



GOOD BUGS BAD BUGS

Organic Pest Management Basics and Insect
Identification

New Farms for New Americans
2010

Principles of Organic Pest Management

1. Good pest management is based on healthy soils.
2. Maintain the diversity and fertility of the soil.
3. Keep a diversity of plants in the field to feed and shelter the beneficial organisms that help fight pests.



Why You Need to Know Your Bugs

Some insects are good. They're called Beneficials.



General Rule for Killing Bugs

- Know Your Pests and Kill Them
- If you don't know it, don't touch it. Watch it.
 - Is it eating your plants?
 - What does it look like?
- If it is causing problems and you don't recognize it, tell someone. Ask your friends, “Do you know this bug?”



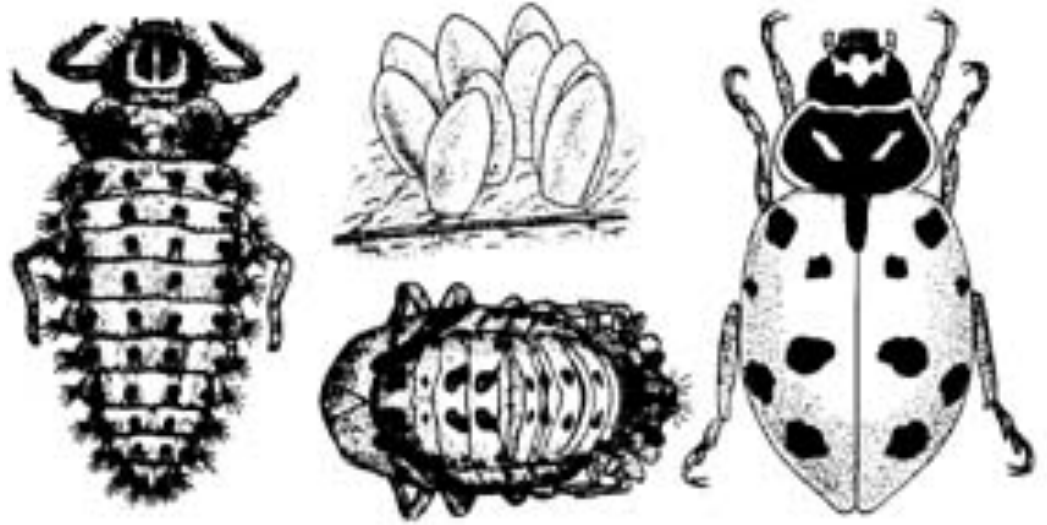
Which one of these two bugs should you kill?

Good Bug #1: Lady Bug

Adults and babies eat aphids and other soft-body insects

Adults have dome-shaped body and are often shiny, red and spotted

Eggs are tiny and yellow and laid upright in clusters of 10-50 eggs



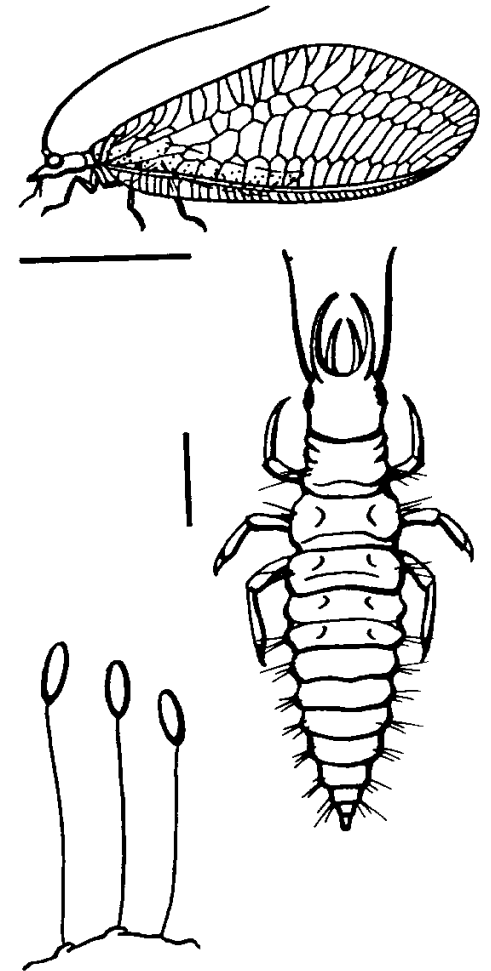
Attract ladybugs with dandelion, wild carrot and yarrow; or use “wheat” (a mixture of sugar and yeast)



