

## Insect Management for Onions, Leek, and Garlic<sup>1</sup>

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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 maggots (*Delia platura*), which feed 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. Selected insecticides approved for use on insects attacking onions and allies.

Chemical Name	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code <sup>1</sup>	Notes
<b>Agree WG</b> ( <i>Bacillus thuringiensis</i> subspecies <i>aizawai</i> )	1.0-2.0 lb	4	0	lepidopteran larvae (caterpillar pests)	11B1	Apply when larvae are small for best control. OMRI-listed <sup>2</sup> .
<b>*Ambush 25 W</b> (permethrin)	6.4-19.2 oz	12	1	armyworms, cutworms, leafminers, onion maggot (adults), onion thrips, stink bugs	3	Dry bulb only and garlic.
<b>*Ammo 2.5 EC</b> (cypermethrin)	2.0-5.0 fl oz	12	7	aphids, armyworms, cutworms, leafminers, onion maggot adults, stink bugs	3	All <i>Allium</i> spp., green and dry.
<b>Aza-Direct</b> (azadirachtin)	1-2 pts, up to 3.5, if needed	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	18B	Antifeedant, repellent, insect growth regulator. OMRI-listed <sup>2</sup> .
<b>Azatin XL</b> (azadirachtin)	5-21 fl oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	18B	Antifeedant, repellent, insect growth regulator.
<b>Biobit HP</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.5-2.0 lb	4	0	caterpillars (will not control large armyworms)	11B2	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse. OMRI-listed <sup>2</sup> .
<b>BotaniGard 22 WP, ES</b> ( <i>Beauveria bassiana</i> )	<b>WP:</b> 0.5-2 lb/100 gal <b>ES:</b> 0.5-2 qts/100 gal	4	0	aphids, thrips, whiteflies	--	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Not compatible in tank mix with fungicides.
<b>Deliver</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.25-1.5 lb	4	0	caterpillars	11B2	Use higher rates for armyworms. OMRI-listed <sup>2</sup> .

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*Diazinon AG500, 4 EC, *50 W (diazinon)	foliar - AG500, 4EC: 3-4 qts 50W: 6-8 lb	24	14	onion thrips	1B	Bulb and green
	preplant - AG500, 4EC: 3-4 qts 50W: 6-8 lb	24	preplant	wireworms	1B	See label.
<b>DIPel DF</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.5-2.0 lb	4	0	caterpillars	11B2	Treat when larvae are young. Good coverage is essential.
<b>Entrust</b> (spinosad)	1-2.5 oz	4	1	armyworms, dipteran leafminers, flea beetle, loopers, suppression of thrips	5	No more than 5 applications per year (9 oz product).
<b>Esteem Ant Bait</b> (pyriproxyfen)	1.5-2.0 lb	12	1	red imported fire ant	7C	Dry bulb only.
<b>Extinguish</b> ((S)-methoprene)	1-1.5 lb	4	0	fire ants	7A	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. This is the only fire ant bait that is labeled for use on cropland. May be applied by ground equipment or aerially.
<b>Javelin WG</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	0.12-1.5 lb	4	0	most caterpillars, but not <i>Spodoptera</i> species (armyworms)	11B2	Treat when larvae are young. Thorough coverage is essential. OMR1-listed <sup>2</sup> .
<b>Knack IGR</b> (pyriproxyfen)	8-10 fl oz	12	3	silverleaf whitefly, sweetpotato whitefly	7C	Maximum of 2 applications, at least 14 days apart.
<b>*Lannate LV; *SP</b> (methomyl)	<b>LV:</b> 1.5-3.0 pt <b>SP:</b> 0.5-1.0 lb	48	7 = (dry and green)	beet armyworm, black cutworm, thrips, variegated cutworm	1A	Add a wetting agent to improve coverage.

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<b>Lepinox WDG</b> ( <i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> )	1.0-2.0 lb	12	0	for most caterpillars, including beet armyworm (see label)	11B2	Treat when larvae are small. Thorough coverage is essential.
<b>Lorsban 15 G; 75 WG</b> (chlorpyrifos)	See labels for rates	24	at planting	onion maggot	1B	Dry bulb only.
<b>Malathion 8 F</b> (malathion)	1-2 pt	12	3	aphids, cucumber beetles, mites, Mexican bean beetle, potato leafhopper	1B	Field & greenhouse. Do not graze or feed forage to livestock.
<b>M-Pede 49% EC</b> Soap, insecticidal	1-2% V/V	12	0	aphids, leafhoppers, mites, plant bugs, thrips, whiteflies	--	OMRI-listed <sup>2</sup> .
<b>*Mustang Max</b> (zeta-cypermethrin)	2.24-4.0 oz	12	7	aphids, armyworms, cutworms, leafminers, onion maggot adults, onion thrip, stink bugs	3	
<b>Neemix 4.5 EC</b> (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, cabbage looper, cutworms, leafminers, onion maggot, thrips, whiteflies	26	OMRI-listed <sup>2</sup> .
<b>*PennCap-M</b> (methyl parathion)	2 pt	4 days - See label	15	thrips	1B	Do not apply when onions are blooming and bees are foraging.
<b>*Pounce 25WP</b> (permethrin) (dry only)	6.4-19.2 oz	12	1	armyworms, cutworms, leafminers, onion maggot (adults), onion thrips, stink bugs	3	

