Insect Management for Onions, Leek, and Garlic[1]

S. E. Webb[2]

Sweet varieties of bulbing onions, which make bulbs under short day conditions and do not store well, are by far the most common onions grown in Florida. They are generally grown on small acreages in the winter for local and farmers markets. In Hillsborough County and in the Suwannee Valley, strawberry growers are the major producers of onions, many of which are harvested green.

Because it is grown in the winter and early spring, the onion crop in Florida suffers from relatively few insect pests, with thrips and seedcorn maggot being the most commonly found. Armyworms and cutworms can occasionally damage seedlings. Cultural controls, such as growing thrips-tolerant varieties and preparing seedbeds early, should be used and insecticides avoided as much as possible to limit the development of insecticide resistance and favor the survival of insect predators and parasites.

Several species of thrips feed on onions. In north Florida, onion thrips (*Thrips tabaci*) and tobacco thrips (*Frankliniella fusca*) are the most commonly found. Onion thrips can transmit *Iris yellow spot virus* and tobacco thrips transmits *Tomato spotted wilt virus* to onions. Other thrips that have been reported to attack onions include western flower thrips (*F. occidentalis*) and melon thrips (*T. palmi*). Thrips can become resistant to insecticides very quickly. Because they feed deep down at the base of emerging leaves, they can also avoid both insecticides and natural enemies, such as the insidious pirate bug. There are relatively few insecticides labeled for use on onions. The most commonly used are the pyrethroids and methomyl, a carbamate, but they may be only moderately effective. A threshold of 5–10 thrips per plant has been suggested for winter-grown sweet onions in the South.

Seedcorn maggot (*Delia platura*), which feeds on many different plants, can be a problem when there are high levels of decaying organic matter in the soil and when the weather is cool and wet. Soil applications of chlorpyrifos or diazinon at planting may be useful if there is a history of seedcorn maggot problems. Early preparation of the field to allow the breakdown of organic matter before planting is essential.

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Table 1. Inseticides registered for managing insect pests of garlic and leeks.

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
Aphids	1B	**Malathion 5EC, 8F** (malathion)	**5EC:** 1.5-2.5 pt; **8F:** 1-1.56 pt	leeks, shallots, garlic: 24	3	**Leeks, shallots, garlic.** Three applications per year for garlic, two for all others.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Leeks, shallots, and garlic.**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (garlic)**. Do not apply more than 15.36 fl oz per acre per season.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**BotaniGard ES** (*Beauveria bassiana*)	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	**Leek, garlic, shallot**
	--	**M-Pede 49% EC** Soap, insecticidal	1-2% V/V	12	0	OMRI-listed.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	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.
Beet Armyworm	1A	***Lannate LV; *SP** (methomyl)	**LV:** 1.5 pt; **SP:** 0.5 lb	48	7	**Garlic only.**
	28	**Coragen** (chlorantraniliprole)	3.5-5.0 fl oz	4	1	No more than 4 foliar applications or 15.4 fl oz of product per acre per crop. For entire Bulb Vegetable Group.
Caterpillars (includes cutworms and armyworms)	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Dry bulb and garlic only**. **Label is registered only for garlic.** Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Garlic.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Leeks, shallots, and garlic.**
	3A	***Pounce 25 WP** (permethrin)	6.4-12.8 oz—garlic	12	1	**Garlic**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (garlic)**. Do not apply more than 15.36 fl oz per acre per season.
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For leeks, garlic, and shallots.** OMRI-listed.

Table 1. Inseticides registered for managing insect pests of garlic and leeks. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	5	**Radiant SC** (spinetoram)	5-10 fl oz	4	1	Use with an adjuvant.
	11A	**Agree WG** (*Bacillus thuringiensis* subspecies *aizawai*)	1.0-2.0 lb	4	0	Apply when larvae are small for best control.
	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. For organic production.
	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*)	0.25-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. OMRI-listed.
	11A	**Javelin WG** (*Bacillus thuringiensis* subspecies *kurstaki*)	0.12-1.5 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)	4-12 fl oz	4	1	
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	–	**Grandevo** (*Chromobacterium subtsugae* strain PRAA4-1)	1-3 lb	4	0	**Leek, garlic, and shallot**
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
Fire ants	7A	**Extinguish** ((S)-methoprene)	1-1.5 lb	4	0	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
	7C	**Esteem Ant Bait** (pyriproxyfen)	1.5-2.0 lb	12	1	**Dry bulb only**.
Flea beetles	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Garlic (Crop Groups 3-07A and 3-07B)**
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For leeks, garlic, and shallots.** OMRI-listed.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
Leafminers	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Garlic only**. **Label is registered only for garlic.** Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Garlic.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. L**eeks, shallots, garlic.**
	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Garlic (Crop Groups 3-07A and 3-07B)**