Wild carrot

Good Bug #2: Lacewings

- Eat aphids and other bugs – up to 200 per day!
- Larvae look like tiny alligators
- Larvae pupate in a silky cocoon
- Adults are light green with large, shiny eyes
- Eggs are “planted onto leaves on little stalks



From Oregon St. University

Good Bug #3: Hover Fly

- Eat aphids and other small bugs
- Look like bees
- Larvae look like tiny green maggots who feed of aphids
- Fall to ground and pupate in soil



From eduwebs.com

Other Good Guys

- Bats
- Spiders
- Frogs
- Dragonflies



Bad Bug #1: Flea Beetle



Jumpy little bugs

Adults spend winter in the woods and lay eggs in the soil in spring

Eat young, tender cabbages, broccoli, Brussels sprouts, radishes, tomatoes

Can use row covers to keep beetles out or put down mulch

Control weeds, delay planting, hoe near plants and do not compact soil

Know that you will have some flea beetle damage but they rarely kill plants

Bad Bug #2: Colorado Potato Beetle



Black and yellow bugs that eat potatoes and eggplants, as well as tomatoes and peppers

Hibernate in soil over winter and lay eggs in spring

Kill them by hand or by drowning



Bad Bug #3: Cucumber Beetle

Adults overwinter in the woods

Eggs are oval, orange-yellow and in large clusters under leaves

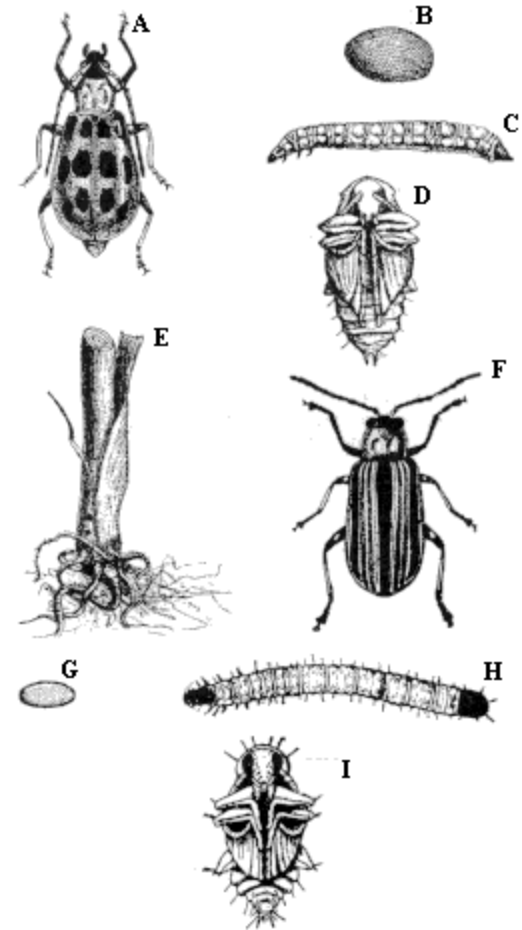
Larvae are yellow-white, wrinky with three pairs of brownish legs

Pupae are white

Adults are oblong and bright yellowish-greenish; can be striped or spotted

Beetles love squashes and melons and will eat everything – leaves, blossoms and fruits

Can use wire or cloth protectors, sticky traps, trellis to get plants off the ground and encourage good bugs and bats.



Cucumber beetles. A-D, Elevenspotted cucumber beetle. A, Adult. B, Egg. C, Larva. D, Pupa. E, Larval damage to corn. F-I, Striped cucumber beetle. F, Adult. G, Egg. H, Larva. I, Pupa.

