Natural Control of OK Garden Pests
Part I

Colorado Potato Beetle
Cucumber Beetle
Aphid
Root Knot Nematode

Cabbageworms
Cutworms
Slug/snail
Hornworms/Sphinx Moths

Part II

Squash Vine Borer
Squash Bug
Spider Mite
Corn Earworm

Flea Beetle
Blister Beetle
Cucurbit disease
Birds
Colorado Potato Beetle
*Leptinotarsa decemlineata*

Feeds on solanums: mainly potatoes and eggplant; tomatoes and peppers also.
Colorado Potato Beetle

One of our major garden pests; can destroy entire potato crops
The making of a superbug

- Originally fed on a tumbleweed Solanum
- Adapted to potatoes in mid 1800’s
- Spread through Europe and Asia after WWII
The making of a superbug

- Object of 1st large-scale use of insecticides
- Became resistant to DDT in the 1950s
- Extremely successful at developing resistance to pesticides.
Simplest Answer: Prevention

• Agricultural row cover works especially great for eggplant
• Eggplant and potatoes don’t require pollinators so you can leave crops covered
Handpicking

• 1-2 times/week works well
• Not very mobile; easy to see and catch.
• Avoid orange goo: collect in a bucket and flush them.
Beneficial Nematodes

Parasitic nematodes attack a wide range of insect larvae, including potato beetles. *Heterorhabditis, Steinernema* are genus names of 2 commercially available types.
Spinosad

- Derived from bacteria
- Also used for human head lice and dog/cat fleas
- Effective on larvae
- Works via contact & if ingested
- Lower chance of resistance
- Toxic to bees for 3 hours following treatment (when still wet)
Neem oil may provide some control of eggs and larvae (not adults).
Pyrethrins

- Products containing Pytrethrins may be effective
- Some CPB may be resistant to Pyrethrin
- Toxic to fish, bees, cats and other wildlife; read instructions
Pyrethrins

It is recommended that the final spray mix be buffered to a pH of 6.0-7.0.

To avoid possible harm to honey bees, it is advisable to apply in the early morning or late evening hours.

USED AS A TANK MIX: This product may be tank mixed with other insecticides.
Colorado Potato Beetle Plan

☐ Row cover eggplant and possibly potatoes
☐ Apply beneficial nematodes
☐ Handpick 1-2 times per week
☐ Spray Spinosad and/or Neem
Cucumber Beetles

**Spotted**
*Diabrotica undecimpunctata*

**Striped**
*Acalymma vittata*

Adults feed on leaves and flowers and transmit disease.
Larvae feed on roots
Cucumber Beetles

Especially hard on seedlings, and love flowers.
Cucumber Beetle prevention

- Cover cucurbits with a light-weight row cover.
- Remove cover when flowers form to let in pollinators.

Young pumpkins in 2011 starting out under a protective row cover tunnel
Cucumber Beetle Control
Kaolin Clay (Surround)

Tiny clay particles (1.4 microns).
Forms a barrier which irritates and repels pests.
Reduces heat stress.
Use on fruit trees, squash, cucumbers, grapes, tomatoes

$38 for 25 lbs. groworganic.com
$30 for 5 lbs. gardensalive.com
Cucumber Pest Control

**Neem** may help control larva and repel adults. (1-2 sprays/week)

*Pyrethrins* can be used (with caution-toxic to bees)
Cucumber Beetle Plan

- Apply beneficial nematodes
- Row cover until flowers form
- Kaolin Clay (Surround)
- Neem
Aphids
many species, genera & families

Common on brassicas, apple, pears, roses, milkweed and many more plants
Aphids

Ants “herd” and protect aphids to eat their sweet “honeydew”
Aphids

Aphids feed by sucking on plant juices
Aphid damage

Aphids reduce plant vigor and make cleaning produce difficult
Aphids A.K.A. Plant lice

- Give birth to live, pregnant young
- Winged individuals form & fly off to create start new populations
Aphid control

- Dislodge them with a strong stream of water.
- Aphids are not mobile enough to climb back on the plant.
Aphid control

• Use an insecticidal soap,
• Neem or Neem/soap mix
Aphid control

• For aphids on trees, try Tanglefoot.
• Keeps ants off trees, preventing them from protecting aphids.
Aphid control

And don’t forget ladybugs love aphids!
Root-knot Nematode
*Meloidogyne spp.*

Parasitize a wide range of crops—almost anything except for onions, garlic, corn and nematode resistant varieties.
J2s initiate feeding sites by injection of esophageal gland secretions into root cells, forming “giant-cells.”

J2s enter roots and migrate to the area of cell elongation.

