Insect Management for Carrots[1]

S. E. Webb[2]

There are no major insect pests on carrot in Florida. The greatest concern for growers has been root damage from soil pests, particularly wireworms (southern potato and tobacco), cutworms (variegated, granulate, black), and mole crickets, all of which are sporadic. Occasional minor pests include leafminers (especially the vegetable leafminer), aphids (green peach and melon), and weevils (especially vegetable weevils). Other arthropods that may occasionally cause minimal damage to carrots in Florida include armyworms (fall, beet, and southern), field crickets, mites (especially twospotted spider mite), and plant bugs (including tarnished plant bug).

Flooding the field during the summer fallow, which was viable in the former muck production areas, effectively controlled wireworms and other soil insects. However, with the transition from production on organic soils to the inorganic mineral soils of north Florida, flooding is no longer a feasible method of cultural control for most carrot growers. North Florida carrot production will likely require greater insecticide inputs for the management of soil insects.

Cutworms

Cutworms (Figure 1), a sporadic pest of carrots in Florida, can be a problem during seedling establishment. Cutworms, which are related to armyworms, are thick, dark caterpillars whose adult stage is a moth. They attack young seedlings, most actively at night, and may cut the stem off at the base. During the day, they remain hidden in debris on or just under the soil surface. When disturbed, cutworms curl into a C-shaped ball. Thorough soil preparation in advance of planting helps in cutworm control.

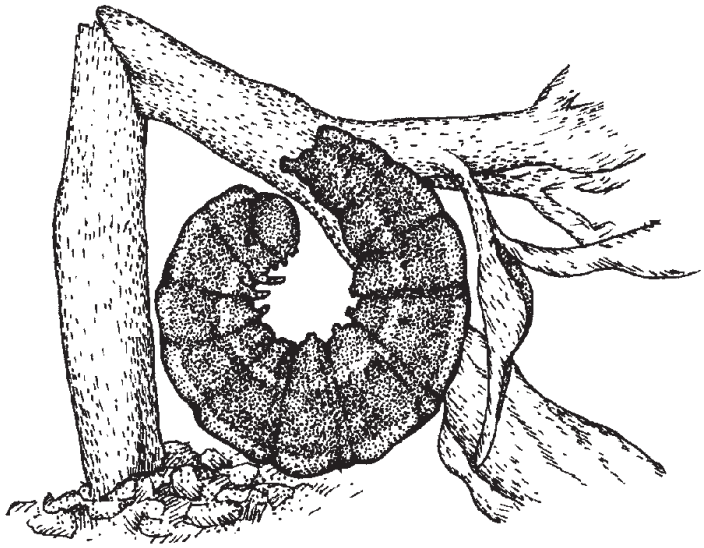

Figure 1. Cutworm.

1. This document is ENY-462, one of a series of the Department of Entomology and Nematology, UF/IFAS Extension. Original publication date July 2002. Revised August 2007, March 2010, June 2013, and February 2017. Visit the EDIS website at http://edis.ifas.ufl.edu.

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Wireworms, *Agriotus* spp., *Melanotus* spp., and other Elateridae

Description

Wireworms (Figure 2) are the shiny, hard-bodied, slender larvae of the click beetle. Larvae are brownish yellow and ½–1 ½ inches long. Adults are large, brown beetles that make a clicking sound when they try to right themselves after being on their backs.

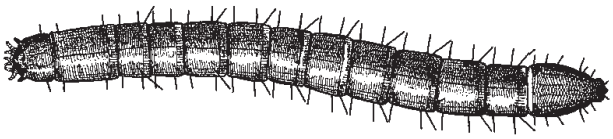

Figure 2. Wireworm larva.

Biology

Depending on species, wireworm larvae can stay in the soil for 1 to 5 years. Eggs are laid singly in soil 1 to 6 inches deep in spring or summer. Hatching takes place in 2 to 4 weeks. Because of the long egg-laying period, overlapping generations (larvae of different sizes) are present. Adults prefer to oviposit into grassy areas, which include rye, wheat, oats, mixed pastures, old fields, and sometimes potatoes.