Bad Bug #4: Japanese Beetle



Both adults and grubs eat plants

Adults have shiny bodies

Pupae are whitish yellow and
over shape

Eggs are laid underground

Larva / grubs are clear-white
worms that lay in a curled
position and spend 10
months underground, eating
roots

Use soapy water to repel them



Life Cycle from aphis.usda.edu

Bad Bug #5: Squash Bug



Adults are larger black bugs and pupae are small and gray and cluster on the bottom of leaves. Eggs are yellow or bronze and are laid on underside of leaves.

They eat cucumbers, zucchini, melons, pumpkins and squash. Leaves can look dried out because they suck on them. They love yellow squash.

Keep plants healthy, do not over water and provide enough space for fruits.

Will eat marigolds and mints instead and other ground beetles will eat them

Bad Bug #6: Aphids

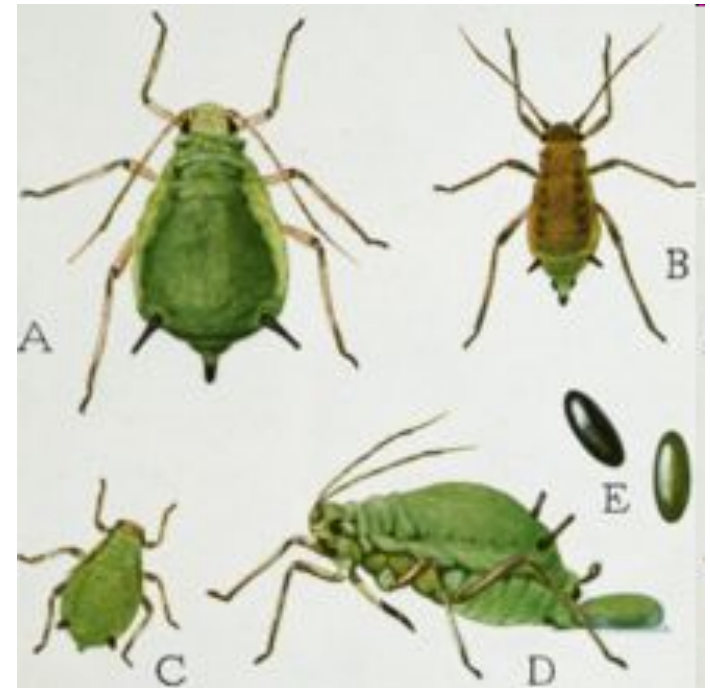
Small, very destructive insect that sucks the sap out of plants

Usually greenish throughout life stages

Lady bugs, hoverflies and other insects eat them

Protect plants by controlling ants, spraying onion or garlic water and creating good habitat for beneficial insects

It's good to dispose of significantly infested plants to save other plants.



Bad Bug #7: Cabbage Worm

They eat cabbage, cauliflower, broccoli, Brussels sprouts, turnips, radishes, kale, lettuce and weeds of the mustard family.

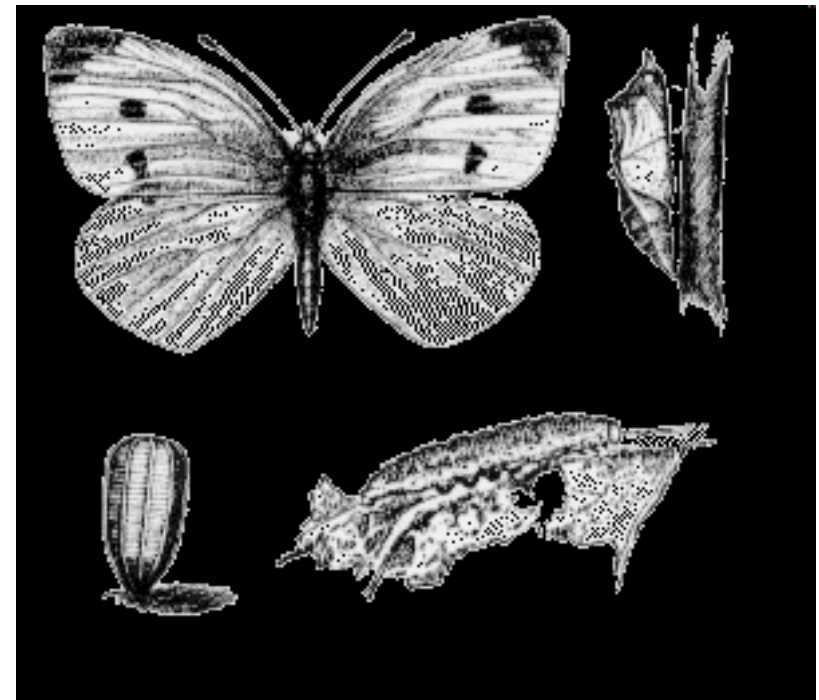
The first sign is the 1 1/2 inch white butterfly in the early spring.

