

## Insecticides Currently Used on Vegetables<sup>1</sup>

S. E. Webb and P. A. Stansly<sup>2</sup>

The following table lists many of the common insecticides currently labeled for use on vegetables in Florida. A number of new materials have been registered in the past few years or have had additional crops added to their labels. Some older organophosphate insecticides (methyl parathion, in particular) are now restricted to just a few crops, a result of recent rulings related to the Food Quality Protection Act. Changes continue, thus this listing may not be totally accurate at the time of printing.

No attempt has been made to list all available formulations. Some are listed under "Signal Word," when different formulations differ in toxicity. Many of the listed insecticides are limited to specific vegetables. Specific crop recommendations and pesticide labels should be consulted for more detailed information.

Insects can become resistant to any insecticide if it is used repeatedly. This also applies to alternating insecticides with similar modes of action, for example following a soil application of Admire with foliar applications of Actara or Assail (all neonicotinoids). To complicate matters, some

insecticides in the same class have different modes of action and some unrelated chemicals have the same mode of action. In general, pesticides with the same mode of action should be used no more than twice in any crop cycle if residual activity is short and only once if residual activity is long. To aid in developing a spray program we have included a column with a code number for the mode of action of each insecticide. A footnote lists the mode of action associated with the code. In addition to alternating insecticides with different modes of action, integrating other non-chemical control measures in a pest management program should help to delay resistance.

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2. S. E. Webb, associate professor/extension entomologist, Entomology and Nematology Department, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611, and P. A. Stansly, professor, Entomology and Nematology Department, Southwest Florida Research and Education Center, University of Florida, Immokalee, FL, 34142.

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition. All chemicals should be used in accordance with directions on the manufacturer's label. Use pesticides safely. Read and follow directions on the manufacturer's label.

**Table 1.** Insecticides For Use On Vegetables

Insecticide	General Characteristics	Signal Word	MOA <sup>1</sup>	Typical Target Pests
<b>Organophosphates</b>				
*Counter (terbufos)	systemic action	Danger-Poison	1B	soil pests
*Diazinon		Caution	1B	aphids, beetles, caterpillars, soil pests, thrips
Dibrom (naled)	some short residual fumigant action	Danger	1B	caterpillars
Dimethoate	local systemic	Warning	1B	aphids, leafhoppers, mites
*Di-Syston (disulfoton)	systemic action	Danger-Poison	1B	aphids
*Guthion (azinphosmethyl)		Danger-Poison	1B	beetles, caterpillars, maggots
Imidan (phosmet)		Warning	1B	caterpillars, sweetpotato weevil
Lorsban (chlorpyrifos)	long residual	Caution - (15G) Warning - (50W, *4E)	1B	caterpillars, soil pests
Malathion	short residual	Warning	1B	broad spectrum
*MSR Spray Concentrate (oxydemetonmethyl)	systemic; contact & stomach action	Warning	1B	aphids, thrips & other sucking insects
*Mocap (ethoprop)	contact action	Warning - (10G, *15G)	1B	aphids, caterpillars
*Monitor (methamidophos)	long residual	Danger-Poison	1B	aphids, caterpillars & other pests
Orthene (acephate)	contact action & local systemic action	Caution	1B	aphids, caterpillars
*PennCap-M (methyl parathion)	contact & fumigant action; slow release formulation	Warning -(PennCap-M only)	1B	caterpillars, thrips
*Thimet (phorate)	systemic action	Danger-Poison	1B	soil pests
<b>Carbamates</b>				
*Furadan (carbofuran)	systemic action	Danger-Poison	1A	beetles, some caterpillars
*Lannate (methomyl)	very short residual	Danger-Poison	1A	caterpillars, leafhoppers
Larvin (thiodicarb)	larvicide & ovicide	Warning	1A	caterpillars
Sevin (carbaryl)	use can result in aphid and mite outbreaks	Caution - (4F, XLR, Bait) Warning - (80S)	1A	beetles, leafhoppers, caterpillars
*Temik (aldicarb)	systemic action	Danger-Poison	1A	aphids, mites, some beetles
*Vydate (oxamyl)	contact action, systemic if applied to soil	Danger-Poison	1A	aphids, thrips, some beetles