Damage

Wireworms, a sporadic pest on carrots in Florida, are a greater problem on organic soils than on mineral soils. They can attack the developing carrots directly, causing severe loss, or can provide entry points for pathogens that cause secondary rots. See Table 1 for wire management suggestions.

Tawny Mole Cricket, *Scapteriscus vicinus*; Short-winged Mole Cricket, *S. abbreviatus*

Description

Of the 10 species of mole crickets (Figure 3), only a few are pests. The tawny mole cricket is the most damaging to vegetable crops. Meandering tunnels created by mole crickets are the most obvious sign of their presence. Approximately ½ inch in diameter, tunnels are just below the surface and resemble miniature ground mole tunnels.

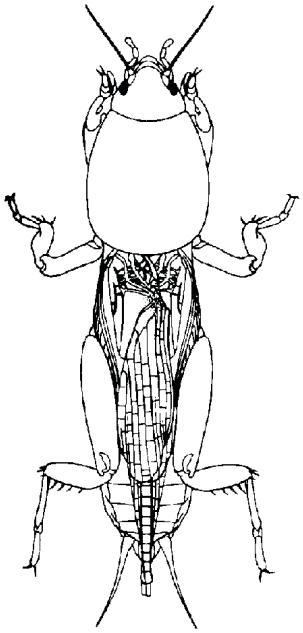

Figure 3. Mole cricket.

Biology

In the southeastern United States, there is one generation per year. Eggs are laid in chambers 4 to 12 inches underground from April through June. Eggs hatch after about three weeks. The adults of the previous generation die off during May and June, and most of the new generation reaches the adult stage in the fall and early winter. These adults overwinter and breed in the spring. For two to three months in the spring, tawny mole crickets are most commonly seen during their brief mating flights, which begin shortly after sunset.

Damage

Mole crickets mainly feed on plant roots. At night, in warm, wet weather, they will also feed on stems and leaves at surface level. Their tunneling in, around, and under the developing root system, in addition to feeding, is particularly damaging to young seedlings. Although some damage occurs from their feeding on the roots and on the stems and leaves of young plants, mole crickets are most damaging to carrot plants when they cut the stems of seedlings at or near ground level.

Management

In areas where mole crickets are known to cause problems, a preplant application of a soil insecticide that is incorporated into the soil is the most useful control measure. Because of the damage done to pastures and turf, much effort has gone into finding natural enemies of this pest in South America and releasing them in the United States.

The tachinid fly *Ormia depleta* has been evaluated for use in a classical biological control program for mole crickets, with initial releases made at Gainesville and Bradenton in 1988 and subsequent releases in other counties through 1992. Populations of the fly became established from Dade to Alachua counties but no farther north. This program is still in the experimental stage, with some work focusing on provision of appropriate nectar sources for the fly.

Presently, the most effective biological control agent for mole crickets is a steinernematid nematode introduced from South America. The parasitic nematode *Steinernema scapterisci* has shown promise for managing mole crickets in pasture and turf in Florida, and in the past has been available commercially for mole cricket control in turf. *Steinernema scapterisci* has been shown to be highly effective against tawny mole crickets and less effective against short-winged mole crickets. It is most effective as a biocontrol agent where mole cricket populations are highest, as in pastures. It can also be used as a biopesticide where mole cricket populations are lower, and it shows residual activity. The nematode is able to disperse well when applied and has shown good recovery years after its application. Populations have become established in small areas of several Florida counties. If it becomes established in pastures surrounding vegetable crop production areas, it is expected to keep mole cricket populations below damaging levels.

