime (flupyradifurone)	10.5–14.0 fl oz	28 fl oz per year	4	7	–
	29	Beleaf 50 SG (flonicamid)	2.8 oz	8.4 oz per year	12	3	–
Wireworms	1B	*Diazinon AG-500 *Diazinon 50 W (diazinon)	AG500: 3–4 qt 50W: 6–8 lb	AG500: 4 qt per year 50W: 8 lb per	72	Preplant	–

¹ Mode of Action (MOA) codes for plant pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 11.1 January. Number codes are used to distinguish the main insecticide mode of action groups, with additional letters for certain subgroups within each main group. All insecticides within the same group (with the same number) indicate the same active ingredient or a similar mode of action. This information must be considered for the insecticide resistance management decisions.

² Always double-check labels regarding maximum application limits. Many labels are changing from a maximum rate per season (or crop cycle) to a maximum rate per year.

³ 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 UF/IFAS Extension nor discrimination against similar products or services not mentioned.

*Restricted use insecticide.

Table 12. Insecticides labeled for management of arthropod pests of sweetpotato. **Labels change frequently. Be sure to read a current product label before applying any chemical. Please refer to chapter 19 for information on biopesticides, including materials labeled for certified organic production.** Contact: Julien Beuzelin, UF/IFAS Everglades Research and Education Center.

Insects	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
Aphids	3A	*Fastac CS (alpha-cypermethrin)	3.2–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	1.28–1.92 fl oz	7.68 fl oz	24	7	Many other brands with same active ingredient are available.
	3A + 28	*Besiege (lambda-cyhalothrin + chlorantraniliprole)	5–9 fl oz	27.0 fl oz	24	14	–
	4A	Actara (thiamethoxam)	1.5–3.0 oz	6 oz	12	14	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 3.7 fl oz Soil: 10.5 fl oz	12	Foliar: 7 Soil: 125	–
	4A	Assail 30SG (acetamiprid)	2.5–4.0 oz	16 oz per year	12	7	–
	4A	Belay (clothianidin)	In-furrow or side-dress: 9–12 fl oz Foliar: 2–3 fl oz	12 fl oz per year	12	Foliar: 14	–
	4A	Platinum 75SG (thiamethoxam)	1.66–2.67 oz	2.67 oz	12	Applied at planting	–
	4C	Transform WG (sulfoxaflor)	Leaf production: 0.75–1.0 oz Root production: 0.75–1.5 oz	8.5 oz per year	24	7	–
	4D	Sivanto Prime (flupyradifurone)	7–14 fl oz	28 fl oz per year	4	7	–
	9B	Fulfill (pymetrozine)	2.75–5.5 oz	11 oz	12	14	–
	9B	PQZ (pyrifluquinazon)	2.4–3.2 fl oz	9.6 fl oz	12	7	–
	23	Movento (spirotetramat)	4.0–5.0 fl oz	10 fl oz	24	7	–
	28	Verimark (cyantraniliprole)	6.75–13.5 fl oz	13.5 fl oz at planting or 0.4 lb a.i. per year	4	At planting	–

Insects	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	29	Beleaf 50 SG (flonicamid)	2.0–2.8 oz	8.4 oz per year	12	7	–
Beetles (including cucumber beetle, Japanese beetle, tortoise beetle, flea beetle, whitefringed beetle)	1A	Sevin 80S; XLR; 4F (carbaryl)	80S: 1.25–2.5 lb XLR, 4F: 1–2 qt	80S: 10 lb XLR, 4F: 8 qt	12	7	–
	1B	Imidan 70 W (phosmet)	1.3 lb	–	Seedbed treatment: 4 days Foliar: 5 days	7	No more than 5 applications per season. Do not apply through irrigation system. Crop must be mechanically harvested.
	1B	*Mocap 15 G, *EC (ethoprop)	15G: 1.6–2.1 lb/1000 row ft EC: 5.1–6.9 fl oz/1000 row ft	–	48	Preplant	No more than 1 application 2–3 weeks before planting.
	3A	*Baythroid XL (beta-cyfluthrin)	0.8–2.8 fl oz	16.8 fl oz	12	0	–
	3A	*Brigade 2 EC (bifenthrin)	Soil: At plant: 9.6–19.2 fl oz At lay-by: 3.2–9.6 fl oz Foliar: 2.1–6.4 fl oz	32 fl oz per year	12	21	–
	3A	*Fastac CS (alpha-cypermethrin)	1.8–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	0.96–1.92 fl oz	7.68 fl oz	24	7	Many other brands with same active ingredient are available.
	3A + 4A	*Endigo ZC (lambda-cyhalothrin + thiamethoxam)	3.5–4.5 fl oz	10 fl oz	24	14	–
	3A + 28	*Besiege (lambda-cyhalothrin + chlorantraniliprole)	5–9 oz	27.0 fl oz	24	14	–
	4A	Actara (thiamethoxam)	1.5–3.0 oz	6 oz	12	14	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 3.7 fl oz Soil: 10.5 fl oz	12	Foliar: 7 Soil: 125	–
	4A	Assail 30SG (acetamiprid)	1.5–4.0 oz	16 oz per year	12	7	–

Insects	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	4A	Belay (clothianidin)	In-furrow or side-dress: 9–12 fl oz Foliar: 2–3 fl oz	12 fl oz per year	12	Foliar: 14	Flea beetles only.
	4A	Platinum 75SG (thiamethoxam)	1.66–2.67 oz	2.67 oz	12	Applied at planting	Flea beetles only.
	4A	Scorpion 35 SL (dinotefuran)	Foliar: 2.0–2.75 fl oz Soil: 11.5–13.25 fl oz	Foliar: 8 fl oz Soil: 13.25 fl oz	12	Foliar: 7 Soil: apply preplant, preemergence or at ground crack	Flea beetles only.
	4A + 28	Voliam Flexi (thiamethoxam + chlorantraniliprole)	4 oz	8 oz	12	14	–
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	80S: 10 lb XLR, 4F: 8 qt	12	7	–
	3A	*Baythroid XL (beta-cyfluthrin)	0.8–2.8 fl oz	16.8 fl oz	12	0	–
	3A	*Brigade 2 EC (bifenthrin)	Soil: At plant: 9.6–19.2 fl oz At lay-by: 3.2–9.6 fl oz Foliar: 2.1–6.4 fl oz	32 fl oz per year	12	21	–
	3A	*Fastac CS (alpha-cypermethrin)	1.8–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	0.96–1.92 fl oz	7.68 fl oz	24	7	Many other brands with same active ingredient are available.
	3A + 28	*Besiege (lambda-cyhalothrin + chlorantraniliprole)	5–9 oz	27.0 fl oz	24	14	–
	5	Radiant SC (spinetoram)	Foliage harvest: 5–10 fl oz Root harvest: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 24 fl oz per year	4	Leaves: 3 Roots: 7	–
	15	Rimon 0.83 EC (novaluron)	6–12 fl oz	24 fl oz	12	14	–
	18	Intrepid 2F (methoxyfenozide)	6–10 fl oz	64 fl oz per year	4	7	–

Insects	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	22	Avaunt eVo (indoxacarb)	2.5–6.0 oz	24 oz	12	7	–
	28	Coragen (chlorantraniliprole)	3.5–7.5 fl oz	15.4 fl oz	4	1	–
	28	Exirel (cyantraniliprole)	10–20.5 fl oz	0.4 lb a.i. per year	12	1	–
	28	Vantacor (chlorantraniliprole)	1.2–2.5 fl oz	5.1 fl oz	4	1	–
	28	Verimark (cyantraniliprole)	6.75–13.5 fl oz	13.5 fl oz at planting or 0.4 lb a.i. per year	4	At planting	–
	32	Spear-Lep (GS-omega/kappa-Hctx-Hv1a)	1–2 pt	10 gal per year	4	0	–
Leafhoppers	1B	Malathion 5EC (malathion)	1.5–2.5 pt	–	12	0	No more than 2 applications per year.
	3A	*Baythroid XL (beta-cyfluthrin)	0.8–2.8 fl oz	16.8 fl oz	12	0	–
	3A	*Fastac CS (alpha-cypermethrin)	1.8–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	1.76–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	0.96–1.92 fl oz	7.68 fl oz	24	7	–
	3A + 4A	*Endigo ZC (lambda-cyhalothrin + thiamethoxam)	3.5–4.5 fl oz	10 fl oz	24	14	–
	3A + 28	*Besiege (lambda-cyhalothrin + chlorantraniliprole)	5–9 oz	27.0 fl oz	24	14	--
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 3.7 fl oz Soil: 10.5 fl oz	12	Foliar: 7 Soil: 125	–
	4A	Assail 30SG (acetamiprid)	1.5–4.0 oz	16 oz per year	12	7	–
	4A	Platinum 75SG (thiamethoxam)	1.66–2.67 oz	2.67 oz	12	Applied at planting	–

