

Home and Small-Scale Vegetable Insect Management

Ric Bessin, Extension Entomologist

Entfact-465

This guide addresses the most common arthropod pests of vegetables grown in Kentucky and provides scouting thresholds used to make management decisions, cultural controls for small-scale producers and home gardeners, and examples of insecticides that can be used for particular pest problems. While specific values are provided for insect thresholds, these are frequently adjusted up or down based on an individual's tolerance for damage, cost of control specific control tactics, changes in the value of the commodity and level of control expected with a particular control.

Scouting thresholds are designed as guides to help determine if it is worthwhile to control a pest problem. When the pest density is below the threshold level, there are not enough pests to justify the cost of controlling them. However, when pest numbers exceed the threshold level, it is expected that the cost of the damage pest will cause is likely to exceed the cost of control.



Figure 1. Whiteflies on a tomato leaf in a high tunnel.

Generally, those that are willing to accept more damage will use a higher threshold before using a tactic. When a control tactic is more expensive, the threshold to use that control is higher in order to justify that expense. However, as the value of a

commodity increases, the threshold will decrease as each unit of that commodity is more valuable. Likewise, when a commodity becomes less valuable, then the threshold to use a control tactic will increase.




Figure 2. Colorado potato beetle defoliating potatoes.





Many of the cultural controls we use to manage pests are scale dependent, in that some are more practical for small-scale production while others fit larger operations. Where insecticides are mentioned, users must read and follow all label directions. Insecticide users need to verify the crop they intend to treat is listed on the label, they understand how to properly measure and calibrate their equipment to achieve the labeled rate, understand the minimum interval between insecticide treatment and harvest to ensure food safety, and personal protective equipment to use during pesticide application.





Insecticides that are approved for organic production are denoted by 'ORG:'.

Asparagus



Pest	Photo	Threshold	Cultural Controls	Garden Spray Examples* (See ENTFACT-445 for a more thorough listing)	Commercial Spray Examples (see ID-36 for complete listing)
Asparagus Beetle Striped Spotted		10% of spears with beetles, keep defoliation below 10%.	Rows covers to protect spears. Hand picking of beetles regularly in early afternoon from spears. Sanitation of debris around planting at end of year to reduce overwinter survival.	ORG: So. Ag Pyrethrin (<i>pyrethrins</i>) Bonide Malathion (<i>malathion</i>) So. Ag Permetrol (<i>permethrin</i>) Bonide Eight (<i>permethrin</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Sevin (<i>carbaryl</i>) Malathion (<i>malathion</i>) Assail (<i>acetamiprid</i>) Pounce (<i>permethrin</i>)



Beans

Mexican bean beetle		30% defoliation prior to bloom; 15% defoliation after bloom or 2 per plant	Hand picking of beetles regularly, particularly during colonization. Crop destruction immediately after final harvest. Sanitation of debris around planting at end of year to reduce overwinter survival.	Bonide Malathion (<i>malathion</i>) Fertilome Broad-spectrum Insecticide (<i>bifenthrin</i>) Garden Tech Sevin Insect Killer (<i>zeta-cypermethrin</i>) ORG: Surround (<i>Kaolin clay</i>)	Assail (<i>acetamiprid</i>) Malathion (<i>malthion</i>) Mustang Maxx (<i>zeta-cypermethrin</i>) Brigade (<i>bifenthrin</i>)
Japanese beetle		30% defoliation prior to bloom; 15% defoliation after bloom	Hand picking of beetles regularly, particularly during colonization. Do not use traps.	Bonide Malathion (<i>malathion</i>) Fertilome Broad-spectrum Insecticide (<i>bifenthrin</i>) ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Gordon's Bug-No-More Lawn & Garden Insect Control (<i>zeta-cypermethrin</i>)	Assail (<i>acetamiprid</i>) Malathion (<i>malthion</i>) Mustang Maxx (<i>zeta-cypermethrin</i>) Brigade (<i>bifenthrin</i>)
Stink bugs Brown Green Brown marmorated		One stink bug per two feet of row.	Hand picking of beetles regularly, particularly during pod setting and seed fill.	ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>) Ortho BugClear Lawn Insect Killer (<i>bifenthrin</i>) Gordon's Bug-No-More Lawn & Garden Insect Control (<i>zeta-cypermethrin</i>)	Warrior (<i>lambda-cyhalothrin</i>) Mustang Maxx (<i>zeta-cypermethrin</i>)
Spider mites		More than 20 per leaflet	Hard stream of water. Good regular weed control around garden.	ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>) Bonide Malathion (<i>malathion</i>) Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Acramite (<i>bifenazate</i>) Agri-Mek (<i>abamectin</i>) Miteus (<i>fenpyroximate</i>)