Leafminers, *Liriomyza sativae* and *L. trifolii*

Description and Biology

The adult leafminer (Figure 4) is a small fly, about ⅛ to ¹⁄₁₀ of an inch long with a yellow abdomen. The fly inserts her eggs in feeding punctures on the upper leaf surface. Larvae (maggots) feed between the upper and lower leaf surfaces, creating meandering mines that enlarge as the larvae grow. After approximately two weeks in warm weather the larva completes development and leaves the mine, dropping to the ground to pupate. The complete life cycle can be as short as 18 to 21 days. In Florida, leafminer generations are continuous during most of the year.

Damage

Leafminers are a sporadic foliar pest on carrots in Florida. Infestations can be more severe late in the growing season, particularly if adults migrate out of nearby crop residue into late-planted fields. They are a problem on seedlings during the fall carrot season. Although healthy plants can usually tolerate substantial leafminer damage, heavy damage may cause leaf drop. Also, the exit holes in old mines may provide access to pathogens.

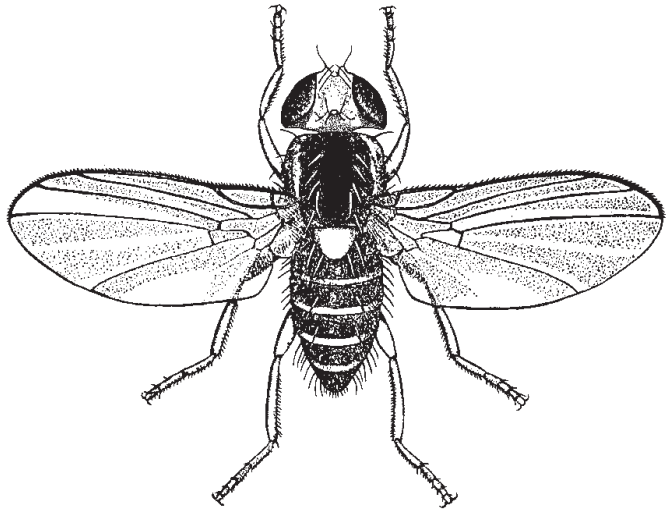

Figure 4. Vegetable leafminer.

Management

Chemical control of leafminers is difficult, because during the feeding stage the pest remains protected within the leaf. Targeting small larvae results in better control. Several parasitic wasps naturally keep populations below damaging levels in Florida in the absence of broad-spectrum insecticide use.

Melon Aphid, *Aphis gossypii*; Green Peach Aphid, *Myzus persicae*

Aphids are also a minor and sporadic pest on carrots in Florida. The green peach aphid (*Myzus persicae*) is the species most often reported on the crop in the state. The melon aphid (*Aphis gossypii*), which has a wide host range, may also be found on carrots. The aphid *Hyadaphis coriandri*, which has recently been found in Florida, is damaging to several umbelliferous herbs and is capable of colonizing carrots, but there has been no state report on carrots.

Description

Aphids are soft-bodied insects, almost egg-shaped when viewed from above. The largest melon aphids (Figure 5) are not much more than one-sixteenth of an inch in length. The color of melon aphids can vary from pale yellow to orange to dark green to almost black. Green peach aphids (Figure 6) are larger (up to one-tenth of an inch long) and vary in color from pale yellow to medium green. A pair of small tube-like structures called cornicles extends backward and upward from the posterior of the aphid, above a small tail-like structure (cauda). The first individuals to colonize a plant will usually have wings, but then wingless aphids become the dominant form until crowding occurs or the

plant deteriorates. Then winged aphids will be produced again to disperse to other plants.

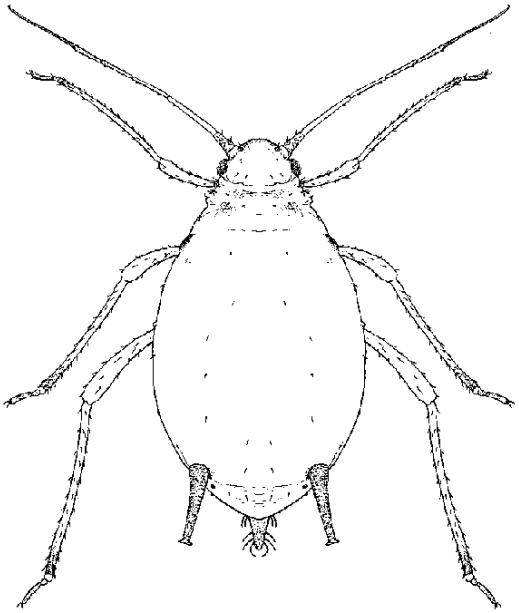

Figure 5. Melon aphid.

