

Organic Pest Controls

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What is a pest?

- *Organisms that damage or interfere with desirable plants. Pests may transmit disease or may be a nuisance.*
- Identification of garden insects is crucial
- Not all bugs are pests



Asian lady beetle



Damsel bug



Praying mantis

Common garden pests

- Aphids
- Asparagus beetle
- Cabbage looper, cabbageworm, & diamondback moth
- Cucumber beetle
- Cutworm
- Flea beetle
- Mexican bean beetle
- Potato beetle
- Slug
- Squash beetle
- Squash vine borer
- Tomato fruitworm
- Tomato hornworm
- Whitefly



Why organic controls?

- Human health reasons
 - Organic produce can be more nutritious
 - Higher antioxidant content
 - Organic controls less toxic than synthetic pesticides
 - Pesticide exposure may affect nervous and endocrine systems, irritate skin & eyes, and cause cancer
- Environmental concerns
 - Insecticides kill beneficial insects
 - Beneficial insects provide pest control
 - Populations of bees and other pollinators have declined



Garden BMPs

- Focus on soil health
 - Use compost, rotten manure to fertilize
 - Take soil tests every 1-3 years
 - Healthy soils grow healthy plants
 - Plants in distress are more likely to attract pests
- Rotate crops
- Plant more than you need
- Interplant flowers to attract beneficial insects
 - Alyssum, borage, calendula, cosmos, zinnias



Garden BMPs (cont.)

- Choose varieties that show pest resistance
 - Sweet corn varieties with tight ear tips for corn earworm prevention
 - Squash that have lanky vines with supplemental roots can cope with vine borer
 - Watermelons are not susceptible to bacterial wilt, while muskmelons are
- Remove dead and infected plant materials
 - Pests and disease can overwinter in debris
- Consider feathered friends
 - Ducks & chickens have an affinity for garden thugs
 - Slugs, squash bugs, cucumber beetles
 - But keep fowl away from your seedlings

Aphid

- Target: tomatoes, cucumbers, melons, cabbage
 - Suck sap
 - Threat when plants are small, use cover cloth
 - Attack fruits later in the season
 - Tomatoes: not large issue by mid-June
 - Cucumbers: treat during & after fruit set
- Control: insecticidal soap



Asparagus beetle

- Target: asparagus
 - Beetle eats shoots, stems & leaves
- Management: handpicking, neem oil



Cabbage looper, cabbageworm, & diamondback moth

- Target: cabbage family
 - Can feed on entire plant
- Management:
 - Handpick
 - Bt, a biological insecticide



Cabbage looper



Cabbageworm



Diamondback moth

Cucumber beetle

- Target: cucumbers, melons
 - Consume leaves, flowers, stems, roots
 - Transmit disease: bacterial wilt (cukes & muskmelon)
- Management
 - Prevention: row cover when plants are small
 - Population control: neem oil
 - Use successive plantings



Cutworm

- Target: sweet corn
 - Cutworms feed at or near soil surface
- Management
 - Sturdy seedlings are naturally resistant to cutworms, so delaying planting until ground warms may help
 - Use rigid collars to protect young seedlings
 - made from plastic drinking cups or cardboard tissue rolls
 - Bt may be used at first sign of damage



Flea beetle

- Target: eggplants
 - Flea beetles very damaging to young plants
 - Feed on roots and leaves
- Management
 - Use row cover to protect young plants
 - Remove cover at bloom
 - Interplant trap crops
 - radishes ('Chinese Daikon' or 'Snow Belle')



Mexican bean beetle

- Target: beans
 - Larvae feed on the underside of leaves between the veins
 - Adults eat leaves, stems, and fruit
- Management
 - Use row cover beans until bloom
 - Squish eggs, handpick larvae & adults
 - Overplant and successive plant to cope
 - Neem oil & insecticidal soap could be helpful against adults & larvae, respectively



Potato beetle

- Target: tomatoes, potatoes & eggplant
 - Larvae and adults quite damaging
- Management
 - Squish eggs
 - Squish or trap larvae and adults in jar half filled with soapy water



Slugs

- Target: basil, beans, cabbage, lettuce, potatoes, strawberries, etc.
 - Eat leaves, seedlings, fruit
- Management
 - Hand picking
 - Traps
 - Lay boards or melon rinds on ground and check underside for slugs
 - Beer in shallow lids
 - Barrier control: Diatomaceous earth



Squash beetle

- Target: squash, other cucurbits
 - Damage entire plant
- Management
 - Physical control: use row covers until bloom
 - Manual control
 - Place wooden boards in garden and check under them each morning
 - Destroy any squash bugs found
 - Remove any infected plants