Table 1. Inseticides registered for managing insect pests of garlic and leeks. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For leeks, garlic, and shallots.** OMRI-listed.
	5	**Radiant SC** (spinetoram)	5-10 fl oz	4	1	Use with an adjuvant.
	6	***Agri-Mek SC** (abamectin)	1.75-3.5 fl oz	12	30	Must be used with a non-ionic activator type wetting, spreading and/or penetrating adjuvant., not a binder sticker type adjuvant. Maximum of 10.25 fl oz per acre per season.
	17	**Trigard** (cyromazine)	2.66 oz	12	7	Maximum of 6 applications per crop.
	28	**Exirel** (cyazypyr)	13.5-20.5 fl oz	12	1	Do not apply more than 0.4 lb ai per acre of cyazypyr or cyantraniliprole-containing products per season. Toxic to bees. Do not allow drift to blooming crops or weeds.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
Onion maggot	1B	***Diazinon AG500, *Diazinon 50W** (diazinon)	**AG500:** 2-4 qt; **50W:** 4-8 lb	72	preplant	Do not make more than one soil application per year. **For leeks, garlic, and shallots.**
	1B	**Lorsban 75WG; *Advanced** (chlorpyrifos)	**75WG:** 1.33 lb; **Advanced:** depends on row spacing	24	60	**Dry bulb only**. One application per year.
	1B	**Malathion 5EC, 8F** (malathion)	**5EC:** 1.5-2.5 pt; **8F:** 1-1.56 pt	leeks, shallots, garlic: 24	3	**Leeks, shallots, and garlic.** Three applications per year for garlic, two for all others.
	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Garlic only**. **Label is registered only for garlic.** Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Garlic.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Leeks, shallots, and garlic.**
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz—garlic	12	1	**Garlic**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (garlic)**. Do not apply more than 15.36 fl oz per acre per season.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
Plant bugs	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Garlic.** Maximum of 0.77 pt per acre per season.
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (garlic)**. Do not apply more than 15.36 fl oz per acre per season.
	--	**M-Pede 49% EC** Soap, insecticidal	1-2% V/V	12	0	OMRI-listed.
Stink bugs	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Garlic only**. **Label is registered only for garlic.** Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Garlic.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Leeks, shallots, and garlic.**
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz—garlic	12	1	**Garlic**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (garlic)**. Do not apply more than 15.36 fl oz per acre per season.

Table 1. Inseticides registered for managing insect pests of garlic and leeks. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Garlic (Crop Groups 3-07A and 3-07B)**
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
Thrips (check label for species controlled)	1A	***Lannate LV; *SP** (methomyl)	**LV:** 1.5-3.0 pt; **SP:** 0.5-1.0 lb	48	7	
	1B	**Malathion 5EC, 8F** (malathion)	**5EC:** 1.5-2.5 pt; **8F:** 1-1.56 pt	leeks, shallots, garlic: 24	3	**Leeks, shallots, and garlic.** Three applications per year for garlic, two for all others.
	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Garlic only**. **Label is registered only for garlic.** Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Garlic.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Leeks, shallots, and garlic.**
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz—garlic	12	1	**Bulb onions and garlic**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (garlic).** Do not apply more than 15.36 fl oz per acre per season.
	4A	**Admire Pro** (imidacloprid)	14.0 fl oz	12	21	Apply no more than 14 fl oz per acre per season.
	4A	**Assail 30SG** (acetamiprid)	5.0-8.0 oz	12	7	No more than 4 applications or 32 oz of product per acre per season.
	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Garlic (Crop Groups 3-07A and 3-07B)**
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For leeks, garlic, and shallots.** OMRI-listed.
	5	**Radiant SC** (spinetoram)	5-10 fl oz	4	1	Use with an adjuvant.
	6	***Agri-Mek SC** (abamectin)	1.75-3.5 fl oz	12	30	Must be used with a non-ionic activator type wetting, spreading and/or penetrating adjuvant., not a binder sticker type adjuvant. Maximum of 10.25 fl oz per acre per season.
	7C	**Knack IGR** (pyriproxyfen)	8 fl oz	12	3	Maximum of 2 applications, at least 14 days apart. No activity against adult insects.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**BotaniGard ES** (*Beauveria bassiana*)	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	**Leek, garlic, and shallot**
	--	**M-Pede 49% EC** Soap, insecticidal	1-2% V/V	12	0	OMRI-listed.
	--	**Requiem EC** (extract of *Chenopodium ambrosioides*)	1.5-3.0 qt	4	0	Begin as soon as thrips are seen.
	--	**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.
Wireworms	1B	***Diazinon AG500,** ***Diazinon 50W** (diazinon)	**AG500:** 2-4 qt; **50W:** 4-8 lb	72	preplant	Do not make more than one soil application per year. **For leeks, garlic, and shallots.**

[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. un = unknown, or a mode of action that has not been classified yet.