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<b>*Proaxis Insecticide</b> (gamma-cyhalothrin)	1.92-3.84 oz	24	14	armyworms, cutworms, leafminer adults, onion and seedcorn maggot adults, onion thrips, plant bugs, stink bugs, tobacco thrips; suppression of aphids, flower thrips, western flower thrips	3	
<b>Pyrelin EC</b> (pyrethrin + rotenone)	1-2 pt	12	12 hours	aphids, leafhoppers, loopers, mites, plant bugs, stink bugs, thrips, whiteflies	3, 21	
<b>Spintor 2SC</b> (spinosad)	3-8 fl oz	4	1	armyworms, dipteran leafminers, flea beetle, loopers; suppression of thrips	5	Do not apply more than 29 oz per acre per crop or make more than 5 applications per year.
<b>*Telone C-35</b> (dichloropropene + chloropicrin)	See label	5 days - See label	preplant	symphylans, wireworms	--	See supplemental label for use restrictions in south and central Florida.
<b>*Telone II</b> (dichloropropene)						
<b>Trigard</b> (cyromazine)	2.66 oz	12	7	leafminers	17	Maximum of 6 applications per crop.
<b>Trilogy</b> (extract of neem oil)	0.5-2.0% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	18B	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed <sup>2</sup> .
<b>*Warrior</b> (lambda-cyhalothrin)	1.92-3.84 fl oz	24	14	aphids, armyworms, cutworms, onion maggot adults, onion thrips, plant bugs, tobacco thrips; suppression of flower thrips, western flower thrip	3	For bulb crops only, not green onions. Do not apply more than 0.24 lb ai/acre per season.

**Table 1.** Selected insecticides approved for use on insects attacking onions and allies.

Chemical Name	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code <sup>1</sup>	Notes
<b>Xentari DF</b> ( <i>Bacillus thuringiensis</i> subspecies <i>aizawai</i> )	0.5-2.0 lb	4	0	caterpillars	11B1	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.
<b>The pesticide information presented in this table was current with federal and state regulations at the time of revision. The user is responsible for determining the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label instructions.</b>						
<sup>1</sup> Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v.5.2 December 2006.						
1A. Acetylcholine esterase inhibitors, Carbamates						
1B. Acetylcholine esterase inhibitors, Organophosphates						
2A. GABA-gated chloride channel antagonists						
3. Sodium channel modulators						
4A. Nicotinic Acetylcholine receptor agonists/antagonists, Neonicotinoids						
5. Nicotinic Acetylcholine receptor agonists (not group 4)						
6. Chloride channel activators						
7A. Juvenile hormone mimics, Juvenile hormone analogues						
7C. Juvenile hormone mimics, Pyriproxifen						
9A. Compounds of unknown or non-specific mode of action (selective feeding blockers), Cryolite						
9B. Compounds of unknown or non-specific mode of action (selective feeding blockers), Pymetrozine						
9C. Compounds of unknown or non-specific mode of action (flonicamid)						
11B1. Microbial disruptors of insect midgut membranes, <i>B.t.</i> var <i>aizawai</i>						
11B2. Microbial disruptors of insect midgut membranes, <i>B.t.</i> var <i>kurstaki</i>						
12B. Inhibitors of oxidative phosphorylation, disruptors of ATP formation, Organotin miticide						
15. Inhibitors of chitin biosynthesis, type 0, Lepidopteran						
16. Inhibitors of chitin biosynthesis, type 1, Homopteran						
17. Inhibitors of chitin biosynthesis, type 2, Dipteran						
18A. Ecdysone agonist/disruptor						
18B. Ecdysone agonist/disruptor (azadirachtin)						
20. Site II electron transport inhibitors						
21. Site I electron transport inhibitors						
22. Voltage-dependent sodium channel blocker						
23. Inhibitors of lipid biosynthesis						
25. Neuronal inhibitors						
<sup>2</sup> OMRI-listed: Listed by the Organic Materials Review Institute for use in organic production.						
<b>* Restricted Use Only.</b>						