Insects	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	4A	Scorpion 35 SL (dinotefuran)	Foliar: 2.0–2.75 fl oz Soil: 11.5–13.25 fl oz	Foliar: 8 fl oz Soil: 13.25 fl oz	12	Foliar: 7 Soil: apply preplant, preemergence, or at ground crack	–
	4A + 28	Voliam Flexi (thiamethoxam + chlorantraniliprole)	4 oz	8 oz	12	14	–
	4C	Transform WG (sulfoxaflor)	1.5–2.75 oz	8.5 oz per year	24	7	–
	4D	Sivanto Prime (flupyradifurone)	7–14 fl oz	28 fl oz per year	4	7	–
	23	Movento (spirotetramat)	4.0–5.0 fl oz	10 fl oz	24	7	–
Leafminers	1B	Malathion 5EC (malathion)	1.5–2.5 pt	–	12	0	No more than 2 applications per year.
	4A	Actara (thiamethoxam)	1.5–3.0 oz	6 oz	12	14	–
	5	Radiant SC (spinetoram)	Foliage harvest: 5–10 fl oz Root harvest: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 24 fl oz per year	4	Leaves: 3 Roots: 7	–
	6	*Agri-Mek SC (abamectin)	1.75–3.5 fl oz	10.25 fl oz per year	12	14	–
	15	Rimon 0.83 EC (novaluron)	6–12 fl oz	24 fl oz	12	14	–
Mites	6	*Agri-Mek SC (abamectin)	1.75–3.5 fl oz	10.25 fl oz per year	12	14	–
	23	Oberon 2SC (spiromesifen)	8–16 fl oz	32 fl oz	12	7	–
Stink bugs, plant bugs	3A	*Fastac CS (alpha-cypermethrin)	3.2–3.8 fl oz	11.4 fl oz	12	1	–
	3A	*Mustang Maxx (zeta-cypermethrin)	3.2–4.0 fl oz	24 fl oz	12	1	Leaves cannot be used for food or feed.
	3A	*Warrior II (lambda-cyhalothrin)	0.96–1.92 fl oz	7.68 fl oz	24	7	Many other brands with same active ingredient are available.

Insects	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	3A + 4A	*Endigo ZC (lambda-cyhalothrin + thiamethoxam)	3.5–4.5 fl oz	10 fl oz	24	14	–
	3A + 28	*Besiege (lambda-cyhalothrin + chlorantraniliprole)	5–9 fl oz	27.0 fl oz	24	14	–
	29	Beleaf 50 SG (flonicamid)	2.0–2.8 oz	8.4 oz per year	12	7	–
Sweetpotato weevil	1B	Imidan 70 W (phosmet)	1.3 lb	–	Seedbed treatment: 4 days Foliar: 5 days	7	No more than 5 applications. Crop must be mechanically harvested.
	3A	*Baythroid XL (beta-cyfluthrin)	0.8–2.8 fl oz	16.8 fl oz	12	0	–
	4A	Belay (clothianidin)	9–12 fl oz	12 fl oz per year			–
Thrips (check label for species controlled)	5	Radiant SC (spinetoram)	Foliage harvest: 5–10 fl oz Root harvest: 6–8 fl oz	Leaves: 34 fl oz per year Roots: 24 fl oz per year	4	Leaves: 3 Roots: 7	–
Whitefly	1B	Malathion 5EC (malathion)	1.5–2.5 pt	–	12	0	No more than 2 applications per year.
	3A	*Brigade 2EC (bifenthrin)	2.1–6.4 fl oz	32 fl oz per year	12	21	–
	3A	*Warrior II (lambda-cyhalothrin)	2.1–6.4 fl oz	7.68 fl oz	24	7	–
	3A + 4A	*Endigo ZC (lambda-cyhalothrin + thiamethoxam)	3.5–4.5 fl oz	10 fl oz	24	14	–
	4A	Admire Pro (imidacloprid)	Foliar: 1.2 fl oz Soil: 4.4–10.5 fl oz	Foliar: 3.7 fl oz Soil: 10.5 fl oz	12	Foliar: 7 Soil: 125	–
	4C	Transform WG (sulfoxaflor)	2–2.75 oz	8.5 oz per year	24	7	–
	4D	Sivanto Prime (flupyradifurone)	7–14 fl oz	28 fl oz per year	4	7	–

Insects	MOA Code ¹	Trade Name (Active Ingredient)	Max Rate/Acre		REI (Hours)	Days to Harvest	Remarks ³
			Appl.	Season ²			
	15	Rimon 0.83 EC (novaluron)	6–12 fl oz	24 fl oz	12	14	–
	23	Movento (spirotetramat)	4.0–5.0 fl oz	10 fl oz	24	7	–
	23	Oberon 2SC (spiromesifen)	8–16 fl oz	32 fl oz	12	7	–
Wireworms	1B	*Mocap 15 G, *EC (ethoprop)	15G: 1.6–2.1 lb/1000 row ft EC: 5.1–6.9 fl oz/1000 row ft	–	48	Preplant	No more than 1 application 2–3 weeks before planting.
	3A	*Brigade 2 EC (bifenthrin)	Foliar: 2.1 – 6.4 fl oz At plant: 9.6–19.2 fl oz At lay-by: 3.2–9.6 fl oz	32 fl oz per year	12	21	–

¹ Mode of Action (MOA) codes for plant pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 11.1 January 2024. Number codes are used to distinguish the main insecticide mode of action groups, with additional letters for certain subgroups within each main group. All insecticides within the same group (with the same number) indicate the same active ingredient or a similar mode of action. This information must be considered for the insecticide resistance management decisions.

² Always double-check labels regarding maximum application limits. Many labels are changing from a maximum rate per season (or crop cycle) to a maximum rate per year.

³ 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 UF/IFAS Extension nor discrimination against similar products or services not mentioned.

*Restricted use insecticide.