Flea beetles		2 for newly established plants; 3 for established plants	Rows covers to protect young plants. Timely plant destruction after harvest. Early spring plantings to avoid flea beetles.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Fertilome Broad-spectrum Insecticide (<i>bifenthrin</i>)	Admire Pro (<i>imidacloprid</i>) Assail (<i>acetamiprid</i>) Brigade (<i>bifenthrin</i>) Malathion (<i>malathion</i>) Exirel (<i>cyantraniliprole</i>) Sevin (<i>carbaryl</i>)
Caterpillars Imported cabbageworm Cabbage looper Cross-striped Cabbageworm Diamondback moth Southern cabbageworm		10% infested plants until head development; 5% infested plants after.	Rows covers to protect young plants. Hand picking of caterpillars. Timely plant destruction after harvest. Early spring plantings to avoid caterpillars.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) ORG: Monterey B.t. (<i>Bt</i>) ORG: Thuricide Caterpillar Control (<i>Bt</i>)	ORG: Agree, Dipel, Javelin (<i>Bt</i>) Coragen (<i>chlorantraniliprole</i>) Radiant (<i>spinetoram</i>) Exirel (<i>cyantraniliprole</i>) Sevin (<i>carbaryl</i>)
Aphids		50% infested plants until head development; 2% after heads initiate.	Hard stream of water. Plant onto reflective plastic mulches.	Bonide Malathion (<i>malathion</i>) ORG: Bonide Insecticidal soap (<i>insecticidal soap</i>)	Admire Pro (<i>imidacloprid</i>) Assail (<i>acetamiprid</i>) Brigade (<i>bifenthrin</i>) Exirel (<i>cyantraniliprole</i>) Malathion (<i>malathion</i>)
Harlequin bug		0.5 adult per plant before heads initiate; 0.2 adults after heads initiate.	Hand picking to remove adults, eggs, and nymphs. Timely plant destruction after harvest. Sanitation of debris around planting at end of year.	Bonide Malathion (<i>malathion</i>) Gordon's Bug-No-More Garden Insect Control (<i>zeta-cypermethrin</i>) Fertilome Broad-spectrum Insecticide (<i>bifenthrin</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Assail (<i>acetamiprid</i>) Brigade (<i>bifenthrin</i>) Sevin (<i>carbaryl</i>) ORG: Azera (<i>neem+pyrethrins</i>)


Sweet Corn

Cutworms		3% cut plants.	Use plastic collars around plants. Thorough weed control around garden. Prepare soil at least 2 weeks before planting.	Bioadvanced Vegetable & Garden Insect Spray (<i>cyfluthrin</i>) Fertilome Broad-spectrum Insecticide (<i>bifenthrin</i>) ORG: Monterey B.t. (<i>Bt</i>) ORG: Thuricide Caterpillar Control (<i>Bt</i>)	Permethrin (<i>permethrin</i>) Brigade (<i>bifenthrin</i>) Warrior II (<i>lambda-cyhalothrin</i>)
Japanese beetle		Damage to silks on more that 5% of plants.	Hand picking and removal of adults in early morning. Do not use traps.	Bonide Eight (<i>permethrin</i>) So. Ag Permetrol (<i>permethrin</i>) Garden Tech Sevin Insect Killer (<i>zeta-cypermethrin</i>) ORG: beetleGone (<i>Bt galleriae</i>)	Sevin (<i>carbaryl</i>) Brigade (<i>bifenthrin</i>) Permethrin (<i>permethrin</i>) Warrior (<i>lambda-cyhalothrin</i>)



Corn earworm		Spray at 30% silking and again every 5 days	Resistant varieties with long, tight husk leaves to limit penetration and damage. Banding tips of ears or mineral oil after pollination. Avoid plantings after end of May.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Bonide Eight (<i>lambda-cyhalothrin</i>) Hi-Yield Garden & Farm Insect Control (<i>permethrin</i>)	Besiege (<i>lambda-cyhalothrin + chlorantraniliprole</i>) Warrior (<i>lambda-cyhalothrin</i>) Coragen (<i>chlorantraniliprole</i>)
Stink bugs Brown Green Brown marmorated		Presence on 5% of plants.	Hand picking and removal of adults and nymphs in early morning.	Fertilome Broad-spectrum Insecticide (<i>bifenthrin</i>) Bonide Eight (<i>lambda-cyhalothrin</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Brigade (<i>bifenthrin</i>) Baythroid XL (<i>cyfluthrin</i>)