Eggs are yellowish, elongated eggs, singly, on the underside of leaves.

Larva are velvety green caterpillars with a thin yellowish-orange stripe down the middle of the back. Most common in July and August.

Pupa is greenish-brown and hang from the bottom of leaves.

Control mustard weeds, removing plant remains at the end of the season, fall plowing and hand picking worms and larvae can significantly reduce damage.



From Maine Extension

Bad Bug #8: Potato Leafhopper

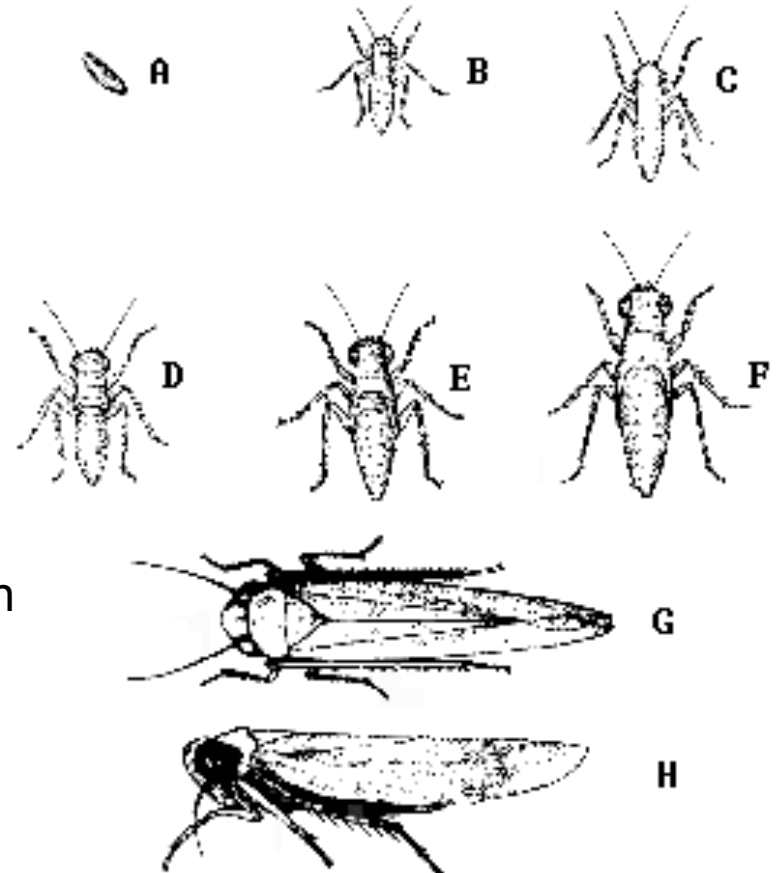
Adults are 3 mm long, wedge-shaped and winged

Eggs are tiny, longish and whitish

There are several stages of nymph, generally pale and wingless

Feed on over 100 plants, including beans and potatoes

Control them with beneficials; use a net to catch them



Potato Leafhopper. A, Egg. B-F, Nymphs. G-H, Adults.