Table 13. Beet fungicides ordered by disease and then FRAC group according to their mode of action. **Labels change frequently. Be sure to read a current product label before applying any chemical. Please refer to chapter 19 for information on biopesticides, including materials labeled for certified organic production.** Contact: Mathews Paret, UF/IFAS North Florida Research and Education Center.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
Alternaria, powdery mildew	7	Fontelis SC (penthioopyrad)	30 fl oz	61 fl oz	0	0.5	No more than 2 sequential applications before alternating to dissimilar chemistry.
	7 + 11	Merivon (fluxapyroxad + pyraclostrobin)	5.5 fl oz	16.5 fl oz	7	0.5	No more than 2 sequential applications before alternating to dissimilar chemistry.
	9 + 12	Switch 62.5WG (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 5% SC (polyoxin D zinc salts)	13 fl oz	84 fl oz	0	4 hr	–
Cercospora	M1	(copper compounds) Many brands available: Americop 40 DF, Badge SC, Badge X2, Basic Copper 53, Champ DP, Champ Formula 2, Champ WG, Champ WP, COC DF, C-O-C-S WDG, 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, Nu-Cop 3L, Nu-Cop 50WP, Nu-Cop DF, Nu-Cop HB, Top Cop w/Sulfur	See individual label	See individual label	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 label	See individual label	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 41.8EC, Propiconazole 3.6 EC, Propicure 3.6 F, Propi-Star EC, Tilt	See individual label	See individual label	7	0.5	No more than 4 applications per season.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	3	(tebuconazole) Many brands available: Folicur 3.6F, Monsoon, Onset 3.6L, Orius 3.6F, Tebusha 3.6L, Tebustar 3.6L, Tebuzol 3.6F, Toledo	7.2 fl oz	28.8 fl oz	7	0.5	No more than 4 applications per season.
	7	Fontelis (penthioopyrad)	30 fl oz	61 fl oz	0	0.5	No more than 2 sequential applications before alternating to dissimilar chemistry.
	7 + 11	Merivon (fluxapyroxad + pyraclostrobin)	5.5 fl oz	16.5 fl oz	7	0.5	No more than 2 sequential applications before alternating to dissimilar chemistry.
	11	Cabrio EG (pyraclostrobin)	16 oz	48 oz	0	0.5	No more than 3 applications per crop. Alternate chemistry.
	11	Flint Extra (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 lb 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 dipotassium salts of phosphorous acids) Many brands available: Confine Xtra, Fosphite, Fungi-phite, K-Phite 7LP, Oxiphos, Rampart	3 qt	–	0	4 hr	See label for details.
	43	Presidio (fluopicolide)	4 fl oz	12 fl oz	7	0.5	No more than 2 sequential applications.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
Pythium seedling blight	4	Apron XL LS (mefenoxam)	0.64 fl oz/100 lb seed	–	–	2	Seed treatment only.
	4	(metalaxyl) Various brands available: Acquire, Allegiance FL, Dynashield, Metalaxyl 318 FS	0.75 fl oz/100 lb seed	–	–	0.5	Seed treatment only.
	4	Metastar 2E (metalaxyl)	8 pt	–	–	1	Apply as a broadcast soil application and incorporate into top 2 in. See label for directions.
	4	Sebring (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 to 12 in. 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	4 + 11	Uniform SC (mefenoxam + azoxystrobin)	0.34 fl oz/1000 row ft	–	–	0	Soil incorporated. No more than 1 application.
	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.
Various diseases	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	No more than 2 sequential applications before rotating to a fungicide of dissimilar mode of action.

¹ FRAC code (fungicide group): Numbers and letters are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with the same number or letter) indicate the same active ingredient or a similar mode of action. This information must be considered for the fungicide resistance management decisions. Source: FRAC Code List; <https://www.frac.info/> (FRAC = Fungicide Resistance Action Committee).

² Always double-check labels regarding maximum application limits. Many labels are changing from a maximum rate per season (or crop cycle) to a maximum rate per year.

³ 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 UF/IFAS Extension nor discrimination against similar products or services not mentioned.

Table 14. Carrot fungicides ordered by disease and then FRAC group according to their mode of action. **Labels change frequently. Be sure to read a current product label before applying any chemical. Please refer to chapter 19 for information on biopesticides, including materials labeled for certified organic production.** Contact: Mathews Paret, UF/IFAS North Florida Research and Education Center.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
Alternaria blight	M1	(copper compounds) Many labels available: Badge SC, Badge X2, Basic Copper 53, Champ, Champ DP, Champ Formula 2, Champ WG, COC DF, COCS WDG, COC WP, Copper Count N, Cueva, Cuprofix Ultra, Cuproxat, Kentan DF, Kocide, Kocide 2000, Kocide 3000, Kop-hydroxide, Mastercop, Nordox 75 WG, Nu-Cop, Nu-Cop 3L, Nu-Cop 50WP, Nu-Cop HB, Previsto, Stretch, Tenn-Cop 5E, Top Cop w/Sulfur	See individual label	See individual label	1	Varies by product from 4 hr to 2 days	–
	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 label	See individual label	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, Topaz, Willowood Azoxy	4 fl oz	16 fl oz	14	0.5	No more than 4 total applications.
	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 (mefenoxam + chlorothalonil)	2 lb	–	7	2	–
	4 + M5	Ridomil Gold Bravo SC (mefenoxam + chlorothalonil)	2.5 pt	–	7	2	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	7	Endura (boscalid)	7.8 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 (fluxapyroxad + pyraclostrobin)	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	No more than 1 sequential application and 4 total applications of Amistar or other QoI fungicides. See label for soil application.
	11 + M5	Quadris Opti (azoxystrobin + chlorothalonil)	2.4 pt	14.4 pt	0	0.5	No more than 2 sequential applications and 6 total applications of Quadris Opti, and rotate with non-QoI 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, sclerotinia white mold	7	Endura (boscalid)	7.8 oz	22.4 oz	0	0.5	See label for additional instructions.
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	–	7	0.5	See label for additional instructions.
	29	Omega (fluazinam)	1 pt	–	7	0.5	White mold only.
	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 label	See individual label	7	0.5	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	4	Metastar 2E (metalaxyl)	8 pt	–	–	2	Apply as a broadcast soil application and incorporate into top 2 in. See label for directions.
	4	Ridomil Gold Ultra Flourish (mefenoxam)	2 pt	–	7	2	Apply at seeding in a 7 to 12 in. 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 (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.
	M1	(copper compounds) Many labels available: Badge SC, Badge X2, Basic Copper 53, Champ DP, Champ Formula 2, Champ WG, COC DF, COCS WDG, COC WP, Copper Count N, Cueva, Cuprofix Ultra, Cuproxat, Kentan DF, Kocide 2000, Kocide 3000, Kocide 4.5 LF, Kocide DF, Kop-hydroxide, Mastercop, Nordox 75 WG, Nu-Cop 3L, Nu-Cop 50WP, Nu-Cop DF, Nu-Cop HB, Nu-Cop XLR, Stretch, Tenn-Cop 5E, Top Cop w/Sulfur	See individual label	See individual label	1	Varies by product from 4 hr to 2 days	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	3	(propiconazole) Many labels available: Amtide Propiconazole, Bumper 41.8EC, Fitness, Propimax, Propi-Star EC, Shar-Shield PPZ, Tide Propiconazole, Tilt, Topaz	4 fl oz	16 fl oz	14	0.5	No more than 4 total applications.
	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 (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	Luna Sensation (fluopyram + trifloxystrobin)	7.6 fl oz	230 fl oz	7	0.5	No more than 2 sequential applications before rotating to a fungicide of dissimilar mode of action.
	7 + 11	Merivon (pyraclostrobin + fluxapyroxad)	5.5 fl oz	16.5 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action.
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	No more than 1 sequential application and 4 total applications of Amistar or other QoI fungicides. See label for soil application.
Damping-off	M3	Defiant 75WP (thiram)	5.3 oz/100 lb of seed	–	–	1	Seed treatment only.
Powdery mildew	M2	(sulfur compounds) Many brands available: Dusting Sulfur – Crusade, IAP, Kumulus DF, Microfine Sulfur, Micro Sulf, Microthiol Disperss, Sulfur 90W, Super-Six, Top Cop w/Sulfur, Yellow Jacket Wettable Sulfur	See individual label	See individual label	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: Amtide Propiconazole, Bumper 41.8EC, Fitness, Propimax, Propi-Star EC, Shar-Shield PPZ, Tilt	4 fl oz	16 fl oz	14	0.5	No more than 4 total applications.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	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	No more than 2 sequential applications and 6 total applications of Quadris Opti, and rotate with non-QoI 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 + 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 318FS, Sebring 480FS, Metalaxyl 4.0 ST (metalaxyl)	0.7 fl oz/100 lb of seed	–	–	1	Seed treatment only.
Pythium seedling blight	4	Apron XL (mefenoxam)	0.64 fl oz/100 lb of seed	–	–	2	Seed treatment only.
	4	Metastar 2E (metalaxyl)	8 pt	–	–	2	Apply as a broadcast soil application and incorporate into top 2 in. See label for directions.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	4	Ridomil Gold (mefenoxam)	2 pt	–	–	2	Apply at seeding in a 7 to 12 in. 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	No more than 2 sequential applications before rotating to a fungicide of dissimilar mode of action.
	7 + 11	Luna Sensation (fluopyram + trifloxystrobin)	7.6 fl oz	23 fl oz	7	0.5	No more than 2 sequential applications before rotating to a fungicide of dissimilar mode of action.
	7 + 11	Merivon (fluxapyroxad + pyraclostrobin)	5.5 fl oz	16.5 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action.
	7 + 11	Pristine (boscalid + pyraclostrobin)	10.5 oz	63 oz	0	0.5	No more than 6 applications crop and alternate chemistry.
	11	(azoxystrobin) Many labels available: Azoxystar, Azoxyzone, Equation SC, Quadris, Satori, Trevo, Willowood Azoxy	15.4 fl oz or 0.8 fl oz/1000 ft	3.75 qt	0	4 hr	No more than 1 sequential application and 4 total applications of QoI fungicides. See label for soil application.
	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	No more than 3 sequential applications before alternating to a fungicide of dissimilar mode of action.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11 + M5	Quadris Opti (azoxystrobin + chlorothalonil)	2.4 pt	14.4 pt	0	0.5	No more than 2 sequential applications and 6 total applications of Quadris Opti, and rotate with non-QoI fungicides.
	11 + 3	Quadris Top (azoxystrobin + difenoconazole)	14 fl oz	56 fl oz	7	0.5	No more than 1 sequential application and 4 total applications of 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	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	–
	29	Omega (fluazinam)	1 pt	4 pt	7	0.5	For southern blight, apply 45 days prior to harvest.
	33	(mono- and dipotassium salts of phosphorous acid) Many brands available: Alude, Confine Extra, Fosphite, Fungi-phite, K-Phite 7LP, Oxiphos, Phiticide, Prophyt, Phostrol, Rampart	3 qt	–	0	4 hr	–
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): Numbers and letters are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with the same number or letter) indicate the same active ingredient or a similar mode of action. This information must be considered for the fungicide resistance management decisions. Source: FRAC Code List; <https://www.frac.info/> (FRAC = Fungicide Resistance Action Committee).

