

TRICHOGRAMMA WASPS: (*Moth Egg Parasite*):
*T. pretiosum***, *T. brassicae*** and *T. minutum***

EATS: Cutworms, corn earworms, corn borer, white grubs, caterpillars, cabbage worms, cabbage looper, tomato hornworms, army worms, webworms, codling moth, armyworm, fruit worms, and cane borers.

HOSTS: Gypsy moth, codling moth, diamondback moth, oriental fruit moth, tomato pinworms, cabbage loopers, imported cabbage worms, tent caterpillars, tobacco and tomato hornworms.

FACT: These wasps lay their eggs into the eggs of over 200 species of moths, which turns the eggs black and kills them, preventing the next generation from maturing. Adult wasps parasitize 100 eggs in their short 8-10 day life cycle. These wasps are harmless to people, animals and plants.

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BENEFICIAL GARDEN INSECTS

Integrated Pest Management is the practice of using biological, cultural, mechanical, physical and 'chemical' interventions as a preventative or corrective control for plant health. Using larval and adult predatory and parasitic insects to target unwanted pests is recommended within IPM.

ENCOURAGING PREDATORY INSECTS

If you have pests present in the garden don't panic! Planting a forage garden will attract a nearby predator to stop by for a snack. Providing habitat rich in nectar and pollen for beneficial insects will help keep pest populations under control.

MAKING A FORAGE GARDEN

Planting a mix of annual, perennial, and flowering shrubs in a diverse range of colors, shapes, sizes, heights, and growth habits will help to attract a variety of beneficial insects. Including native plant species provides reliable, low maintenance forage and habitat. Grouping the same plant in a block creates a desirable insectary, as many pollinators feed on one species at a time. Planning for a continuous succession of blooming times provides valuable nectar and pollen that will keep beneficial insects nearby year-round.

Small branches and logs placed onto garden beds will create critical protection and habitat for long-lived insects, such as ladybugs, to overwinter. At a minimum, plant a 4x4' patch for a small garden, or for a larger farm, 5-10% of the overall cultivated land, or an insectary row every 100' among crops to encourage a great insect ecosystem. In orchards, sow or plant forage underneath the trees, or between rows. Generally, you want to create predatory insect habitat close to the crops that need the most protection.

Provide water: Shallow pools, bird baths, and non-chlorinated fountains with good sun exposure provide an accessible drinking water source. Remember to include rocks, marbles, or water plants for insects to land on to prevent drowning.

FORAGE & HABITAT PLANTS

Annuals

Cosmos bipinnatus (Cosmos white sensation)
Fagopyrum esculentum (Buckwheat)
Lobelia erinus (Trailing Lobelia)
Lobularia maritima (Sweet Alyssum)
Phacelia tanacetifolia (Lacy Phacelia)
Tagetes tenuifolia (Marigold 'Lemon gem')
Trifolium pretense (Crimson Clover)
Vicia sativa (Common Vetch)
Vicia villosa (Hairy vetch)
Zinnia elegans (Zinnia)

Perennials:

Achillea millefolium (Common Yarrow)
Ajuga reptans (Carpet Bugleweed)
Allium sp. (Flowering Onion)
Anethum graveolens (Dill)
Angelica gigas (Angelica)
Asclepias tuberosa (Butterfly Weed)
Asclepias speciosa (Showy Milkweed)
Astrantia major (Masterwort)
Carum carvi (Caraway)
Coreopsis grandiflora (Tickseed)
Coreopsis tinctoria (Plains Coreopsis)
Coriandrum sativum (Coriander)
*Daucus carota** (Queen Anne's Lace)
Echinacea purpurea (Eastern Purple Coneflower)
*Foeniculum vulgare** (Fennel)
Gaillardia x grandiflora (Blanket Flower)
Geranium sp. (True Geranium)
Helianthus annuus (Sunflower)
Leucanthemum x superbum (Shasta Daisy)
*Leucanthemum vulgare** (Oxeye Daisy)
Melissa officinalis (Lemon Balm)
Mentha x piperita (Peppermint)
Mentha spicata (Spearmint)
Penstemon sp. (Penstemon)
Petroselinum crispum (Parsley)
Rudbeckia sp. (Black Eye Susan)
Sedum sp. (Stonecrop)
Sidalcea virgata (Checker Mallow)
Sidalcea oregana (Oregon Checker Mallow)
*Solidago Canadensis** (Canada Goldenrod)
Symphotrichum subspicatum (Douglas Aster)
Symphotrichum chilense (Pacific Aster)
Thymus serpyllum coccineus (Crimson Thyme)
Veronica spicata (Speedwell)