Infective juvenile (J2) is attracted to growing roots.

First stage juvenile (J1) molts within egg.

Eggs are exuded into an egg mass on the outside of the female.

Egg Masses

Adult females produce >1000 eggs. Males are unnecessary in most species, but are sometimes encountered.

Heavily galled roots provide minimal resources for the rest of the plant.

Nematodes develop into J3, J4 and adult stage. Galling occurs as a response to nematode parasitism.

Giant-cells

Courtesy V. Brewster

Root-knot nematodes disease cycle
Root-knot Nematode Damage

Left image: A close-up view of a plant root system showing galls caused by root-knot nematodes.

Right image: A close-up view of galls on a plant root, typical of root-knot nematode damage.
Resistant Varieties

Lettuce roots of resistant variety

Lettuce roots of variety with no resistance
Root-knot Nematode Control

- Nematodes are not very mobile. Often unintentionally moved by gardeners.
- Avoid moving soil, plants, or tools from infested areas into “clean” areas.
Root-knot Nematode Control

- Clean tools with 1 part bleach to 9 parts water.
- Put affected plants in the trash, not compost bin.
Root-knot Nematode Control

Solarization
• Can be very effective
• Done in hottest time of year
• Well tilled, moist soil
• Clear plastic, edges buried
• 4-6 weeks
Root-knot Nematode Control

Add plenty of organic material—increases growth of fungi, bacteria and beneficial nematodes.
Root-knot Nematode Control

Nematicides are highly toxic and not suitable for gardens.

Caused male sterility; Banned in 1979
Root-knot Nematode Control

- Expensive but locally available (TLC).
- Unsure of efficacy
Root-knot Nematode Control

- Beneficial, predatory nematodes
- Prey on many types of pests.
- Make sure you have the right variety for Root-knot Nematodes.

Steinernema feltiae
Cabbageworms

Imported Cabbage worm
*Pieris rapae*

Cabbage Looper
*Trichoplusia ni*
Cabbageworms

- Only caterpillar stage feeds on our crops, primarily on leaves
- Prefer brassicas (cabbage, cauliflower, broccoli, kale, etc...)
Cabbageworms

• Worst in the fall.
• Hand-picking combined with regular applications of \( Bt \) is effective
• Apply \( Bt \) weekly.
Cutworms

- Girdle seedlings *at night*; can completely sever the stem
- Often more of a problem in areas that were previously covered in grass or weeds
- Many crops susceptible
- Seedling stage most susceptible
Cutworm Control

- You often only see the damage
- Monitor in the morning. If you find a damaged plant you can often find the culprit.
Cutworm Control

- If they are a problem in your garden, homemade collars create an effective barrier.
- Push 2 inches into soil, cutworms can’t get to your plants.
Cutworm Control

- Sprinkle diatomaceous earth around seedlings and transplants
- Tiny particles hurt soft-bodied pests
Slugs and Snails

Diet: strawberry, hosta, basil, beans, cabbage, lettuce, citrus and more
Slug and Snail Prevention

- Remove hiding places
- Consider drip irrigation to cut down on moisture. Snails and slugs require moist habitats
Slug and Snail Control

• Hand pick (at night)
• Set out “traps”—boards or melon rinds make good daytime hiding places.
• Check traps often and discard hiding slugs and snails.
• Don’t salt them, plants don’t like salt either
Slug and Snail Control

- Homemade or store-bought traps.
- Use beer as bait.
Slug and Snail Control

Iron Phosphate baits like Sluggo or Escar-Go work well and are safe for kids, pets and wildlife.
Metaldehyde baits are very toxic to kids, pets and wildlife. Most common cause of dog poisoning in California. Pellets look like dog food.
Slug and Snail Control
Hornworms/Sphinx Moths
Hornworms/Sphinx Moths
also called Hummingbird Moths or Hawk Moths

Caterpillar diet: tomatoes, tobacco, grapes, Virginia creeper
Hornworm/Sphinx Moth Larvae

Tomato Hornworm
V’s and black horn

Tobacco Hornworm
Stripes and red horn

White-lined Sphinx

Achemon Sphinx
Loses horn, larvae various colors
Hornworm/Sphinx Moth Adults

Tomato Hornworm

Tobacco Hornworm

White-lined Sphinx

Achemon Sphinx
Hornworm Control

Often their frass or defoliated areas are seen first
Hornworm Control

Larva

Handpick and discard

*Bt* pesticides are safe and effective; spray every 1-2 weeks or after a rain

Handpick and discard
If they aren’t causing too much trouble, it’s okay to leave them alone.