² Always double-check labels regarding maximum application limits. Many labels are changing from a maximum rate per season (or crop cycle) to a maximum rate per year.

³ 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 UF/IFAS Extension nor discrimination against similar products or services not mentioned.

Table 15. Radish fungicides ordered by disease and then FRAC group according to their mode of action. **Labels change frequently. Be sure to read a current product label before applying any chemical. Please refer to chapter 19 for information on biopesticides, including materials labeled for certified organic production.** Contact: Mathews Paret, UF/IFAS North Florida Research and Education Center.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
Alternaria leaf spot	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 (fluxapyroxad + pyraclostrobin)	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	(azoxystrobin) Various brands available: Quadris, Satori, Willowood Azoxy	15.4 fl oz	62 fl oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides.
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides.
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	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	Luna Sensation (fluopyram + trifloxystrobin)	5.8 fl oz	23 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action.
	7 + 11	Merivon (fluxapyroxad + pyraclostrobin)	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	(azoxystrobin) Many brands available: Quadris, Satori, Willowood Azoxy	15.4 fl oz	62 fl oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides.
	11	Flint Extra (trifloxystrobin)	3 oz	12 oz	0	0.5	Alternate with fungicides of dissimilar modes of action.
Damping-off	M3	Defiant 75WP (thiram)	5.3 oz/100 lb of seed	–	–	1	Seed treatment only.
Downy mildew	4 + M1	Ridomil Gold Copper (mefenoxam + copper hydroxide)	2 lb	8 lb	7	2	–
	33	(mono- and dipotassium salts of phosphorous acid) Many brands available: Confine Extra, Fosphite, Fungi-phite, K-Phite, Oxiphos, Phiticide, Rampart	3 qt	–	0	4 hr	See label for details.
	43	Presidio (fluopicolide)	4 fl oz	16 fl oz	7	0.5	Alternate with fungicides of dissimilar chemistry.
	M2	(sulfur compounds) Many brands available: Micro Sulf, Microthiol Disperss, Sulfur 90W, Top Cop w/Sulfur	See individual label	See individual label	1	1	Do not apply during periods of warm weather. Do not apply within 2 weeks of an oil spray.
	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 (fluxapyroxad + pyraclostrobin)	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	(azoxystrobin) Many brands available: Quadris, Satori, Willowood Azoxy	15.4 fl oz	62 fl oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides. See label for soil application.
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides. See label for soil application.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
Pythium	21	Presidio (fluopicolide)	4 fl oz	16 fl oz	7	0.5	Alternate with fungicides of dissimilar chemistry.
Pythium damping-off	4	Acquire Sebring 318FS Sebring 480FS (metalaxyl)	0.7 fl oz/100 lb of seed	–	–	1	Seed treatment only.
Pythium seedling blight	4	Apron XL (mefenoxam)	0.64 fl oz/100 lb of seed	–	–	2	Seed treatment only.
	4	Metastar 2E (metalaxyl)	8 pt	–	–	2	Apply as a broadcast soil application and incorporate into top 2 in. See label for directions.
	4	Ridomil Gold (mefenoxam)	2 pt	–	–	2	Apply at seeding in a 7 to 12 in. 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.
White rust	11	(azoxystrobin) Many brands available: Quadris, Satori, Willowood Azoxy	15.4 fl oz	62 fl oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides. See label for soil application.
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides. See label for soil application.
Various (see label)	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	No more than 2 sequential applications before rotating to a fungicide of dissimilar mode of action.
	7 + 11	Merivon (fluxapyroxad + pyraclostrobin)	5.5 fl oz	16.5 fl oz	7	0.5	Alternate with fungicides of dissimilar modes of action.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	(azoxystrobin) Many brands available: Quadris, Satori, Willowood Azoxy	15.4 fl oz or 0.8 fl oz/1000 row ft	62 fl oz	0	0.5	No more than 1 sequential application and 4 total applications of Qol fungicides. See label for soil application.
	33	(mono- and dipotassium salts of phosphorous acid) Many brands available: Confine Extra, Fosiphite, Fungi-phite, K-Phite 7LP, Oxiphos, Rampart	3 qt	–	0	4 hr	See label for details.
Various seedling diseases	12	(fludioxonil) Many brands available: Dynashield, Maxim 4FS, Spirato 480 FS	0.16 fl oz/100 lb of seed	–	–	0.5	Seed treatment only.
¹ FRAC code (fungicide group): Numbers and letters are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with the same number or letter) indicate the same active ingredient or a similar mode of action. This information must be considered for the fungicide resistance management decisions. Source: FRAC Code List; https://www.frac.info/ (FRAC = Fungicide Resistance Action Committee). ² Always double-check labels regarding maximum application limits. Many labels are changing from a maximum rate per season (or crop cycle) to a maximum rate per year. ³ 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 UF/IFAS Extension nor discrimination against similar products or services not mentioned.							