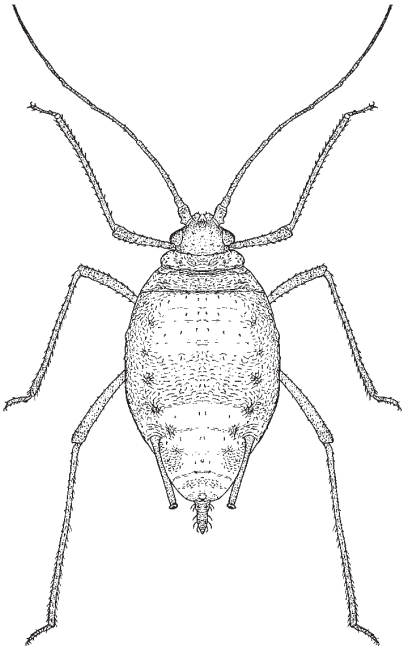

Figure 6. Green peach aphid.

Damage

Aphids feed by piercing plant tissue with their needle-like mouthparts and sucking out water and nutrients. Toxins in their saliva, which can be injected into the plant tissue during feeding, may cause foliage to curl and deform. Aphids also deposit large amounts of honeydew on the plant surface, which encourages the growth of black sooty mold. A short life cycle and reproduction by asexual means and by live birth allow aphid populations to increase rapidly in Florida.

Biological Control

Beneficial natural enemies such as lady beetles, lacewings, and larvae of syrphid flies feed on aphids. Tiny wasps lay their eggs in aphids. The wasp larva matures inside the living aphid and finally exits, leaving a gold or tan shell (aphid mummy) behind. Occasionally, fungi will infect aphids, drastically reducing populations.

Acknowledgement

Much of the information above was taken from the Department of Food Science and Human Nutrition, IFAS Publication, *Florida Crop/Pest Management Profiles: Carrots*, CIR 1243 (http://ufdc.ufl.edu/IR00002996/00001).

Table 1. Insecticides registered for use on insects attacking carrots and garden beets.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
Aphids	1B	**Malathion 5EC** (malathion)	1.5-2.0 pt	beets: 12; carrots:24	7	Maximum number of applications is 3 for beets and 2 for carrots.
	1B	**Malathion 8F** (malathion)	1.25 pt	12	7	**Beets only.** Maximum number of applications is 3.
	3A	***Brigade 2EC** (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots, 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days
	3A	**Pyganic Crop Protection EC 5.0** (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	**Pyronyl Crop Spray** (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	4A	**Actara** (thiamethoxam)	1.5-4.0 oz	12	7	Do not exceed 8 oz product/acre/season.
	4A	**Admire Pro** (imidacloprid)	4.4-10.5 fl oz-soil; 1.2 fl oz-foliar	12	21-soil; 5-foliar	Limited to one soil application. If applied as a foliar spray, use no more than 3.7 fl oz per acre per season. Leaves may be used for food.
	4A	**Platinum, 75SG** (thiamethoxam)	5.0-12.0 fl oz; **75SG:** 1.7-4.0 oz	12	at planting	Do not exceed 12 oz Platinum or 4.0 oz Platinum 75SG per acre per season.
	4C	**Transform WG** (sulfoxaflor)	0.75-2.75 oz	24	7	Do not make more than 2 consecutive applications or apply more than 8.5 oz per acre per year.
	4D	**Sivanto 200 SL** (flupyradifurone)	7-14 fl oz	4	7	Maximum allowed per year: 28 fl oz. Minimum interval between applications: 10 days. Foliar application only.