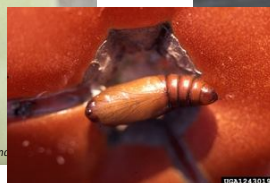
Squash vine borer

- Target: squash & pumpkins
 - Larvae tunnel in stems
- Management
 - Use row covers until the first female flowers appear
 - Slit vines to remove borer
 - Rotate crop and remove infected vine



Tomato fruitworm

- Target: tomatoes, cabbage & corn
 - Huge threat to fruit & foliage
- Treatment
 - Bt (*Bacillus thuringiensis*)
 - Act early as there is a time delay in treatment



Tomato hornworm

- Target: tomatoes
 - Damage foliage & fruit
- Management
 - Manual control
 - Biological control: parasitic wasps
 - Biological insecticide: Bt



Whitefly

- Target:
 - Suck phloem sap
 - Large populations can cause leaves to yellow and fall
- Management
 - Avoid or remove plants that repeatedly hosts of whiteflies
 - Remove infested leaves, vacuum adults, or hose down (syringe) with water sprays
 - insecticidal soaps may reduce but not eliminate populations



Prevention & Treatments

- Organic options
 - Manual control
 - Physical control: row cover
 - Insecticides:
 - *Bacillus thuringiensis* (Bt)
 - Insecticidal soap
 - Deterrents
 - Diatomaceous earth
 - Neem oil

Row cover

- Used as physical barrier to control pests
 - Aphids, cucumber & squash beetles on cukes, squash
 - Flea beetles on eggplants
 - Bean beetles on beans
- Must remove cover to allow pollination
- May overheat certain plants on hot days
 - Lightweight cover cloth available
- Brands: Reemay, Agribon
- Price: \$10 for 5' x 20'



Row cover (cont.)

- Support cloth with hoops
 - Allows for ventilation
 - Purchase or make from coiled 9 gauge galvanized steel wire
 - Works well with 4-5' wide beds
 - Space 3' apart
- Bury edges of cloth
 - Keep cloth in place
 - Keeps insects out
 - Clips, pins not necessary



Bacillus thuringiensis (Bt)

- Use to kill caterpillars that eat crops
 - cabbage looper, cabbageworm, cutworm, diamondback moth, fruitworms, hornworm
- Biological insecticide
 - Foliar application
 - Caterpillar must ingest bacteria
 - Blend of 5 bacterial protein toxins & fungal spore (opt.)
 - Stomach poison for Lepidoptera
 - Acts in 1-3 days
- Brands: Biobit, Dipel, MVP, Steward, Thuricide
- Price: ~ \$25/lb



Insecticidal soap

- Used to kill soft-bodied insects
 - Aphids, white flies
 - Removes waxy coating, bug desiccates
- Use on as-needed basis (not preventative)
 - Must be sprayed directly to insect
 - Wait 3-7 days between applications
- Brands: Many
- Price: ~ \$15/quart



Insecticidal soap - DIY

- 1 Tbsp. liquid soap per 1 quart water
 - Soap must be “natural” – fatty acids from animal or vegetable source
 - Cannot be a detergent, a synthetic compound
 - Brands: Ivory, Fels Naptha, Dr. Bronners



Diatomaceous earth

- Made from the fossilized remains of tiny, aquatic organisms called diatoms
- Desiccates insect/arthropod exoskeleton
 - Absorbs the oils and fats from the cuticle
 - sharp edges are abrasive, speeding up drying
- Used on household infestations: ants, fleas, roaches, etc.
- In garden
 - Use as a barrier around plants to prevent damage from slugs & snails
 - Dust onto flea beetle or aphids
 - Must be dry to be effective
- Price: \$10/pound



Neem oil

- Neem is a tree, oil is produced from seed
- Insect growth regulator
- Deters insects from eating & laying eggs
- Foliar spray application
 - Apply frequently (weekly)
- Brands: Trilogy[®] (also packaged as Triact, Green Light Neem Concentrate)
- Price: ~ \$20/pint



Conclusions

- Follow garden BMPs
 - Healthy soils, healthy plants
- Diversify crops
- Plan – rotations, time plantings
- If pests arrive, opt for natural remedies

Thank you.

Resources:

- Dan Kneier, Green Edge Gardens, Athens, Ohio
- Mother Earth News. www.motherearthnews.com
- Pests, Weeds and Integrated Pest Management. Growers Resources. www.oeffa.org
- UC Statewide IPM Program. www.ipm.ucdavis.edu