Table 16. Sweetpotato fungicides ordered by disease and then FRAC group according to their mode of action. **Labels change frequently. Be sure to read a current product label before applying any chemical. Please refer to chapter 19 for information on biopesticides, including materials labeled for certified organic production.** Contact: Shouan Zhang, UF/IFAS Tropical Research and Education Center.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
Alternaria leaf blight	BM01 + 3	Regev (tea tree oil, difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	–
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	–
	7 + 3	Aprovia Top (benzovindiflupyr + difenoconazole)	13.5 fl oz	27 fl oz	14	0.5	–
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	11.4 fl oz	32.4 fl oz	14	0.5	–
	9	Vango WG (cyprodinil)	7 oz	28 oz	14	0.5	–
	9 + 12	Alterity 62.5WG (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	–
	9 + 12	Switch 62.5WG (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	Alternate with another labeled non-Group 9 or 12 fungicide for 2 applications after 2 applications of Switch WG.
	9 + 12	Xuvia (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	–
	11	Acadia LFC (azoxystrobin)	25.6 fl oz	155 fl oz	14	4 hr	–
	11	Aframe (azoxystrobin)	15.5 fl oz	123 fl oz	0	4 hr	No more than 1 sequential application, including other Group 11 fungicides.
	11	(azoxystrobin) Many brands available: Arius 250, Atticus Acadia 2 SC, A-Zox 25SC, AzoxyStar, GCS Azoxy 2SC, Tetraban Fungicide, Trevo	20 fl oz	123 fl oz	14	4 hr	No more than 2 sequential applications, including other Group 11 fungicides, before alternating with another group.
	11	Azoxystrobin SC (azoxystrobin)	20.3 fl oz	123 fl oz	14	4 hr	–
	11	AZteroid FC 3.3 (azoxystrobin)	12.8 fl oz	77.6 fl oz	14	4 hr	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	No more than 1 consecutive application.
	11	Headline Fungicide Headline SC Fungicide (pyraclostrobin)	12 fl oz	72 fl oz	3	0.5	No more than 2 sequential applications, including other Group 11 fungicides.
	11	Quadris Flowable (azoxystrobin)	15.5 fl oz	120 fl oz	14	4 hr	No more than 1 consecutive application.
	11	Satori (azoxystrobin)	20 fl oz	120 fl oz	14	4 hr	No more than 1 sequential application, including other Group 11 fungicides.
	12	Palladium (fludioxonil)	14 fl oz	56 fl oz	7	0.5	–
Ascochyta leaf spot	3 + 7	Miravis Top (difenoconazole + pydiflumetofen)	13.7 fl oz	56 fl oz	14	0.5	An adjuvant may be added at recommended rates. Reapplications at least 7 days apart.
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	No more than 2 sequential applications of Luna Tranquility or any Group 7 or Group 9 containing fungicides.
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	11.4 fl	34.2 fl oz	14	0.5	An adjuvant may be added at recommended rates.
	11	Acadia LFC (azoxystrobin)	25.6 fl oz	155 fl oz	0 or 14	4 hr	–
	11	Aframe Quadris Flowable (azoxystrobin)	15.5 fl oz	120 fl oz	0 or 14	4 hr	No more than 1 sequential application, including other Group 11 fungicides.
	11	(azoxystrobin) Many brands available: Arius 250, Atticus Acadia 2 SC, A-Zox 25SC, AzoxyStar, GCS Azoxy 2SC, Satori Fungicide, Tetraban Fungicide, Trevo	20 fl oz	123 fl oz	0 or 14	4 hr	No more than 1 sequential application, including other Group 11 fungicides.
	11	Azoxystrobin SC (azoxystrobin)	20.3 fl oz	123 fl oz	0 or 14	4 hr	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	AZteroid FC 3.3 (azoxystrobin)	12.8 fl oz	77.6 fl oz	0 or 14	4 hr	No more than 1 sequential application, including other Group 11 fungicides.
	11 + 3	Acadia ESQ Quadris Top Trevo DCZ (azoxystrobin + difenoconazole)	14 fl oz	55.3 fl oz	14	0.5	No more than 2 consecutive applications; addition of a spreading/penetrating adjuvant (nonionic surfactant or crop oil concentrate) is recommended.
Black dot	3	Provysol Fungicide (mefentrifluconazole)	5 fl oz	15 fl oz	7	0.5	–
	3	Quash Fungicide (metconazole)	4 oz	16 oz	1	0.5	–
	3 + 11	Veltyma Fungicide (mefentrifluconazole + pyraclostrobin)	10 fl oz	30 fl oz	7	0.5	–
	3 + 29	Orbus ESQ (difenoconazole + fluazinam)	14.5 fl oz	64 fl oz	14	2	–
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	–
	7	Velum Prime (fluopyram)	6.84 fl oz	13.7 fl oz	7	0.5	–
	7	Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	–
	7 + 3	Aprovia Top Fungicide (benzovindiflupyr + difenoconazole)	13.5 fl oz	27 fl oz	14	0.5	–
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	No more than 2 sequential applications of Luna Tranquility or any Group 7 or Group 9 containing fungicides.
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	11.4 fl oz	34.2 fl oz	14	0.5	An adjuvant may be added at recommended rates.
	11	Aftershock Evito 480 SC (fluoxastrobin)	0.24 fl oz/1000 row ft	22.8 fl oz	7	0.5	No more than 1 application of seed treatment or in-furrow or banded application in conjunction with foliar application.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	Reason 500 SC (fenamidone)	8.2 fl oz	16.4 fl oz	14	0.5	No more than 1 consecutive application.
	11 + 3	Acadia ESQ Fungicide Quadris Top Trevo DCZ (azoxystrobin + difenoconazole)	14 fl oz	55.3 fl oz	14	0.5	No more than 2 consecutive applications; addition of a spreading/penetrating adjuvant (nonionic surfactant or crop oil concentrate) is recommended.
	BM 01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	–
Botrytis	BM 01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl	34 fl oz	14	0.5	–
	3	Quash Fungicide (metconazole)	4.0 oz	16 oz	1	0.5	–
	7	Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	–
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	No more than 2 sequential applications of Luna Tranquility or any Group 7 or Group 9 fungicides.
	9	Scala SC (pyrimethanil)	7 fl oz	35 fl oz	7	0.5	See label.
Cercospora leaf spot	BM 01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	–
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	11.4 fl oz	34.2 fl oz	14	0.5	No more than 2 consecutive applications of Miravis Prime or other Group 7 fungicide before alternation with a fungicide that is not in Group 7.
	11	Acadia LFC (azoxystrobin)	19.5 fl oz	155 fl oz	0	4 hr	–
	11	(azoxystrobin) Many brands available: Aframe, Arius 250, Atticus Acadia™ 2 SC, A-Zox 25SC, AzoxyStar, Azoxystrobin SC, GCS Azoxy 2SC, Satori Fungicide, Tetraban Fungicide, Trevo	15.5 fl oz	123 fl oz	14	4 hr	No more than 1 sequential application, including other Group 11 fungicides.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	AZteroid FC 3.3 (azoxystrobin)	9.7 fl oz	77.6 fl oz	14	4 hr	No more than 1 sequential application, including other Group 11 fungicides.
	11	Cabrio EG (pyraclostrobin)	12 oz	48 oz	0	0.5	–
	11	Headline Fungicide Headline SC Fungicide (pyraclostrobin)	12 fl oz	72 fl oz	3	0.5	–
	11	Quadris Flowable (azoxystrobin)	15.5 fl oz	120 fl oz	0	4 hr	–
Early blight	BM 01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	No more than 1 postharvest application to the tubers.
	3	Provysol Fungicide (mefentrifluconazole)	5 fl oz	15 fl oz	7	0.5	–
	3	Quash Fungicide (metconazole)	4 oz	16 oz	1	0.5	–
	3 + 7	Miravis Top (difenoconazole + pydiflumetofen)	13.7 fl oz	56 fl oz	14	0.5	An adjuvant may be added at recommended rates. Reapplications at least 7 days apart.
	3 + 11	Veltyma Fungicide (mefentrifluconazole + pyraclostrobin)	10 fl oz	30 fl oz	7	0.5	–
	3 + 29	Orbus ESQ (difenoconazole + fluazinam)	14.5 fl oz	64 fl oz	14	2	–
	7	Bonafide (boscalid)	4.5 oz	20 oz	10	0.5	–
	7	Endura Fungicide (boscalid)	10 oz	20 oz	10	0.5	–
	7	Velum Prime (fluopyram)	6.84 fl oz	13.7 fl oz	7	0.5	No more than 2 sequential applications or with Group 7 fungicides. Postplant drench or hill drench.
	7	Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	7 + 3	Aprovia Top Fungicide (benzovindiflupyr + difenoconazole)	13.5 fl oz	27 fl oz	14	0.5	Apply on a 14-day interval. No more than 2 consecutive applications. Addition of a spreading/penetrating-type adjuvant is recommended.
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	No more than 2 sequential applications or with Group 7 or 9 fungicides.
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	6.8 fl oz	20.4 fl oz	7	0.5	An adjuvant may be added at recommended rates.
	9	Scala SC (pyrimethanil)	7 fl oz	35 fl oz	7	0.5	See label.
	9	Vango WG (cyprodinil)	7 oz	28 oz	14	0.5	–
	9 + 12	Alterity 62.5WG Xuvia (cyprodinil + fludioxonil)	14 oz	56 oz	14	0.5	–
	11	Aftershock Evito 480 SC (fluoxastrobin)	3.8 fl oz	22.8 fl oz	7	0.5	See label.
	11	Aproach (picoxystrobin)	12 fl oz	36 fl oz	3	0.5	–
	11	Flint Extra (trifloxystrobin)	3.8 fl oz	23 fl oz	7	0.5	–
	11	Reason 500 SC (fenamidone)	8.2 fl oz	16.4 fl oz	14	0.5	–
	11 + 3	Acadia ESQ Fungicide Quadris TOP Trevo DCZ (azoxystrobin + difenoconazole)	14 fl oz	55.3 fl oz	14	0.5	Addition of nonionic surfactant or crop oil concentrate or blend is recommended.
	28	Previcur Flex (propamocarb hydrochloride)	1.2 pt	6 pt	14	0.5	Tank-mix with chlorothalonil, maneb, or mancozeb for better control.
Phytophthora	4	ReCon 4 F (metalaxyl)	4 pt	–	–	2	Preplant incorporated or surface application to soil.
	4	Orondis Gold B (mefenoxam)	2 pt	1.5 lb a.i.	–	2	No more than 3 applications per crop.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	4	ReCon Bold SL (mefenoxam)	2 pt	1.5	–	2	–
	4	Ridomil Gold SL (mefenoxam)	2 pt	1.5 lb a.i.	–	2	Preplant incorporated broadcast or band application, soil spray.
	4	Thrive 4M (mefenoxam)	31.4 fl oz	–	–	2	Preplant incorporated or surface application to soil.
	4	Ultra Flourish (mefenoxam)	4 pt	1.5 lb a.i.	–	2	Preplant incorporated broadcast or band application, surface application.
	4	Xylar FC (metalaxyl)	2.9 qt	2.9 qt	–	–	Preplant incorporated broadcast or band application, surface application.
	43	Presidio Fungicide (fluopicolide)	4 fl oz	12 fl oz	7	0.5	–
Pink rot	11	(azoxystrobin) Many brands available: Atticus Acadia 2SC, A-Zox 25SC, AzoxyStar, Azoxystrobin SC, GCS Azoxy 2SC	0.6 fl oz/ton tubers	–	–	4 hr	No more than 1 postharvest application to the tubers.
	11	Satori Fungicide Tetraban Fungicide (azoxystrobin)	0.6 fl oz/ton tubers	–	–	–	–
	21	Ranman 400SC RenaZ SC (cyazofamid)	At planting: 0.42 fl oz/1000 linear ft Lay-by/hilling: 2.75 fl oz	27.5 fl oz	7	0.5	–
	22	Elumin (ethaboxam)	8 fl oz	16 fl oz	–	0.5	–
	49	Orondis Gold 200 (oxathiapiprolin)	9.6 fl oz	9.6 fl oz	5	4 hr	Apply as an in-furrow application at planting.
	49 + 4	Orondis Gold (Premix) (oxathiapiprolin + mefenoxam)	Soil: 27.8 fl oz Foliar: 12 fl oz	27.8 fl oz	14	2	–
Powdery mildew	BM 01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	–
	M2	Microthiol Disperss (sulfur)	10 lb	–	–	1	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	M2	Thiolux (sulfur)	10 lb	–	–	1	OMRI listed. ³
	M2	Suffa (sulfur)	0.6 gal	2.8 gal	0	1	Apply at 14-day intervals or as needed.
	M2	Sulfur 80 WDG (sulfur)	10 lb	–	–	1	OMRI-listed. ³ Apply at early leaf stage; repeat every 14 days or as needed.
	M2	Sulfur 90W (sulfur)	20 lb	–	–	1	For greenhouse use.
	3	Quash Fungicide (metconazole)	4 oz	16 oz	1	0.5	No more than 2 sequential applications.
	3 + 7	Miravis Top (difenoconazole + pydiflumetofen)	13.7 fl oz	56 fl oz	14	0.5	An adjuvant may be added at recommended rates. Reapplications at least 7 days apart.
	3 + 11	Veltyma Fungicide (mefentrifluconazole + pyraclostrobin)	10 fl oz	30 fl oz	7	0.5	–
	7	Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	May be used with adjuvants; other crops cannot be planted until 120 days after the last application of Vertisan.
	7	Fontelis (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	Make no more than 2 sequential applications of Fontelis before switching to a fungicide with a different mode of action.
	7 + 3	Aprovia Top (benzovindiflupyr + difenoconazole)	13.5 fl oz	27 fl oz	14	0.5	Apply on a 14-day interval. No more than 2 consecutive applications. Addition of a spreading/penetrating-type adjuvant is recommended.
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	–
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	11.4 fl oz	34.2 fl oz	14	0.5	An adjuvant may be added at recommended rates.
	9	Vango WG (cyprodinil)	7 oz	28 oz	14	0.5	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	9 + 12	Alterity 62.5WG Xuvia (cyprodinil + fludioxonil)	14 oz	56 oz	Leaves of root and tuber subgroup: 7 Tuberous and corm subgroup: 14	0.5	–
	9 + 12	Switch 62.5WG Palladium (cyprodinil + fludioxonil)	14 oz	56 oz	7	0.5	Alternate with another labeled fungicide for 2 applications after 2 applications of Switch WG.
	11	Acadia LFC (azoxystrobin)	19.5 fl oz	155 fl oz	14	4 hr	–
	11	(azoxystrobin) Many brands available: Aframe, Arius 250, A-Zox 25SC, AzoxyStar, GCS Azoxy 2SC, Quadris Flowable, Satori Fungicide, Tetraban Fungicide, Trevo	15.5 fl oz	123 fl oz	0	4 hr	–
	11	Atticus Acadia 2SC (azoxystrobin)	20 fl oz	123 fl oz	0	4 hr	No more than 1 sequential application or with other Group 11 fungicides.
	11	Azteroid FC 3.3 (azoxystrobin)	9.7 fl oz	77.6 fl oz	Leaves of root and tuber subgroup: 0 Tuberous and corm subgroup: 14	4 hr	–
	11	Azoxystrobin SC (azoxystrobin)	15.3 fl oz	123 fl oz	0 or 14	4 hr	–
	11	Cabrio EG Fungicide (pyraclostrobin)	12 oz	48 oz	0	0.5	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	Headline Fungicide Headline SC Fungicide (pyraclostrobin)	12 fl oz	72 fl oz	3	0.5	No more than 2 sequential applications or with other Group 11 fungicides.
	11 + 3	Quadris Top Acadia ESQ Fungicide Trevo DCZ (azoxystrobin + difenoconazole)	14 fl oz	55.3 fl oz	14	0.5	No more than 2 sequential applications or with other Group 11 fungicides. Adding adjuvant may enhance the efficacy.
Pythium damping-off	4	Orondis Gold B (mefenoxam)	2 pt	1.5 lb a.i.	–	2	Preplant incorporated application or soil spray.
	4	ReCon 4 F (metalaxyl)	4 pt	–	–	2	–
	4	ReCon Bold SL (mefenoxam)	2 pt	2 pt	–	–	Preplant incorporated application or soil spray.
	4	Ridomil Gold SL (mefenoxam)	2 pt	–	–	2	–
	4	StartUp MEFEN (mefenoxam)	0.47 fl oz/100 lb seed	1 lb a.i.	–	–	–
	4	Thrive 4M (mefenoxam)	31.4 fl oz	–	–	2	–
	4	Ultra Flourish (mefenoxam)	4 pt	–	–	2	Preplant incorporated broadcast or band application, surface application.
	4	Xyler FC Fungicide (metalaxyl)	2.9 qt	–	–	2	–
	11	Acadia LFC (azoxystrobin)	1.0 fl oz/1000 row ft	155 fl oz	0 or 14	4 hr	–
	11	Aframe Satori Fungicide (azoxystrobin)	0.8 fl oz/1000 row ft	120 fl oz	14	4 hr	–
	11	(azoxystrobin) Many brands available: Atticus Acadia 2 SC, Arius 250, A-Zox 25SC, AzoxyStar, GCS Azoxy 25C, Azoxystrobin SC	0.8 fl oz/1000 row ft	123 fl oz	0 or 14	4 hr	In-furrow and banded applications over the row shortly after plant or during herbicide applications or cultivation.
	11	AZteroid FC 3.3 (azoxystrobin)	0.48 fl oz/1000 row ft	77.6 fl oz	14	4 hr	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	Quadris Flowable (azoxystrobin)	0.8 fl oz/1000 row ft	120 fl oz	14	4 hr	–
	11	Tetran Fungicide Trevo (azoxystrobin)	0.8 fl oz/1000 row ft	123 fl oz	14	4 hr	–
	11 + 4	Uniform (azoxystrobin + mefenoxam)	0.34 fl oz/1000 ft row	–	–	0	No more than 1 application per crop season as an in-furrow spray.
	21	Ranman 400SC Fungicide Renaz SC (cyazofamid)	0.42 fl oz/1000 linear ft	27.5 fl oz	7	0.5	To avoid development of resistant strains, do not apply at reduced rate; rotate with other fungicides of a different group.
	22	Elumin Fungicide (ethaboxam)	8 fl oz	16 fl oz	–	0.5	Reapplications at least 25 days apart.
	43	Presidio Fungicide (fluopicolide)	4 fl oz	12 fl oz	7	0.5	Must be tank-mixed with another fungicide of different group. No more than 2 sequential applications.
	49 + 9	Orondis Gold (Premix) Fungicide (oxathiapiprolin + mefenoxam)	In furrow: 27.8 fl oz Foliar: 12 fl oz	27.8 fl oz	14	2	–
Rhizopus rot	12	Scholar SC Pilato SC (fludioxonil)	Postharvest dip: 32 fl oz/100 gal water Spray: 16 fl oz/ 200,000 lb sweet potatoes	–	–	–	No more than 1 postharvest application.
	14	Botran 5F (DCNA dicloran)	0.6 qt in 100 gal water for postharvest or for root dip 5–10 seconds	–	–	0.5	See label.
	11 + 12	Archive (azoxystrobin + fludioxonil)	1.0 fl oz/2000 lb tubers	–	–	–	In-line spray.
Rust/white rust	BM01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	–
	7 + 3	Aprovia Top (benzovindiflupyr + difenoconazole)	13.5 fl oz	27 fl oz	14	0.5	Apply on a 14-day interval. No more than 2 consecutive applications. Addition of a spreading/penetrating-type adjuvant is recommended.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	Acadia LFC (azoxystrobin)	25.6 fl oz	155 fl oz	14	4 hr	–
	11	Aframe Satori Fungicide (azoxystrobin)	15.5 fl oz	120 fl oz	14	4 hr	No more than 1 sequential application, including other Group 11 fungicides.
	11	Azoxystrobin SC (azoxystrobin)	20.3 fl oz	123 fl oz	14	4 hr	–
	11	(azoxystrobin) Many brands available: Arius 250.Atticus Acadia 2 SC, A-Zox 25SC, AzoxyStar, GCS Azoxy 2SC, Tetraban Fungicide, Trevo	20 fl oz	123 fl oz	14	4 hr	–
	11	AZteroid FC 3.3 (azoxystrobin)	12.8 fl oz	77.6 fl oz	14	4 hr	–
	11	Cabrio EG (pyraclostrobin)	16 oz	48 oz	0	0.5	Alternate with other labeled fungicides after each application.
	11	Headline Fungicide Headline SC Fungicide (pyraclostrobin)	12 fl oz	48 fl oz	3	0.5	Alternate with other labeled fungicides after each application.
	11	Quadris Flowable (azoxystrobin)	15.5 fl oz	120 fl oz	14	4 hr	No more than 1 application before alternating with a different mode of action.
	11	Reason 500SC (fenamidone)	8.2 fl oz	16.4 fl oz	14	0.5	–
	11 + 3	Acadia ESQ Quadris Top Trevo DCZ (azoxystrobin + difenoconazole)	14 fl oz	55.3 fl oz	14	0.5	No more than 2 consecutive applications; adding adjuvant may enhance the efficacy.
Sclerotinia white mold	BM01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	–
	3	Quash Fungicide (metconazole)	4 oz	16 oz	1	0.5	No more than 2 sequential applications.
	3 + 7	Miravis Top (difenoconazole + pydiflumetofen)	13.7 fl oz	56 fl oz	14	0.5	Apply at early flowering, followed by a second application 14 days later. Reapplications at least 7 days apart.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	3 + 29	Orbus ESQ (difenoconazole + fluazinam)	12.5 fl oz	64 fl oz	14	2	–
	7	Bonafide Endura (boscalid)	10 oz	20 oz	10	0.5	No more than 2 sequential applications or with other Group 7 fungicides.
	7	Velum Prime (fluopyram)	6.84 fl oz	13.7 fl oz	7	0.5	–
	7	Fontelis Vertisan (penthiopyrad)	24 fl oz	72 fl oz	7	0.5	–
	7 + 9	Luna Tranquility (fluopyram + pyrimethanil)	11.2 fl oz	54.7 fl oz	7	0.5	No more than 2 sequential applications of Luna Tranquility or any Group 7 or Group 9 fungicides.
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	11.4 fl oz	32.4 fl oz	14	0.5	Apply at or before row closure, followed by a second application 14 days later; an adjuvant may be added at recommended rates.
	11	Aproach (picoxystrobin)	12 fl oz	36 fl oz	3	0.5	–
	29	Omavo Omega 500F Orbus 4F Vantana (fluazinam)	8 fl oz	56 fl oz	14	0.5	–
Scurf	BM01 + 3	Regev (tea tree oil + difenoconazole)	8.5 fl oz	34 fl oz	14	0.5	–
	7	Fontelis Vertisan (penthiopyrad)	1.6 fl oz/1000 row ft	24 fl oz	7	0.5	No more than 2 sequential applications.
	11	(azoxystrobin) Many brands available: Atticus Acadia 2SC, AzoxyStar, A-Zox 25SC, Azoxystrobin SC, GCS Azoxy 2SC, Tetraban Fungicide, Satori Fungicide	0.6 fl oz/ton tubers	–	–	4 hr	No more than 1 postharvest application to tubers.