Shrubs:

Cornus sericea (Red Osier Dogwood)
Holodiscus discolor (Oceanspray)
Mahonia aquifolium (Oregon Grape)
Prunus virginiana (Chokecherry)
Philadelphus lewisii (Mock Orange)
Physocarpus capitatus (Ninebark)
Ribes sanguineum (Flowering Currant)
Sambucus nigra (Elderberry)
Spiraea douglasii (Douglas Spirea)

*** These plants can be aggressive or regionally invasive.**

AVAILABLE PREDATORY INSECTS

LACEWINGS (Aphid Lion): *Chrysoperla rufilabris***

EATS: Aphids, caterpillars, spider mites, insect eggs, mealybugs, scales, moth eggs, thrips, and whiteflies.
HABITAT: Adequate forage will encourage the adults to remain and reproduce in the release area. An insectary garden full of nectar, pollen and honeydew will stimulate their reproductive process.
FACT: Lacewing larvae will eat over 200 aphids in a week; however, they will cannibalize their own species if there isn't an adequate food source.

Lacewing larvae inject paralyzing venom into their prey before sucking the body fluids with their pincer-like jaws. Adults often live 4-6 weeks.

NEMATODES: *Heterorhabditis heliothidis***, *Steinernema carpocapsae***

EATS: Grubs, root aphids, house flies, weevils, Japanese beetles, ticks, queen ants, fleas, fungus gnats, ticks, thrips, leaf miners, cutworms, onion maggots, and root maggots.

HABITAT: Top 3-6 inches of soil.

FACT: Nematodes carry a Potorhabdus species of bacterium, which kills insects within 48 hours. They are known to feast on over 250 different insects including bacteria, fungi, protozoa and other nematodes. One spade full of soil can easily have more than a million active nematodes.

LADYBUGS: *Hippodamia convergens***

EATS: Aphids, mealybugs, spider mites, scale, thrips, white flies, and mites. They generally eat soft bodied insects.

HABITAT: During winter dormancy, ladybugs live under rocks, wood, or plant debris and usually live in groups of 100 or more adults.

FACT: One larva will eat about 400 aphids as it matures into an adult. An adult ladybug may eat over 5,000 aphids during its lifetime but will also need pollen and nectar before their winter hibernation. They can live up to 2-3 years in the wild.

PREDATORY MITES: *Neoseiulus californicus***, *Neoseiulus fallacis*** *Mesoseiulus longipes*** *Phytoseiulus persimilis*** *Stethorus punctillum*** *Hypoaspis* sp.**

EATS: Spider mite, European red mite, two-spotted spider mite, broad mite, fungus gnat, hemp russet mite, (*Aculops cannibicola*) and citrus mite.

HABITAT: Mites live near plants rich in pollen. Each species lives in a specific range of temperature and humidity. *N. californicus* can live in moderate temperatures (50-91°F) and high humidity (40-80%). *M. longipes* thrives in the highest range of temperature (70-100°F) and needs relative humidity of 40-60%.

FACT: For use in greenhouse or outdoor gardens. Release predatory mites on hops, strawberries, cucurbits, azaleas, cannabis, fruit trees and other affected crops.

PRAYING MANTIS: *Tenodera sinensis***

EATS: Leaf hoppers, beetles, grasshoppers, crickets, spiders, moths, mosquitoes, roaches, flies, and aphids. Adults also eat small rodents, frogs, hummingbirds, lizards, snakes and small song birds.

HABITAT: Attracted to tall grasses, shrubs, fences and building eaves. Cases may also be placed in the branches of a bush or tree. The Mantid life cycle is temperature dependent.

FACT: Mantids have two eyes but only one ear and can turn their heads a full 180 degrees. Mantids are an equal opportunity carnivore and cannibal. Unfortunately, they will eat other beneficial insects as well.