UK COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF KENTUCKY — COLLEGE OF AGRICULTURE

CONTROLS FOR GREENHOUSE VEGETABLE INSECT PESTS

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The warm humid conditions and abundant food in the greenhouse are ideal for pest build up. Problems can be chronic unless recognized and corrected. While insecticides are important tools, successful control of greenhouse vegetables pests relies primarily on cultural factors. Proper cultural practices can minimize the chance for initiation and build up of infestations. Early detection and diagnosis are key to greenhouse pest management, as well as, the proper choice and application of pesticides when pest outbreaks occur.

CULTURAL CONTROLS

Pests may enter the greenhouse in the summer when the ventilators are open. Others may be brought into the greenhouse on new plant material or in soil. Many are able to survive short periods of time between harvest or plant removal and production of the next crop. Cultural controls are the primary defense against infestation.

Proper cultural practices which will help prevent pest infestations include:

1. *Maintain a clean, closely mowed area around the greenhouse to reduce pests that develop in rank growth.*
2. *Remove all plants and any plant debris, clean the greenhouse thoroughly after each production cycle.*
3. *Keep doors, screens and ventilators in good repair.*
4. *Use clean or sterile soils or ground media, tools, flats and other equipment.*
5. *At the conclusion of the season remove all plants and any plant debris, clean greenhouse thoroughly and fumigate.*
6. *Inspect new plants thoroughly to prevent introduction insect or disease infested material into the greenhouse.*
7. *Watch for leaks or pooled water that can lead to fungus gnat infestations.*
8. *If possible allow the greenhouse to freeze in winter to eliminate tender insects like whiteflies.*
9. *Avoid wearing yellow clothing which is attractive to many insect pests.*
10. *Eliminate infestations by discarding or removing heavily infested material.*

MONITORING

Early detection and diagnosis of pest infestations will allow you to make pest control decisions before the problem gets out of hand. It is good practice, therefore, to make weekly inspections of plants in all sections of the greenhouse.

Insect monitoring devices are also available. Yellow stick cards (PT Insect Monitoring & Trapping System, Whitmire) are highly attractive to winged aphids, leafminer adults, whiteflies, leafhoppers, thrips (blue cards can also be used with thrips), various flies and other insects. These can be used to alert you to the presence of a pest and identify hot spots in the greenhouse. One to three cards per 1000 sq. ft. in the greenhouse is recommended and should be changed weekly. If you cannot identify a trapped insect, contact your county extension agent for assistance. Mass trapping products such as sticky tapes are also available for thrips, whitefly, leafminer and fungus gnat detection and management.

Insecticide or Biological control	Registered greenhouse crops	Insects and mites controlled	Comments
Bacillus thuringiensis	All crops	Armyworms, cabbage loopers, hornworms, cutworms, green cloverworms, salt marsh caterpillars, tomato fruitworm.	A microbial insecticide effective against several species of caterpillars. This must be ingested by the insect to be effective. After eating a lethal dose, larvae stop feeding within the hour and will die within several days.
Encarsia formosa	All crops	Whitefly management	A tiny wasp parasite which attacks whiteflies in greenhouses. While they are not useful in controlling heavy whitefly infestations, they can be used successfully against limited infestations under conditions that favor their development over development of whiteflies (64°- 80°F). Parasitized larvae die and turn black, a parasite wasp will emerge and continue the beneficial process. Do not throw pruned leaves away without checking them for black parasite scales. Leave these under plants for about 1 week until wasps have emerged. Very susceptible to insecticides. More effective in controlling greenhouse whitefly than sweet potato whitefly.
Endosulfan (Thiodan)	Tomatoes only (2 day PHI*).	Aphids, armyworms, blister beetles, cabbage looper, colorado potato beetle, flea beetles, tomato fruitworm and whiteflies.	Wear a mask or respirator approved by MSA or OSHA for protection against endosulfan. A foliar insecticide that is effective at higher greenhouse temperatures.
Insecticidal soap	All crops	Aphids, leafhoppers, plant bugs, spider mites, thrips and whiteflies.	Apply when insects first appear. Contains potassium salts of fatty acids. Kills on contact and is neither a stomach nor a residual poison. Exempt from tolerances, can be applied just before harvest.
Malathion	Cucumbers (1 day PHI), Endive (7 day PHI), Lettuce (14 day PHI), Radish (7 day PHI), Tomatoes (1 day PHI)	Aphids, armyworms cabbage loopers, cutworms, fruit flies, garden fleahoppers, mealbugs, serpentine leafminers, spider mites, thrips and whiteflies.	A organophosphate insecticide with broad spectrum activity. Spray plants thoroughly. Do not apply unless plants are dry.
Metaldehyde	On and beneath greenhouse benches	Snails and slugs	Pellets containing 2.75% metaldehyde (HACO, Inc.) Do not allow pellets to come in contact with plants. Thoroughly wet area before and after pellets are spread.
Pyrethrin + Piperonyl Butoxide (Pyrenone Crop Spray, Pyronyl Crop Spray)	All crops	Aphids, armyworms, cabbage loopers, caterpillars, Colorado potato beetle, cucumber beetles, flea beetles, fruit flies, leafhoppers, mealy-bugs, thrips, spider mites, tomato fruitworm and whiteflies.	Apply when insects first appear. A botanical insecticide that is especially effective against whiteflies. For best results, apply during the early evening when foliage is dry and air temperature is between 60-80°F. Effectiveness is enhanced when in combination with the synergist, Piperonyl Butoxide. Available as sprays and total release aerosols
Bacillus thuringiensis israelensis (Gnatrol)	Tomatoes, leafy and cole crops, cucumbers, peppers, eggplants.	Fungus gnat larvae	Must be timed for a stage of development when larvae are present in the soil.

*PHI = Mandatory pre-harvest interval.

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