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	11	Aftershock Evito 480 SC (fluoxastrobin)	0.24 fl oz/1000 row ft 9.2 fl oz	22.8 fl oz	7	0.5	No more than 1 application of seed treatment or in-furrow or banded application in conjunction with foliar application.
	11 + 12	Archive (azoxystrobin + fludioxonil)	1.0 fl oz/2000 lb tubers	–	–	–	In-line spray.
	11 + 12 + 3	Stadium (azoxystrobin + fludioxonil + difenoconazole)	0.5 fl oz/1000 lb tubers	–	–	–	–
	12	Pilato SC (fludioxonil)	0.6 fl oz/ton tubers	–	–	–	–
	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	–	0.5	Do not plant tomatoes as a follow-up crop.
Septoria leaf spot	M2	Sulfur 80 WDG (sulfur)	5 lb/treated acre 10 lb	–	0	1	Do not use within 2 weeks of an oil spray treatment. OMRI-listed. ³ Apply at early leaf stage; repeat every 14 days or as needed.
	3 + 7	Miravis Top (difenoconazole + pydiflumetofen)	13.7 fl oz	56 fl oz	14	0.5	An adjuvant may be added at recommended rates. Reapplications at least 7 days apart.
	3 + 29	Orbus ESQ (difenoconazole + fluazinam)	14.5 fl oz	64 fl oz	14	2	–
	7 + 3	Aprovia Top (benzovindiflupyr + difenoconazole)	13.5 fl oz	27 fl oz	14	0.5	Apply on a 14-day interval. No more than 2 consecutive applications. Addition of a spreading/penetrating-type adjuvant is recommended.
	7 + 12	Miravis Prime (pydiflumetofen + fludioxonil)	11.4 fl oz	34.2 fl oz	14	0.5	An adjuvant may be added at recommended rates.
	9	Vango WG (cyprodonil)	7 oz	28 oz	14	0.5	–