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<b>Organochlorines</b>				
Endosulfan (endosulfan)	fairly long residual	Danger-Poison	2A	aphids, beetles, caterpillars, whiteflies
Kelthane (dicofol)		Caution - (MF) Warning - (35)	20	spider mites, broad mites
<b>Pyrethroids</b>				
*Ambush (permethrin)		Warning	3	beetles, caterpillars, leafhoppers, thrips
*Ammo (cypermethrin)		Caution	3	beetles, caterpillars, leafhoppers, thrips
*Asana (esfenvalerate)		Warning	3	beetles, caterpillars, leafhoppers
*Baythroid (cyfluthrin)		Danger	3	beetles, caterpillars, leafhoppers, thrips
*Capture, Brigade (bifenthrin)		Warning	3	beetles, caterpillars, leafhoppers, thrips, whiteflies
*Danitol (fenpropathrin)		Danger	3	caterpillars, leafhoppers, whiteflies
*Force (tefluthrin)		Caution	3	soil pests
*Mustang Max (zeta-cypermethrin)		Warning	3	beetles, caterpillars, leafhoppers, thrips
*Pounce (permethrin)		Caution - (3.2EC, 1.5G) Warning - (25WP, WSP)	3	beetles, caterpillars, leafhoppers, thrips
*Proaxis (gamma-cyhalothrin)		Caution	3	beetles, caterpillars, leafhoppers, plant bugs, stink bugs
Pyronyl Crop Spray (Pyrethrins)	contact, stomach, & fumigant action; extract from chrysanthemums	Caution	3	broad spectrum
*Warrior (lambda-cyhalothrin)		Warning	3	beetles, caterpillars, leafhoppers, thrips
<b>Other insect nerve poisons</b>				
Acramite-50WS (bifenazate)	contact action, not systemic	Caution	25	mites
*Agri-Mek (abamectin)	active once ingested; some contact action; mostly stomach poison	Warning	6	leafminers, mites, some beetles, tomato pinworm
Avaunt (indoxacarb)	ingestion plus contact, slightly to moderately translaminar	Caution	22	caterpillars
Fulfill (pymetrozine)	feeding inhibitor	Caution	9B	aphids, whiteflies

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*Proclaim (emamectin benzoate)	ingestion & topical; translaminar, not systemic	Caution	6	caterpillars
SpinTor (spinosad)	ingestion & contact; enters leaf but does not translocate	Caution	5	caterpillars, some beetles and thrips
<b>Insect Growth Regulators</b>				
Confirm (tebufenozide)	slow acting	Caution	18	caterpillars
Courier (buprofezin)	disrupts egg hatch and molting; use in rotation with other insecticides	Caution	16	whiteflies
*Dimilin (diflubenzuron)	slow acting, disrupts molting process, reduces egg hatch of pepper weevil	Caution	15	caterpillars, pepper weevil
Esteem Ant Bait (pyriproxyfen)	breaks reproductive cycle of ants; slow acting but effective	Caution	7C	ants
Extinguish [(S)-methoprene]	slow acting	Caution	7A	fire ants
Intrepid (methoxyfenozide)	slow acting	Caution	18	caterpillars
Knack (pyriproxyfen)	use in combination or rotation with other insecticides	Caution	7C	whiteflies
Neemix (azadirachtin)	slow acting, also acts as feeding repellent	Caution - (Azatin XL Plus) Warning - (Neemix 4.5)	26	broad spectrum
Rimon (novaluron)	disrupts cuticle formation and deposition at molting, resulting in death of larva; no effect on adult insect	Warning	15	caterpillars
Trigard (cyromazine)	most effective against small leafminer larvae	Caution	17	dipterous leafminers, maggots, some beetles
<b>Neonicotinyls</b>				
Actara (thiamethoxam)	local systemic	Caution	4A	aphids, potato leafhopper, some beetles, stinkbugs, whiteflies
Admire (imidacloprid)	systemic, long residual	Caution	4A	aphids, leafhoppers, some beetles, whiteflies
Assail (acetamiprid)	local systemic, ovicidal effects	Caution	4A	aphids, Colorado potato beetle, whiteflies
Platinum (thiamethoxam)	systemic, long residual	Caution	4A	aphids, potato leafhopper, some beetles, stinkbugs, whiteflies