Bad Bug #9: Corn Borer

Adults are yellow or brown moths

Eggs are whitish and overlap each other like fish scales

The larva has a black head, yellow body and multiple legs

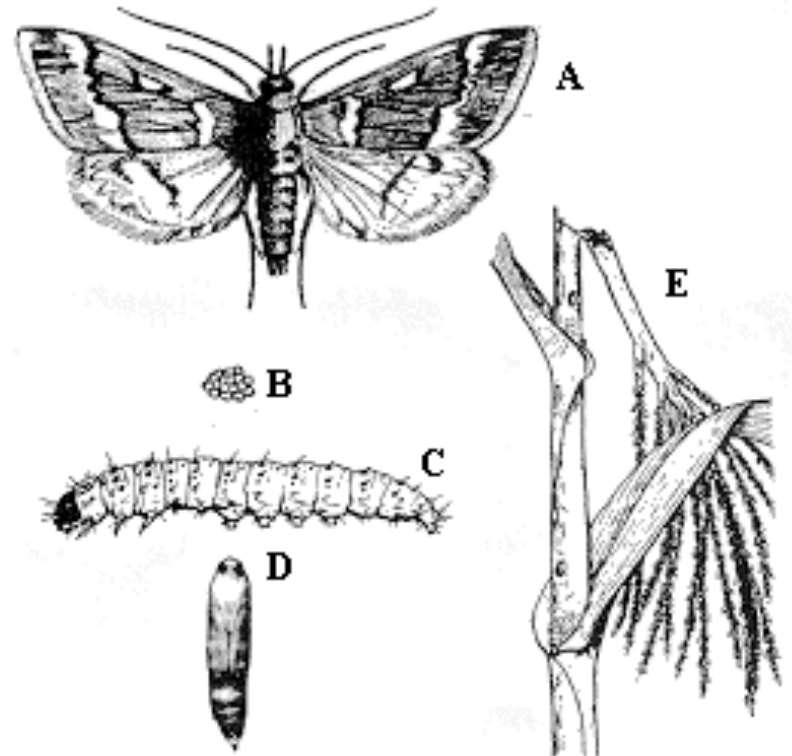
The pupa is a brown worm

Loves corn but can also eat beans, beets, celery, potato, pepper and tomato

Start eating leaves; for corn, eat the whorl.
Look for entrance holes with poop damage.
Can result in death of corn, tomato and potato

Flies, wasps and ladybugs are enemies

Not much you can do about them except keep your plot clean, check corn for damage and remove infected plants



European corn borer. A, Adult. B, Eggs. C, Larva. D, Pupa. E, Damage.



Bad Bug #10: Corn Earworm

Adults is a yellowish-green moth



Eggs are dome-shaped and white

Larva vary in color from whitish to greenish-yellow to brown

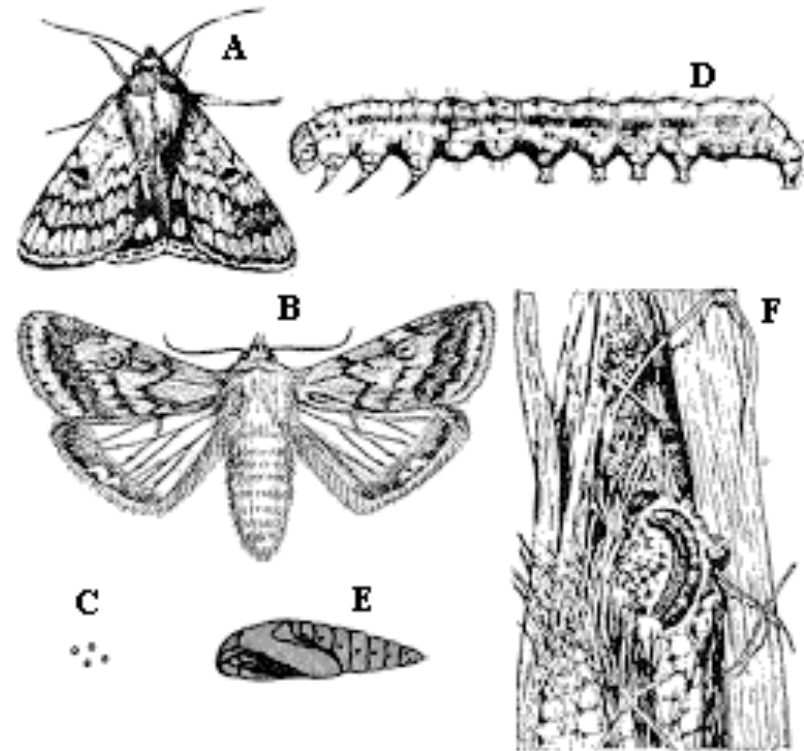
Pupa are reddish-brown worms that overwinter in the soil

Likes lots of plants but prefers corn and eats corn seedlings, buds and fruit

Holes are hard to detect but general bugs enter

at the developing tip of the corn cob

Chemical controls don't always work, but you can put mineral oil on tips of corn to make a barrier or encourage lacewings



Corn earworm. A & B, Adults. C, Eggs. D, Larva. E, Pupa. F, Damaged ear.