Pertinent Diseases or Pathogens	Fungicide Group ¹	Chemical (Active Ingredients)	Max Rate/Acre		Min. Days to		Remarks ³
			Appl.	Season ²	Harvest	Reentry	
	9 + 12	Alterity 62.5WG Xuvia (cyprodinil + fludioxonil)	14 oz	56 oz	14	0.5	–
	11 + 3	Acadia ESQ Quadris Top Trevo DCZ (azoxystrobin + difenoconazole)	14 fl oz	55.3 fl oz	14	0.5	No more than 2 consecutive applications. Adding adjuvant may enhance the efficacy.
Southern blight (<i>Sclerotium rolfsii</i>)	11	Acadia LFC (azoxystrobin)	1.0 fl oz/1000 row ft	155 fl oz	0	4 hr	–
	11	Aframe Satori (azoxystrobin)	0.80 fl oz/1000 row ft	120 fl oz	14	4 hr	–
	11	(azoxystrobin) Many brands available: Atticus Acadia 2 SC, Arius 250, A-Zox 25SC, AzoxyStar, Azoxystrobin SC, GCS Azoxy 2SC, Tetraban, Trevo	0.80 fl oz/1000 row feet	123 fl oz	Tuberous and corm subgroup: 14	4 hr	–
	11	AZteroid FC3.3 (azoxystrobin)	0.48 fl oz/1000 row feet	77.6 fl oz	–	4 hr	–
	11	Quadris Flowable (azoxystrobin)	0.80 fl oz/1000 row feet	120 fl oz	–	4 hr	–
Various soilborne diseases	11	Many brands (azoxystrobin)	Various; see label	See label	4 hr	See label	–