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

*** Restricted use insecticide.**

Table 2. Inseticides registered for managing insect pests of onions.

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
Aphids	1B	**Malathion 5EC, 8F** (malathion)	**5EC:** 1.5-2.5 pt; **8F:** 1-1.56 pt	onions: 12	3	**Onions, bulb and green.** Two applications per year.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Onions, bulb and green.**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (onions and garlic), not green onions**. Do not apply more than 15.36 fl oz per acre per season.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**BotaniGard ES** (*Beauveria bassiana*)	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	**Onion (bulb and green), and shallot**
	--	**M-Pede 49% EC** Soap, insecticidal	1-2% V/V	12	0	OMRI-listed.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	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.
Beet armyworm, black cutworm, variegated cutworm	1A	***Lannate LV; *SP** (methomyl)	**LV:** 1.5-3.0 pt; **SP:** 0.5-1.0 lb	48	7	**Dry bulb, green onions, only**. Add a wetting agent to improve coverage.
	28	**Coragen** (chlorantraniliprole)	3.5-5.0 fl oz	4	1	**Beet armyworm only.** No more than 4 foliar applications or 15.4 fl oz of product per acre per crop.
Caterpillars (includes cutworms and armyworms)	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Dry bulb and garlic only**. Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Bulb onions.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Onions, bulb and green.**
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz—garlic	12	1	**Bulb onions**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (onions), not green onions**. Do not apply more than 15.36 fl oz per acre per season.
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For onions, bulb and green.** OMRI-listed.
	5	**Radiant SC** (spinetoram)	5-10 fl oz	4	1	Use with an adjuvant.
	11A	**Agree WG** (*Bacillus thuringiensis* subspecies *aizawai*)	1.0-2.0 lb	4	0	Apply when larvae are small for best control.
	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. For organic production.
	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*)	0.25-2.0 lb	4	0	Treat when larvae are young. Good coverage is essential. OMRI-listed.

Table 2. Inseticides registered for managing insect pests of onions. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	11A	**Javelin WG** (*Bacillus thuringiensis* subspecies *kurstaki*)	0.12-1.5 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)	4-12 fl oz	4	1	**Green onion subgroup only.** Do not apply more than 64 fl oz per acre per year.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
Fire ants	7A	**Extinguish** ((S)-methoprene)	1-1.5 lb	4	0	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
	7C	**Esteem Ant Bait** (pyriproxyfen)	1.5-2.0 lb	12	1	**Dry bulb only**.
Flea beetles	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Bulb and green onions (Crop Groups 3-07A and 3-07B)**
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For onions, bulb and green.** OMRI-listed.
Leafminers	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Dry bulb only**. Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Bulb onions.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Onions, bulb and green.**
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz —garlic	12	1	**Bulb onions**
	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Bulb and green onions (Crop Groups 3-07A and 3-07B)**
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For onions, bulb and green.** OMRI-listed.
	5	**Radiant SC** (spinetoram)	5-10 fl oz	4	1	Use with an adjuvant.
	6	***Agri-Mek SC** (abamectin)	1.75-3.5 fl oz	12	30	Must be used with a non-ionic activator type wetting, spreading and/or penetrating adjuvant., not a binder sticker type adjuvant. Maximum of 10.25 fl oz per acre per season.
	17	**Trigard** (cyromazine)	2.66 oz	12	7	Maximum of 6 applications per crop.
	28	**Exirel** (cyazypyr)	13.5-20.5 fl oz	12	1	Do not apply more than 0.4 lb ai per acre of cyazypyr or cyantraniliprole-containing products per season. Toxic to bees. Do not allow drift to blooming crops or weeds.
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
Onion maggot	1B	***Diazinon AG500, *Diazinon 50W** (diazinon)	**AG500:** 2-4 qt,**50W:** 4-8 lb	72	preplant	Do not make more than one soil application per year. **For onions, bulb and green.**