Table 1. Insecticides registered for use on insects attacking carrots and garden beets. (continued)

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	9C	**Beleaf 50 SG** (flonicamid)	2.0-2.8 oz	12	3	Do not apply more than 3 times at high rate.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**BotaniGard 22 WP, ES** (Beauveria bassiana)	**WP:** 0.5-2 lb/100 gal; **ES:** 0.5-2 qt/100 gal	4	0	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Not compatible in tank mix with fungicides.
	–	**Grandevo** (*Chromobacterium subtsugae* strain PRAA4-1)	1-3 lb	4	0	**Greens and roots**. OMRI-listed
	--	**M-Pede** (potassium salts of fatty acids)	1-2% V/V	12	0	OMRI-listed.
	--	**Neemix 4.5** (azadirachtin)	4-16 fl oz	12	0	Acts as IGR and feeding repellent. OMRI-listed.
	--	**Trilogy** (extract of neem oil)	0.5-2.0% V/V	4	0	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed.
Beetles (includes blister beetles, cucumber beetles, flea beetles)	1A	**Sevin 80S; XLR; 4F** (carbaryl)	**80S:** 0.63-2.5 lb; **XLR, 4F:** 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	1B	**Malathion 8F** (malathion)	1.25 pt	12	7	**Beets only.** Maximum number of applications is 3.
	3A	***Baythroid XL** (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. **Carrots only.**
	3A	***Brigade 2EC** (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots, 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days
	3A	***Mustang** (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	**Pyganic Crop Protection EC 5.0** (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	**Pyronyl Crop Spray** (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	4A	**Actara** (thiamethoxam)	1.5-4.0 oz	12	7	Do not exceed 8 oz product/acre/season.
	4A	**Admire Pro** (imidacloprid)	4.4-10.5 fl oz-soil; 1.2 fl oz-foliar	12	21-soil; 5-foliar	Limited to one soil application. If applied as a foliar spray, use no more than 3.7 fl oz per acre per season. Leaves may be used for food.
	4A	**Platinum, 75SG** (thiamethoxam)	5.0-12.0 fl oz; **75SG:** 1.7-4.0 oz	12	at planting	Do not exceed 12 oz Platinum or 4.0 oz Platinum 75SG per acre per season.
	5	**Entrust SC** (spinosad)	roots: 3-6 fl oz, beet greens: 1.5-10 fl oz	4	3	Do not apply more than a total of 21 fl oz/acre per crop (29 for beet greens) or apply more than 4 times. OMRI-listed.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
Caterpillars (includes beet armyworm, celery leaf-tier, corn earworm, cutworms, fall armyworm, loopers)	1A	**Sevin 80S; XLR; 4F** (carbaryl)	**80S:** 0.63-2.5 lb; **XLR, 4F:** 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	1B	***Diazinon AG500, *50W** (diazinon)	**AG500:** 1-4 qt; **50W:**2-8 lb	72	preplant	Do not make more than one application per year.
	1B	**Malathion 8F** (malathion)	1.25 pt	12	7	**Beets only.** Maximum number of applications is 3.
	3A	***Baythroid XL** (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. **Carrots only.**
	3A	***Brigade 2EC** (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots, 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days

Table 1. Insecticides registered for use on insects attacking carrots and garden beets. (continued)