Cucurbits (Cucumber, melons, squash, pumpkins and watermelons)



Cucumber beetles Striped Spotted		0.25 beetle per plant until fruit set; 0.25 afterward.	Row covers until female flowers open, remove for 2 weeks then recover until harvest. Cucumbers and summer squash need to remain uncovered after the female flowers open. Trap cropping.	Bayer Advanced Citrus Fruit and Vegetable Insect Control (<i>imidacloprid</i>) Malathion (<i>malathion</i>) Ortho Bug-B-Gon for Lawns & Gardens (<i>bifenthrin + zetacypermethrin</i>)	Admire Pro (<i>imidacloprid</i>) Assail (<i>acetamiprid</i>) Brigade (<i>bifenthrin</i>) Warrior II (<i>lambda-cyhalothrin</i>)
Squash bug (squash, pumpkins)		1 adult or egg mass (treat after hatch) per plant.	Row covers until female flowers open, remove for 2 weeks then recover. Hand removal of adults arriving to transplants. Plant destruction immediately after last harvest. Trap cropping.	Bonide Eight Insect Control (<i>permethrin</i>) Malathion (<i>malathion</i>) Ortho Bug-B-Gon for Lawns & Gardens (<i>bifenthrin + zetacypermethrin</i>)	Admire Pro (<i>imidacloprid</i>) Assail (<i>acetamiprid</i>) Brigade (<i>bifenthrin</i>) Warrior II (<i>lambda-cyhalothrin</i>)
Melon aphid		20% of plants with 5 or more aphids	Companion plantings, such as buckwheat, to encourage natural enemies. Lady beetles released under row covers.	ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>) Malathion (<i>malathion</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>) Bayer Advanced Fruit Citrus and Vegetable Insect Control (<i>imidacloprid</i>)	Admire Pro (<i>imidacloprid</i>) Assail (<i>acetamiprid</i>) Malathion (<i>malathion</i>) Exirel (<i>cyantraniliprole</i>)
Spider mites		50% of runners infested	Hard stream of water. Good regular weed control around garden.	ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>) Malathion (<i>malathion</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Acramite (<i>bifenazate</i>) Agri-Mek (<i>abamectin</i>) Miteous (<i>fenpyroximate</i>) Oberon (<i>spiromesifen</i>)

Squash vine borer (squash, pumpkins)		Treat every 10 to 14 days from June 15 to July 31.	Row covers until female flowers open, remove for 2 weeks then recover. Plant destruction immediately after last harvest. Careful deworming of vines. Adding shovelfuls of soil on top of vines periodically to encourage secondary rooting.	Malathion (<i>malathion</i>) Monterey Bug Buster II (<i>esfanvalerate</i>) Ortho Flower, Fruit & Vegetable Insect Killer (<i>acetamiprid</i>)	Assail (<i>acetamiprid</i>) Brigade (<i>bifenthrin</i>) Permethrin (<i>permethrin</i>) Warrior II (<i>lambda-cyhalothrin</i>)
---	---	--	---	---	--



Eggplant

Flea beetles		Treat when 2 beetles/plant and plants <3"; 4 beetles/plant and plants 3-6"; 8 beetles/plant with plants >6"	Use floating row covers with small plants. Weed control to remove alternate hosts.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Bonide Eight Vegetable, Fruit & Flower Concentrate (<i>permethrin</i>) Ortho Flower, Fruit, & Vegetable Insect Killer Concentrate (<i>acetamiprid</i>)	Sevin (<i>carbaryl</i>) Admire Pro (<i>imidacloprid</i>) Permethrin (<i>permethrin</i>)
Colorado potato and false potato beetle		0.25 per plant when less than 6 inches, then 1 per 2 plants afterward. Keep defoliation below 10%.	Row covers to exclude beetles. Using 5 to 6 inches of straw mulch around plants to reduce adults settling on plants. Hand picking and removal of colonizing adults in early morning.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Ortho Flower, Fruit, & Vegetable Insect Killer Concentrate (<i>acetamiprid</i>)	Radiant (<i>spinetoram</i>) Assail (<i>acetamiprid</i>) Coragen (<i>chlorantraniliprole</i>)