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Provado (imidacloprid)	local systemic	Caution	4A	aphids, leafhoppers, some beetles, whiteflies
Venom (dinotefuran)	systemic or locally systemic, depending on application method, long residual	Caution	4A	aphids, Colorado potato beetle, leafhoppers, leafminers, thrips, whiteflies
<b>Miscellaneous</b>				
<i>Bacillus thuringiensis</i> (B.t.) var. <i>aizawai</i>	pest must ingest; slow acting but feeding stops long before death	Caution	11B1	caterpillars or beetles, depending on strain
<i>Bacillus thuringiensis</i> (B.t.) var. <i>kurstaki</i>	pest must ingest; slow acting but feeding stops long before death	Caution	11B2	caterpillars or beetles, depending on strain
Cryolite (Kryocide)	pest must ingest; not rainfast; an inorganic fluorine compound	Caution	9A	beetles, caterpillars
Mycotrol ( <i>Beauveria</i> )	contact; slow acting		--	aphids, leafhoppers, whiteflies
Oberon (spiromesifen)	inhibitor of lipid synthesis; most effective on juvenile stages of mites and on nymphs and pupae of whiteflies and psyllids	Caution	23	mites, psyllids, whiteflies
Oil (SunSpray Ultra Fine Spray Oil)	contact activity	Caution	--	aphids, mites, whiteflies
Soap (M-Pede)	contact activity; phytotoxic at high temperatures	Warning	--	aphids and other soft-bodied arthropods
*Vendex (fenbutatin-oxide)		Danger-Poison	12B	mites

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<p>*Restricted Use Pesticide                      Originally adapted from: Welty, Celeste. Insecticides for use on vegetables in Ohio. pp. 46-48, 2002 Ohio Vegetable production Guide, Ohio State University.</p> <p><sup>1</sup><b>Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v.3.3 October 2003.</b></p> <ul style="list-style-type: none"> <li>1A. Acetylcholine esterase inhibitors, Carbamates</li> <li>1B. Acetylcholine esterase inhibitors, Organophosphates</li> <li>2A. GABA-gated chloride channel antagonists</li> <li>3. Sodium channel modulators</li> <li>4A. Nicotinic Acetylcholine receptor agonists/antagonists, Neonicotinoids</li> <li>5. Nicotinic Acetylcholine receptor agonists (not group 4)</li> <li>6. Chloride channel activators</li> <li>7A. Juvenile hormone mimics, Juvenile hormone analogues</li> <li>7C. Juvenile hormone mimics, Pyriproxifen</li> <li>9A. Compounds of unknown or non-specific mode of action (selective feeding blockers), Cryolite</li> <li>9B. Compounds of unknown or non-specific mode of action (selective feeding blockers), Pymetrozine</li> <li>11B1. Microbial disruptors of insect midgut membranes, <i>B.t. var aizawai</i></li> <li>11B2. Microbial disruptors of insect midgut membranes, <i>B.t. var kurstaki</i></li> <li>12B. Inhibitors of oxidative phosphorylation, disruptors of ATP formation, Organotin miticide</li> <li>15. Inhibitors of chitin biosynthesis, type 0, Lepidopteran</li> <li>16. Inhibitors of chitin biosynthesis, type 1, Homopteran</li> <li>17. Inhibitors of chitin biosynthesis, type 2, Dipteran</li> <li>18. Ecdysone agonist/disruptor</li> <li>20. Site II electron transport inhibitors</li> <li>21. Site I electron transport inhibitors</li> <li>22. Voltage-dependent sodium channel blocker</li> <li>23. Inhibitors of lipid biosynthesis</li> <li>25. Neuroactive (unknown mode of action)</li> <li>26. Unknown mode of action, Azadirachtin</li> </ul>				