¹ FRAC code (fungicide group): Numbers and letters are used to distinguish the fungicide mode of action groups. All fungicides within the same group (with the same number or letter) indicate the same active ingredient or a similar mode of action. This information must be considered for the fungicide resistance management decisions. Source: FRAC Code List; <https://www.frac.info/> (FRAC = Fungicide Resistance Action Committee).

² Always double-check labels regarding maximum application limits. Many labels are changing from a maximum rate per season (or crop cycle) to a maximum rate per year.

³ 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 UF/IFAS Extension nor discrimination against similar products or services not mentioned. OMRI-listed: Listed by the Organic Materials Review Institute for use in organic production.

Table 17. Nonfumigant nematicides for carrot, beet, and radish in Florida. Contact: Johan Desaegeer, UF/IFAS Gulf Coast Research and Education Center.

Product	Application Directions
Vydate L (a.i. oxamyl) (carrot only)	Apply within 1 week before planting or before emergence if postplant, either broadcast (2 gal/A, incorporate 2 in. at least), in the seed furrow (1–2 gal/A), or via chemigation (1 gal/A). No more than 4 gal/A per season. Reapplications at least 14 days apart. No more than 8 applications per season. Last application at least 14 days to harvest.
Nimitz (a.i. fluensulfone)	All applications must be incorporated either physically or via drip or overhead irrigation. Make preplant applications at a rate of 3.5–7 pt/A (56.0–80.0 fl oz/A) a minimum of 7 days before planting. Do not plant any unlisted crops into treated land for 365 days after application of the product. No more than 1 application per crop, and no more than 112 fl oz/A 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 crops.
Salibro (a.i. fluazaindolizine) (only for carrots)	Apply 30.7–61.4 fl oz/A (1–2 lb a.i./A) as preplant incorporated. Apply at 15.4–30.7 fl oz/A (0.5–1 lb a.i./A) for in-season drip. No more than 61.4 fl oz/A per calendar year and no more than 30.7 fl oz/A applied by drip. No more than 2 applications per calendar year. Reentry interval is 12 hr. Reapplications at least 14 days apart. Preharvest interval: Do not apply within 65 days of harvest.
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 for how best to 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 18. Nonfumigant nematicides for sweetpotato in Florida. Contact: Johan Desaegeer, UF/IFAS Gulf Coast Research and Education Center.

Product	When to Apply	Application Pattern	Incorporation Depth	Rate
Mocap 15G (a.i. ethoprop)	2–3 weeks preplant	Row, 12"–15" band	2"–4" with rotary hoe, tiller, etc., or by bedding over the band	20–26 lb/A or 1.6–2.1/1000 row ft (min. row spacing of 42")
Mocap EC (a.i. ethoprop)	2–3 weeks preplant	Row, 12"–15" band	2"–4" deep	5.1–6.9 fl oz/1000 ft row
Vydate L* (a.i. oxamyl)	Within 1 week before planting	Broadcast, band, or in-furrow transplant drench	4"–6" deep	2 gal/A broadcast or 1–2 gal/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 3.5–7 pt/A (56.0–80.0 fl oz/A) a minimum of 7 days before planting. Do not plant any unlisted crops into treated land for 365 days after application of the product. No more than 1 application per crop, and no more than 112 fl oz/A 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 crops.			
Velum (a.i. fluopyram)	Apply max 6.84 fl oz/A as an in-furrow spray during planting directed on or below seed, by using overhead chemigation equipment, or for transplanted crops, as a postplanting drench or hill drench. No more than 13.7 fl oz/A of Velum (0.446 lb/A fluopyram) per year, regardless of formulation (Velum and/or Luna) or method of application (soil or foliar). Do not apply Velum within 7 days of harvest. 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. The grazing of livestock in treated areas within 7 days of application is prohibited.			
Salibro (a.i. fluazindolizine)	Apply 30.7–61.4 fl oz/A (1–2 lb a.i./A) as preplant incorporated. Apply 15.6–61.4 fl oz/A for in-furrow soil treatment. Apply 15.4–30.7 fl oz/A (0.5–1 lb a.i./A) for in-season drip. No more than 61.4 fl oz/A per calendar year. No more than 30.7 fl oz/A applied post-emergence. No more than 2 applications per calendar year. Re-entry interval is 12 hr. Reapplications at least 14 days apart. Pre-harvest interval: Do not apply within 40 days of harvest.			
Biological nematicides	See chapter 19.			
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 for how best to 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 sweetpotatoes 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 gal of water. As a broadcast treatment thoroughly incorporate to a soil depth of 4–6 in.				

Table 19. Fumigant nematicides for carrot and sweetpotato in Florida. Contact: Johan Desaegeer, UF/IFAS Gulf Coast Research and Education Center.

Nematicide	Broadcast Application ¹		In-the-Row Applications
	Gallons per Acre	fl oz/1000 ft/chisel-spaced 12" apart	
Telone II ^{2,3}	9–12	26–35	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}	10.8–17.1	31.8–50.2	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}	13–20.5	38–60	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	19–31.5	57–90	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	–	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	–	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	–	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 ft 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 (GAPs), 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.

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² Julien M. Beuzelin, associate professor, integrated pest management, Department of Entomology and Nematology, UF/IFAS Everglades Research and Education Center, Belle Glade, FL; Peter J. Dittmar, associate professor, weed science, UF/IFAS Department of Horticultural Sciences, Gainesville, FL; Johan Desaeager, associate professor, nematology, Department of Entomology and Nematology, UF/IFAS Gulf Coast Research and Education Center, Wimauma, FL; Lincoln Zotarelli, professor and Extension specialist, Department of Horticultural Sciences, Gainesville, FL; Shouan Zhang, professor, vegetable and tropical fruit disease management, Department of Plant Pathology, UF/IFAS Tropical Research and Education Center, Homestead, FL; Qingren Wang, Extension agent IV, Ph.D., vegetable crops, UF/IFAS Extension Miami-Dade County, Homestead, FL; Craig J. Frey, county Extension director and Extension agent III, multi-county commercial vegetable production, M.S., UF/IFAS Extension Hendry County, Labelle, FL; Anna Mészáros, Extension agent II, M.S., commercial horticulture, vegetable crop production, UF/IFAS Extension Palm Beach County, Belle Grande, FL; UF/IFAS Extension, Gainesville, FL 32611.

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Use pesticides safely. Read and follow directions on the manufacturer's label.

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