

Attracting Beneficial Insects and Dealing Organically With Pests

Preventive Measures (Cultural Controls) - keeping plants healthy:

- handle plants with care - bruising, tearing of plant material stresses plants, opens up areas for infection or bug infestation
- in particular, prune and harvest with sharp clippers or a knife to prevent pulling/tearing of stems
- never work with plants when they're wet - diseases (and sometimes bugs) are easily transported in water
- pick the right site for your garden - some plants are susceptible to molds and do best with morning sun so their leaves will dry quickly
- keep your soil healthy - this will optimize plant health and therefore decrease the risk of disease and infection
- fertilize only when absolutely needed (high nitrogen fertilizers=lots of new growth=bug infestations)
- choose disease-resistant varieties whenever possible
- rotate crops with ones that belong to other plant families, as bugs can overwinter in a bed (ie. tomatoes and peppers are from same plant family - avoid planting in same area 2 years in a row.
- clean up end-of-season refuse completely - do not compost diseased/infested refuse - put it in the garbage, or send it to the city for hot composting
- make your garden a happy home for large pest predators and beneficial insects!

Encouraging Natural Pest Predators:

Larger Scale Pest Predators: Birds (including chickens and ducks) and Frogs

Birds – Provide a water source if possible, and plenty of bird houses

Frogs – Attracted to damp, dark area – i.e. overturned pots propped up with sticks; you can purchase frogs, but you can't make them stay ☹

3 Types of Beneficial Insects: Soil Improvers, Pollinators and Pest Predators

The Soil Improvers: Earthworms

The Pollinators: Bees, Hover (Syrphid) Flies, Wasps and Butterflies

The Pest Predators: Ladybugs/ladybeetles, Ground Beetles, Syrphid Flies, Tachinid Flies, Green Lacewings, Praying Mantises, Predatory and Parasitic Wasps

In general, to attract these beneficial insects, you must:

- use only organic controls to combat diseases/insect infestations - never use wide-spectrum, chemical pesticides, as they kill both good and bad bugs
- provide food (nectar producing flowers and prey), water (usually morning dew is sufficient) and shelter (wildflowers, herbs and even weeds)

The Top 10 Predatory Beneficials:

Ladybugs/Ladybeetles/Ladybird Beetles

- larvae and adults are voracious eaters of aphids, mealybugs, scale, spider mites, insect eggs and corn earworms
- be sure to become familiar with what the (clusters of small, oval, bright yellow) eggs look like, what the (yellow and black, multisegmented, somewhat ugly) larvae look like, and be aware that lady bugs can be all tones of orange/red and can have various spot configurations
- lady bugs are particularly attracted to angelica, buckhorn, euonymus, yarrow, Lemon Gem marigolds, butterfly weed and tansy - tuck these in and around plants that are commonly affected by aphids and other ladybug prey
- sometimes, all it takes to attract ladybugs is to let aphids exist on a few plants longer than you would usually do so
- ant control is particularly important in keeping ladybugs and other aphid-eating predators in the garden; ants "farm" the aphid honeydew and will attack and kill any aphid predators. Boric acid as needed along ant trails and sticky bands around trees should keep ants under control.
- ladybugs can be purchased, but few of them will stay in your garden long term after you release them - it's *much* better to attract them naturally

Ground Beetles:

- fierce enemies of slugs, snails, cabbageworms, cutworms, armyworms, corn earworms,, flea beetles, aphids, mites and thrips (as well as others)
- provide them with shelter (rocks, chips in paths) and they will multiply :)

Syrphid (or Hover or Flower) Flies:

- the adults are excellent pollinators, and the larvae of some types of Hover Fly are significant predators of aphids, mealybugs, thrips and leafhoppers
- they love daisy-like and flat-topped flowers
- be sure to become familiar with what the (small, oval, white) eggs look like, what the (1/2 inch, greenish, grey or brown, maggot/slug-like with legs) larvae look like, and be aware that the adults can look like small wasps or bees but they don't sting

Tachinid Flies:

- the larvae are important parasites of Mexican bean, Japanese and other beetle pests, many caterpillars and cutworms and grasshoppers
- they resemble large, bristly, grey, black or brown houseflies - ranging from 1/4- 1/2" long
- tachinid fly eggs are either laid directly on or are consumed by pests, once the eggs hatch, the pest is eaten from within (ewwww)
- wild buckwheat is a favorite for the adults- a small planting should draw many to your garden naturally

Green Lacewings:

- the larvae are aptly called "aphid lions", devouring hundreds of aphid in their development; they also feed on small worms, mites, thrips, leafhoppers, scale and young whiteflies.
- be sure to become familiar with what the (single, pale, pearly green) eggs look like (they sit upon a fine, silken stalk), what the (very small, dull brown alligator-like) larvae look like, and be aware that the adults are light green with delicate, lacy-looking wings
- adults depend on a ready supply of pollen, nectar or honeydew, and are particularly attracted to angelica, red cosmos, coreopsis, tansy, goldenrod and Queen Anne's lace

Praying Mantises:

- tend to be predators of many things - aphids, beetles, butterflies, caterpillars, leafhoppers - even small birds, frogs and shrews (uggh)
- adults can be up to 5" long, off-white, green or brown, and have bulging eyes and swiveling heads; they move slowly, but paralyze their victims with quick, well-placed bites
- up to 100 eggs are laid by each female in foamy, sponge-like egg cases that are commonly deposited on branches or suspended from stems or twigs; these cases can be collected and refrigerated over the winter, and set out in the garden in spring
- purchased eggs fair well, and 3 of them are enough to patrol 5000 square feet of garden
- mantises are particularly attracted to cosmos, raspberries (or other bramble berries) and stands of weeds

Parasitic Wasps (3 of the Most Outstanding):

- thousands of varieties, all highly effective on their hosts
- most popular – the ***Trichogramma wasps*** – kill the eggs of pests by laying their own inside; a predator to more than 200 pests, including cabbageworms, hornworms, cutworms borers and armyworms. Available by mail order from many companies.
- ***Braconid and Chalcid wasps*** are also effective pest predators, helping to eliminate aphids, scale, mealybugs and many caterpillars (they actually lay their eggs in the pest and the hatchlings feed on the pest's innards).

Robber Fly:

- eggs are white and laid in the soil
- larvae look like tiny, white, flattened worms
- adult is a gray, ¼ to 1 inch fly, most with slender, tapering abdomens
- they will eat leafhoppers, beetles, grasshoppers, grubs and grasshopper eggs

Dealing With Common Pests:

- the best bug/disease prevention starts with daily, observant walks in your garden
- a good-bugs/bad-bugs chart helps with identification
- for larger bugs, the best control may be hand picking; plop them into a biodegradable soapy water mix, and once their dead, compost them!

Some basic home-made deterrants and barriers:

- Aluminum foil mulch on the surface of the soil will repel aphids, whiteflies and thrips when plants are small
- Spunbound or floating row covers (such as Reemay) laid over sturdy, low-lying crops such as cucumbers and squash can keep out cucumber beetles, flea beetles, whiteflies and aphids at the start of the season. They **must** be removed once the flowers bloom, or the cover will prevent the pollinators do their work.
- Foil or nylons wrapped around the stems of squash plants prevent the entry of squash vine borers.
- Sticky barriers – around trunks exclude ants
- Copper around raised beds exclude slugs and snails

Some basic home-made bug traps:

- Earwigs love soy sauce and oil; punch holes in a plastic container and bury it up to the holes. Empty regularly. Damp rolled-up newspaper works well too.
- Snails love beer (add flour to make them stick), molasses/yeast/water mixture, cabbage leaves and over turned pot saucers.
- Yellow sticky traps attract aphids, leaf miners and whiteflies – coat a bright yellow plastic or yellow-painted piece of wood with Tanglefoot
- Wireworms will readily feed on raw potato – cut a potato in half, remove the eyes, and stick with a 6” stick. Bury potato piece 1-2” in ground, and pull up after a few days. Remove wireworms, rebury potato piece, and repeat.