Table 2. Inseticides registered for managing insect pests of onions. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	1B	**Lorsban 75WG; *Advanced** (chlorpyrifos)	**75WG:** 1.33 lb; **Advanced:** depends on row spacing	24	60	**Dry bulb only**. One application per year.
	1B	**Malathion 5EC, 8F** (malathion)	**5EC:** 1.5-2.5 pt; **8F:** 1-1.56 pt	onions: 12, leeks, shallots, garlic: 24	3	**Onions, bulb and green.** Three applications per year for garlic, two for all others.
	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Dry bulb only**. Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Bulb onions.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Onions, bulb and green.**
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz—garlic	12	1	**Bulb onions**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (onions and garlic), not green onions**. Do not apply more than 15.36 fl oz per acre per season.
	--	**Neemix 4.5 EC** (azadirachtin)	4-16 fl oz	12	0	OMRI-listed.
Plant bugs	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Bulb onions.** Maximum of 0.77 pt per acre per season.
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (onions and garlic), not green onions**. Do not apply more than 15.36 fl oz per acre per season.
	--	**M-Pede 49% EC** (soap, insecticidal)	1-2% V/V	12	0	OMRI-listed.
Stink bugs	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Dry bulb only**. Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Bulb onions.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Onions, bulb and green.**
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz—garlic	12	1	**Bulb onions**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (onions), not green onions**. Do not apply more than 15.36 fl oz per acre per season.
	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Bulb and green onions (Crop Groups 3-07A and 3-07B)**
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
Thrips (check label for species controlled)	1B	**Malathion 5EC, 8F** (malathion)	**5EC:** 1.5-2.5 pt; **8F:** 1-1.56 pt	onions: 12, leeks, shallots, garlic: 24	3	**Onions, bulb and green.** Three applications per year for garlic, two for all others.
	3A	***Ambush 25W** (permethrin)	6.4-19.2 oz	12	1	**Dry bulb**. Maximum of 2 lb ai/acre per season.
	3A	***Declare Insecticide** (gamma-cyhalothrin)	0.77-1.54 fl oz	24	14	**Bulb onions.** Maximum of 0.77 pt per acre per season.
	3A	***Mustang** (zeta-cypermethrin)	2.4-4.3 oz	12	7	Do not apply more than 21.5 oz per acre per season. **Onions, bulb and green.**

Table 2. Inseticides registered for managing insect pests of onions. (continued)

Labels change frequently. Be sure to read a current product label before applying any chemical.
Also refer to Table 18.2 for biopesticide and other alternative products labeled for disease management.

Pest	MOA Code[1]	Trade Name Active Ingredient	Rate Product/acre	REI hours	Days to Harvest	Notes
	3A	***Pounce 25 WP** (permethrin)	6.4-19.2 oz—onions 6.4-12.8 oz—garlic	12	1	**Bulb onions**
	3A	***Warrior II** (lambda-cyhalothrin)	0.96-1.92 fl oz	24	14	**For bulb crops only (onions), not green onions**. Do not apply more than 15.36 fl oz per acre per season.
	4A	**Admire Pro** (imidacloprid)	14.0 fl oz	12	21	Apply no more than 14 fl oz per acre per season.
	4A	**Assail 30SG** (acetamiprid)	5.0-8.0 oz	12	7	No more than 4 applications or 32 oz of product per acre per season.
	4A	**Scorpion 35SL** (dinotefuran)	foliar: 3.5-7.0 fl oz, soil: 8.75-10.5 fl oz	12	foliar: 1, soil: N/A	**Bulb and green onions (Crop Groups 3-07A and 3-07B)**
	5	**Entrust SC** (spinosad)	3-8 fl oz	4	1	No more than 5 applications per year (29 fl oz product). **For onions, bulb and green.** OMRI-listed.
	5	**Radiant SC** (spinetoram)	5-10 fl oz	4	1	Use with an adjuvant.
	6	***Agri-Mek SC** (abamectin)	1.75-3.5 fl oz	12	30	Must be used with a non-ionic activator type wetting, spreading and/or penetrating adjuvant., not a binder sticker type adjuvant. Maximum of 10.25 fl oz per acre per season.
	7C	**Knack IGR** (pyriproxyfen)	8 fl oz	12	3	Maximum of 2 applications, at least 14 days apart. No activity against adult insects. **Onion (dry bulb only).**
	--	**Aza-Direct** (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	Antifeedant, repellant, insect growth regulator. OMRI-listed.
	--	**Azatin XL** (azadirachtin)	5-21 fl oz	4	0	Antifeedant, repellant, insect growth regulator.
	--	**BotaniGard ES** (*Beauveria bassiana*)	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.
	--	**M-Pede 49% EC** Soap, insecticidal	1-2% V/V	12	0	OMRI-listed.
	--	**Requiem EC** (extract of *Chenopodium ambrosioides*)	1.5-3.0 qt	4	0	Begin as soon as thrips are seen.
	--	**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.
Wireworms	1B	***Diazinon AG500, *Diazinon 50W** (diazinon)	**AG500:** 2-4 qt,**50W:** 4-8 lb	72	preplant	Do not make more than one soil application per year. **For onions, bulb and green.**

[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. un = 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.