Bad Bug #11: Tarnished Plant Bug

A big family of bugs,
these suck the sap out
of plants and like to eat
buds and young fruits

Adults are brownish with
wings

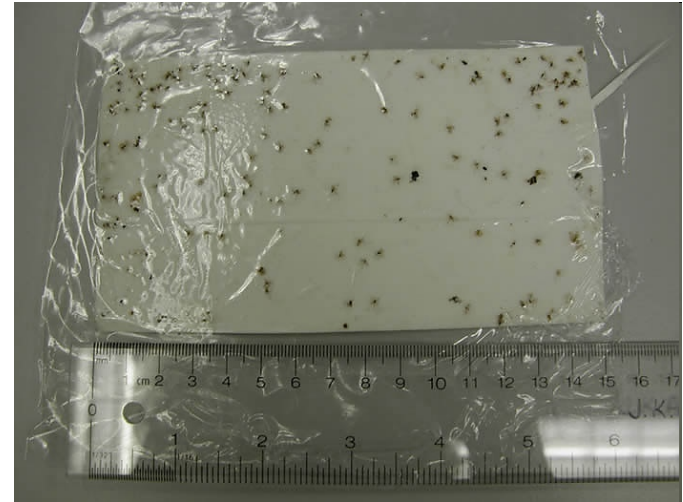
Nymphs are greenish
without wings

Avoid them by not letting
weeds flower



Bad Bug #12: Swede Midge

- Common but new pest in Vermont that can be very difficult to control
- Adults lay clusters of eggs on youngest plant tissue
- Larvae are tiny and clear to creamy yellow-white
- Adults are tiny light-brown flies
- Love cabbages and broccoli
- Can overwinter in the soil
- Crop rotation effective because they don't like wind and don't travel too far
- Scout for them early, destroy or remove plants after harvest and control weeds



Bad Bug #13: Snails

- Slimy long snail pests
- Like shade, so control them by removing shade and close cutting nearby grass
- Sand or anything scratchy is a natural barrier to them
- Generally, they dry up in the sun and are eaten by birds



Bad Bug # 14: Tomato Hornworm

- Feed on solanaceous plants, most often the tomato
- Moth is large, heavy-bodied moth with narrow front wings and mottled gray-brown color. The wingspan can be up to 5 inches!
- Eggs are deposited singly on lower and upper surface of leaves.
- Larvae are pale green; caterpillars are 3 ¼ to 4 inches long and pupate underground.
- Handpicking and rototilling the soil to kill larvae are effective.
- Lady bugs and lacewings will eat them and wasps will paralyze them.



Bad Bug #15: Mexican Bean Beetle

- One of the few harmful bugs in the ladybug family, it's copper-colored with 16 black spots.
- Larvae are yellow and covered with large spines. Eggs are also yellow and are laid in groups on underside of lower leaves.
- Bugs like beans; both adults and babies feed on the undersides of leaves, leaving a lace-like appearance. They will kill your plants.
- Control by planting early, using bush beans and removing plants as soon as the crop is harvested to kill remaining beetles and prevent overwintering. Row cover can also work as an effective cover.



Other Bad Guys

- Deer
- Rodents
- Ticks



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Only one bite out of a hundred causes a rash



Review: Ways to Keep Bad Bugs Under Control



- Encourage good bugs
 - Good buffers
 - Wheast



- Keep weeds under control
- Soapy water / alcohol traps / other traps
- Wire or cloth protectors or reemay



What about weeds?

- Mechanical or hand cultivation
- Mulch
- Flame weeding
- Mowing
- Black Plastic
- Newspaper without color dyes