Some basic home-made sprays that many gardeners swear by (not MG approved):

- Blend 2 cloves of garlic with 3 cups of water, strain, add a few drops of dish soap (I like the biodegradable kind) and spray – a great all-purpose spray that kills many bugs on contact.
- Chop 1 hot pepper (or 1T of cayenne), 1 onion and 1 garlic clove and soak overnight, strain and dilute to 1 part in 5 with water. Another great all-purpose spray (and my personal favorite); can be sprayed daily for heavy infestations.
- Straight milk sprayed on plants kills red spider mites, caterpillars and tomato worms (also checks tobacco mosaic virus).

- 2T laundry (Ivory) soap flakes (not detergent) in 4 cups of water, dissolve and strain – kills aphids, maggots, leafcutters, mealybugs, mites and whiteflies.
- Wormwood tea has been used for centuries to repel slugs, aphids, flea beetles, flies, and cabbage white butterflies; use 4 cups of boiling water over a cup of wormwood leaves; dilute to 1 part in five with water.
- Pyrethrum Spray – use 4 cups boiling water over ½ cup pyrethrum flowers (chrysanthemum coccineum) or use feverfew flowers. Let steep, add a little soap and strain. Spray in the evening to combat aphids, caterpillars, leafhoppers, mites and thrips.
- Bug juice – gather as many of the pest as you can, blend them with water, strain, further dilute mix with water and spray on plants. Theory is that at least some of the harvested pests will carry disease, and the spray will infect the others.

“Organic” Pesticides (to be used as a last-resort):

- BT (microbial) – controls many forms of caterpillar, mosquito and beetle larvae
- Diatomaceous Earth – dust from crushed skeletons of microscopic marine organisms – can control cockroaches, ants, sow bugs (it’s a dessicant)
- Insecticidal Oils – controls aphids, psylla, scale, mites and their eggs
- Lime Sulfur – controls mites and psylla
- Neem – controls a broad range of insects, but has low toxicity
- Pyrethrum - controls a broad range of insects
- Insecticidal Soap – controls mites, aphids and other plant-sucking insects.
- Sulphur Dust – controls mites
- Vegetable Oil – controls scale, aphids and mites

(class handout) **The Top 10 Beneficial Insects**

Ladybugs/Ladybeetles/Ladybird Beetles

- small, oval, bright yellow eggs
- yellow and black, multisegmented larvae
- adults can be all tones of orange/red and can have various spot configurations

Ground Beetles:

- many different kinds; most are all black, but some have iridescent green shells

Syrphid (or Hover or Flower) Flies:

- small, oval, white eggs
- larvae are 1/2 inch, greenish, grey or brown, somewhat slug-like with legs
- adults look like (and have the coloring of) small wasps or bees but they don't sting

Tachinid Flies:

- resemble large, bristly, grey, black or brown houseflies
- size ranges from 1/4-1/2" long

Green Lacewings:

- single, pale, pearly green eggs that sit upon a fine, silken stalk
- very small, dull brown alligator-like larvae
- adults are light green with delicate, lacy-looking wings
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Praying Mantises:

- adults can be up to 5" long, off-white, green or brown, and have bulging eyes and swiveling heads
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Parasitic Wasps (3 Most Popular):

- ***Trichogramma wasps***
- ***Braconid wasps***
- ***Chalcid wasps***

Robber Fly:

- eggs are white and laid in the soil
- larvae look like tiny, white, flattened worms
- adult is a gray, 1/4 to 1 inch fly, most with slender, tapering abdomen

The Best Flowers To Plant If You Want To Attract Beneficial Insects

Angelica	Coneflower
Buckhorn	Basket-of-gold or hoary or sweet alyssum
Euonymus	Milkweed
Yarrow	Cinquefoil
Lemon Gem marigolds	Phacelia
Butterfly weed	Goldenrod
Tansy	Queen Anne's lace
Wild buckwheat	Caraway
Red cosmos	Fennel
Blanket flower	Bishop's flower
Coreopsis	

Home-Made Recipes For Garden Pest/Disease Control

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- Bug juice – gather as many of the pest as you can, blend them with water, strain, further dilute mix with water and spray on plants. Theory is that at least some of the harvested pests will carry disease, and the spray will infect the others.
- Powdery Mildew and “Black Spot” (commonly found on roses) can be checked with a spray the following mixture : 1 gallon of water, 4 teaspoons of baking soda , 2.5 tablespoons of horticultural oil.