Leafy Greens

Aphids		Colonies of 5 or more aphids on 10% the plants.	Hard stream of water. Plant onto reflective plastic mulches.	ORG: Fertlome Triple Action (<i>pyrethrin+neem oil</i>) ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>) Malathion (<i>malathion</i>) Bayer Advanced Fruit Citrus and Vegetable Insect Control (<i>imidacloprid</i>)	Admire Pro (<i>imidacloprid</i>) Malathion (<i>malathion</i>) Sivanto (<i>flupyradifurone</i>) Harvanta (<i>cyflumetofeniliprole</i>) Fulfill (<i>pymetrozine</i>)
Flea beetles		Keep flea beetle numbers below 3 to 5 per plant.	Use floating row covers to keep flea beetles off of plants. Can use radish as a trap crop, but flea beetles need to be managed on the trap crop.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Bonide Eight Vegetable, Fruit & Flower Concentrate (<i>permethrin</i>) Bayer Advanced Fruit Citrus and Vegetable Insect Control (<i>imidacloprid</i>)	Admire Pro (<i>imidacloprid</i>) Sevin (<i>carbaryl</i>) Brigade (<i>bifenthrin</i>)



Onions

Thrips		10 at early bulb stage	Remove cull piles near fields. Regular weed control around fields.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Ortho Flower, Fruit, & Vegetable Insect Killer Concentrate (<i>acetamiprid</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Assail (<i>acetamiprid</i>) Radiant (<i>spinetoram</i>) Torac (<i>tolfenpyrad</i>)
Onion Maggots		Flies attracted to bright yellow colors. Yellow sticky cards are inexpensive and easy to use; attach them with small wire stakes and place near the soil.	Delay planting until soil conditions favor rapid germination of seeds and avoid sowing seed too. Tilling soil at least 2 weeks before planting can reduce root maggots. Thin floating row covers can prevent infestation.	ORG: diatomaceous earth around the base of the seedlings at planting and following each rain early in the season. Malathion (malathion) foliar spray when flies are present.	Lorsban 4E (chlorpyrifos) Soil application Malathion (malathion) foliar spray when flies are present.





Potatoes




Flea beetles		Maintain defoliation below 20%.	Row covers to exclude beetles.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Ortho Flower, Fruit, & Vegetable Insect Killer Concentrate (<i>acetamiprid</i>)	Admire Pro (<i>imidacloprid</i>) Sevin (<i>carbaryl</i>) Exirel (<i>cyantraniliprole</i>) Assail (<i>acetamiprid</i>)
Colorado potato beetle		0.25 per plant when less than 6 inches, then 1 per 2 plants afterward. Keep defoliation below 10%.	Row covers to exclude beetles. Using 5 to 6 inches of straw mulch around plants. Hand picking and removal of colonizing adults in early morning.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Ortho Flower, Fruit, & Vegetable Insect Killer Concentrate (<i>acetamiprid</i>)	Admire Pro (<i>imidacloprid</i>) Radiant (<i>spinetoram</i>) Coragen (<i>chlorantraniliprole</i>) Avaunt (<i>idoxacarb</i>)
Wireworms		No reliable threshold exists for these below ground pests.	Avoid planting into ground that was previously in weedy grasses, pasture, sod, or small grains in the past 3 years. Shorter maturity potatoes or early harvest can reduce damage.	Garden Tech Sevin Insect Killer Lawn Granules (<i>bifenthrin+zeta-cypermethrin</i>)	Admire Pro (<i>imidacloprid</i>) Brigade (<i>bifenthrin</i>) Scorpion (<i>dinotefuran</i>) Verimark (<i>cyantraniliprole</i>)

Peppers

Aphids		Colonies of 5 or more aphids on half the plants	Hard stream of water. Plant onto reflective plastic mulches.	ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>) Bonide Malathion (<i>malathion</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Admire Pro (<i>imidacloprid</i>) Malathion (<i>malathion</i>) Sivanto (<i>flupyradifurone</i>) Assail (<i>acetamiprid</i>)
Stink bugs		1 per 40 plants.	Good regular weed control around garden. Hand removal of stink bugs and their nymphs. Trap cropping.	Gordon's Bug-No-More Lawn & Garden Insect Control (<i>zeta-cypermethrin</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>) Ortho Bug-B-Gon for Lawns & Gardens (<i>bifenthrin + zetacypermethrin</i>)	Brigade (<i>bifenthrin</i>) Baythoid (<i>cyfluthrin</i>) Venom (<i>dinotefuran</i>) Actara (<i>thiamethoxam</i>)