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	3A	***Mustang** (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	**Pyganic Crop Protection EC 5.0** (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	**Pyronyl Crop Spray** (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	5	**Entrust SC** (spinosad)	roots: 3-6 fl oz, beet greens: 1.5-10 fl oz	4	3	Do not apply more than a total of 21 fl oz/acre per crop (29 for beet greens) or apply more than 4 times. OMRI-listed.
	5	**Radiant SC** (spinetoram)	leaves, 5-10 oz; roots, 6-8 fl oz	4	3	Maximum of 4 applications per year. If roots will be harvested, lower rate must be used.
	11A	**Agree WG** (*Bacillus thuringiensis* subspecies *aizawai*)	0.5-2.0 lb	4	0	Apply when larvae are small for best control. Leaves and roots. OMRI-listed.
	11A	**Biobit HP** (*Bacillus thuringiensis* subspecies *kurstaki*)	0.5-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse.
	11A	**Crymax WDG** (*Bacillus thuringiensis* subspecies *kurstaki*)	0.5-2.0 lb	4	0	Use high rate for armyworms. Treat when larvae are young.
	11A	**Deliver** (*Bacillus thuringiensis* subspecies *kurstaki*)	0.25-1.5 lb	4	0	Use higher rates for armyworms. OMRI-listed.
	11A	**DiPel DF** (*Bacillus thuringiensis* subspecies *kurstaki*)	0.5-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. Can be used for organic production.
	11A	**Javelin WG** (*Bacillus thuringiensis* subspecies *kurstaki*)	0.12-1.50 lb	4	0	Treat when larvae are young. Thorough coverage is essential. OMRI-listed.
	11A	**Xentari DF** (*Bacillus thuringiensis* subspecies *aizawai*)	0.5-2.0 lb	4	0	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.
	18	**Intrepid 2F** (methoxyfenozide)	4-16 for leaves, 8-16 fl oz for roots	4	leaves: 1; roots: 14	Do not apply more than 64 fl oz per acre per season.
	22	**Avaunt** (indoxacarb)	3.5-6.0 oz	12	7	Do not use adjuvants. Do not apply more than 24 oz per acre per crop. **Beets only.**
	28	**Coragen** (chlorantraniliprole)	3.5-5.0 fl oz	4	1	Do not apply more than 15.4 fl oz product per acre per year. Make no more than 4 applications.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	–	**Grandevo** (*Chromobacterium subtsugae* strain PRAA4-1)	1-3 lb	4	0	**Greens and roots**. OMRI-listed
	--	**Neemix 4.5** (azadirachtin)	4-16 fl oz	12	0	Acts as IGR and feeding repellent. OMRI-listed.
Fire ants	3A	***Brigade 2EC** (bifenthrin)	5.12-6.4 fl oz	12	21 – carrots, 1 – beets	Do not apply more than 0.5 lb ai/acre per season for carrots or 0.4 lb ai/acre per season for beets. Apply no more than once every seven days
	3A	**Pyronyl Crop Spray** (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	7A	**Extinguish Fire Ant Bait** ((S)-methoprene)	1.0-1.5 lb	4	0	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks.
Grasshoppers	3A	***Mustang** (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	**Pyganic Crop Protection EC 5.0** (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
Leafhoppers	1A	**Sevin 80S; XLR; 4F** (carbaryl)	**80S:** 0.63-2.5 lb; **XLR, 4F:** 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.

Table 1. Insecticides registered for use on insects attacking carrots and garden beets. (continued)