Tomato

Flea beetles		Keep defoliation below 10%.	Row covers to protect transplants.	Gordon's Bug-No-More Lawn & Garden Insect Control (<i>zeta-cypermethrin</i>) Ortho Bug-B-Gon for Lawns & Gardens (<i>bifenthrin + zetacypermethrin</i>)	Admire Pro (<i>imidacloprid</i>) Sevin (<i>carbaryl</i>) Exirel (<i>cyantraniliprole</i>) Assail (<i>acetamiprid</i>)
Aphids		Colonies of 5 or more aphids on half the plants	Hard stream of water. Plant onto reflective plastic mulches.	ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>) Bonide Malathion (<i>malathion</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)	Admire Pro (<i>imidacloprid</i>) Malathion (<i>malathion</i>) Sivanto (<i>flupyradifurone</i>) Assail (<i>acetamiprid</i>)
Colorado potato beetle		Maintain defoliation below 10%, or 1 beetle or larva per 2 plants.	Hand removal of adults and larvae.	ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>) Ortho Flower, Fruit, & Vegetable Insect Killer Concentrate (<i>acetamiprid</i>)	Admire Pro (<i>imidacloprid</i>) Radiant (<i>spinetoram</i>) Coragen (<i>chlorantraniliprole</i>) Avaunt (<i>idoxacarb</i>)
Stink bugs Brown Green Brown marmorated		1 per 40 plants.	Good regular weed control around garden. Hand removal of stink bugs and their nymphs. Trap cropping.	Gordon's Bug-No-More Lawn & Garden Insect Control (<i>zeta-cypermethrin</i>) ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>) Ortho Bug-B-Gon for Lawns & Gardens (<i>bifenthrin + zetacypermethrin</i>)	Brigade (<i>bifenthrin</i>) Baythoid (<i>cyfluthrin</i>) Venom (<i>dinotefuran</i>) Actara (<i>thiamethoxam</i>)

Hornworms		Maintain defoliation below 10%	Hand removal, but leave caterpillars bearing wasp cocoons.	<p>ORG: Captain Jacks Dead Bug Brew (<i>spinosad</i>)</p> <p>ORG: Monterey B.t. (<i>Bt</i>)</p> <p>ORG: Thuricide Caterpillar Control (<i>Bt</i>)</p> <p>Bonide Eight Insect Control (<i>permethrin</i>)</p>	<p>ORG: Agree, Dipel, Javelin (<i>Bt</i>)</p> <p>Coragen (<i>chlorantraniliprole</i>)</p> <p>Radiant (<i>spinetoram</i>)</p> <p>Exirel (<i>cyantraniliprole</i>)</p> <p>Sevin (<i>carbaryl</i>)</p>
Whiteflies		5 nymphs/10 leaflets. Yellow stick cards to monitor for adults.	Silver mulch to repel adults from young plants. Control garden weeds and buy only clean transplant material.	<p>ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>)</p> <p>ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)</p>	<p>Admire Pro (<i>imidacloprid</i>)</p> <p>Exirel (<i>cyantraniliprole</i>)</p> <p>Venom (<i>dinotefuran</i>)</p> <p>Sivanto (<i>flupyradifurone</i>)</p>
Spider mites		More than 20 per leaflet	Hard stream of water. Good regular weed control around garden.	<p>ORG: Bonide Multi-purpose Insect Control (<i>insecticidal soap</i>)</p> <p>Bonide Malathion (<i>malathion</i>)</p> <p>ORG: Fertilome Triple Action (<i>pyrethrin+neem oil</i>)</p>	<p>Acramite (<i>bifenazate</i>)</p> <p>Agri-Mek (<i>abamectin</i>)</p> <p>Miteus (<i>fenpyroximate</i>)</p>

- **ORG:** denotes organic or other alternative control materials.

CAUTION! Pesticide recommendations in this publication are registered for use in Kentucky, USA ONLY! The use of some products may not be legal in your state or country. Please check with your local county agent or regulatory official before using any pesticide mentioned in this publication.

Of course, **ALWAYS READ AND FOLLOW LABEL DIRECTIONS FOR SAFE USE OF ANY PESTICIDE!**