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	1B	**Malathion 5EC** (malathion)	1.5-2.0 pt	beets: 12; carrots:24	7	Maximum number of applications is 3 for beets and 2 for carrots.
	3A	***Asana XL (0.66EC)** (esfenvalerate)	5.8-9.6 fl oz	12	7	Do not apply more than 0.5 lb ai/acre per season. **Carrots only.**
	3A	***Baythroid XL** (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. **Carrots only.**
	3A	***Mustang** (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	3A	**Pyganic Crop Protection EC 5.0** (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	3A	**Pyronyl Crop Spray** (pyrethrins + piperonyl butoxide)	1-12 fl oz	12	0	
	4A	**Actara** (thiamethoxam)	1.5-4.0 oz	12	7	Do not exceed 8 oz product/acre/season.
	4A	**Admire Pro** (imidacloprid)	4.4-10.5 fl oz-soil; 1.2 fl oz-foliar	12	21-soil; 5-foliar	Limited to one soil application. If applied as a foliar spray, use no more than 3.7 fl oz per acre per season. Leaves may be used for food.
	4A	**Platinum, 75SG** (thiamethoxam)	5.0-12.0 fl oz; **75SG:** 1.7-4.0 oz	12	at planting	Do not exceed 12 oz Platinum or 4.0 oz Platinum 75SG per acre per season.
	4C	**Transform WG** (sulfoxaflor)	0.75-2.75 oz	24	7	Do not make more than 2 consecutive applications or apply more than 8.5 oz per acre per year.
	4D	**Sivanto 200 SL** (flupyradifurone)	7-14 fl oz	4	7	Maximum allowed per year: 28 fl oz. Minimum interval between applications: 10 days. Foliar application only.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	–	**Grandevo** (*Chromobacterium subtsugae* strain PRAA4-1)	1-3 lb	4	0	**Greens and roots**. OMRI-listed
Leafminers	3A	**Pyganic Crop Protection EC 5.0** (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	5	**Entrust SC** (spinosad)	roots: 3-6 fl oz, beet greens: 1.5-10 fl oz	4	3	Do not apply more than a total of 21 fl oz/acre per crop (29 for beet greens) or apply more than 4 times. OMRI-listed.
	5	**Radiant SC** (spinetoram)	leaves, 5-10 oz; roots, 6-8 fl oz	4	3	Maximum of 4 applications per year. If roots will be harvested, lower rate must be used.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**M-Pede** (potassium salts of fatty acids)	1-2% V/V	12	0	OMRI-listed.
	--	**Neemix 4.5** (azadirachtin)	4-16 fl oz	12	0	Acts as IGR and feeding repellent. OMRI-listed.
Mole crickets and wireworms	1B	***Diazinon AG500, *50W** (diazinon)	**AG500:** 1-4 qt; **50W:**2-8 lb	72	preplant	Do not make more than one application per year.
Plant bugs	9C	**Beleaf 50 SG** (flonicamid)	2.0-2.8 oz	12	3	Do not apply more than 3 times at high rate.
Stink bugs	1A	**Sevin 80S; XLR; 4F** (carbaryl)	**80S:** 0.63-2.5 lb; **XLR, 4F:** 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	3A	**Pyganic Crop Protection EC 5.0** (pyrethrins)	4.5-18 fl oz	12	0	Pyrethrins degrade rapidly in sunlight, but still may be harmful to bees. OMRI-listed
	--	**Aza-Direct** (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
Tarnished plant bug	1A	**Sevin 80S; XLR; 4F** (carbaryl)	**80S:** 0.63-2.5 lb; **XLR, 4F:** 0.5-2 qt	12	7	Highly toxic to bees. Repeat applications, as needed up to 6 times, at least 7 days apart.
	3A	***Mustang** (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
Weevils	3A	***Asana XL (0.66EC)** (esfenvalerate)	5.8-9.6 fl oz	12	7	Do not apply more than 0.5 lb ai/acre per season. **Carrots only.**

Table 1. Insecticides registered for use on insects attacking carrots and garden beets. (continued)

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	3A	***Baythroid XL** (beta-cyfluthrin)	1.6-2.8 fl oz	12	0	Do not exceed 14 fl oz/acre per season. **Carrots only.**
	3A	***Mustang** (zeta-cypermethrin)	1.4-4.3 oz	12	1	A maximum of 0.3 lb ai/acre per season may be applied. Leaves cannot be used for food or feed.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, (max 3.5 pts)	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.

[1] Mode of Action (MOA) codes for plant pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 7.3, February 2014. Number codes (1 through 28) are used to distinguish the main insecticide mode of action groups, with additional letters for certain sub-groups within each main group. All insecticides within the same group (with same number) indicate same active ingredient or similar mode of action. This information must be considered for the insecticide resistance management decisions. -- = unknown, or a mode of action that has not been classified yet.

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

*** Restricted use insecticide.**