Make Allies out of Beneficial Insects

There are literally thousands of species of predatory and parasitic insects native to the coast. Gardeners can reap the greatest benefits from these free pest control agents by attracting them to a garden that is safe (without insecticides) and hospitable (provides food and water).

The most important thing you can do is avoid using insecticides. Where some type of treatment is called for, try non-chemical methods first. Insecticides, even soap sprays, also kill beneficial insects. Use pesticides as a last resort and choose the least toxic product that will do the job. For example, if insecticidal soap will work, use that instead of a pyrethrins spray, which is more toxic and lasts longer on leaves. To minimize the harm to non-target organisms, limit any sprays to just the plants, or parts of plants, that need treatment.

Attract Beneficial Insects to Your Garden

For many species of beneficial insects, it is only the larva, or juvenile stage, that is predatory. The adults sip nectar or feed on pollen. Flowers have sugar in their nectar, which provides insects with the energy they need to search for prey, mates and places to lay eggs. Pollen contains protein and fat that insects need in order to produce eggs. When adult beneficial insects have access to pollen and nectar they live longer (some studies found 4-10 times longer!) and may lay twice as many eggs. They also tend to stay in the same area to begin searching for aphids, caterpillars and other hosts for their eggs. When the eggs hatch the larvae attack the pests. You can lure the parents that produce these hungry juveniles into your garden by growing flowers to attract them.

The value of providing food plants for beneficial insects has been demonstrated repeatedly in studies in agricultural crops: growing dill between rows of potatoes attracted lady beetles, which reduced the number of potato beetle larvae to half that of fields without the dill; sowing dill, mustard and buckwheat under apple trees increased parasitism of codling moth by *Trichogramma* wasps. In one garden study, sweet alyssum attracted 204 beneficial insects for every pest insect that was found in the nearby crop.

Lady beetles love dill flowers.

What to Plant

Not all flowers provide pollen or nectar or make it available to tiny insects—in fact, many of the showiest ornamentals we enjoy are no use to beneficial insects because they lack accessible insect food. The most attractive plants are those with exposed nectar and pollen sources that tiny insects can reach. Plants in the carrot family (Umbellifereae), mustard/cabbage family (Brassicaceae), aster family (Asteraceae) and mint family (Lamiaceae) are the most useful. Many weeds, such as wild carrot, yarrow, dandelions, chickweed, wild mustard and hawkweed, are also good insect plants. You don't have to encourage weeds, however, because many ornamental flowers are excellent nectar sources (see Table 4, pg. 108). You can find out which plants are most valuable in your garden by watching where bees, tiny parasitic wasps, lady beetles, hover flies, pirate bugs and other predators prefer to feed.

Beneficial Species

Tips on planting for beneficial insects:

- Try to provide 5-10% of overall garden space to flowers that attract and feed bees and beneficial insects.

- Mingle insect plants throughout the yard and garden, plant them among vegetables, use as edging plants or plant in rock walls.

- Grow a variety of plants so that flowers are available to insects from early spring to late summer.

My Top 12 List

Here are my favorite insectary plants, roughly in order of blooming. They are easy care plants and many also have culinary uses.

- **Kale:** Along with other hardy mustard family greens, such as leaf mustard, Chinese vegetables, arugula and broccoli, kale provides a rich food supply when in bloom. In mild climates, let a few plants that stood through the winter go to flower in the spring. They bloom well before other plants and provide early nectar for syrphid flies and lady beetles.

- **Parsley**: Plants that have overwintered in the garden will flower the second year. They start to bloom in May and continue for months. The tiny white flowers are carried in umbels on tall stalks.

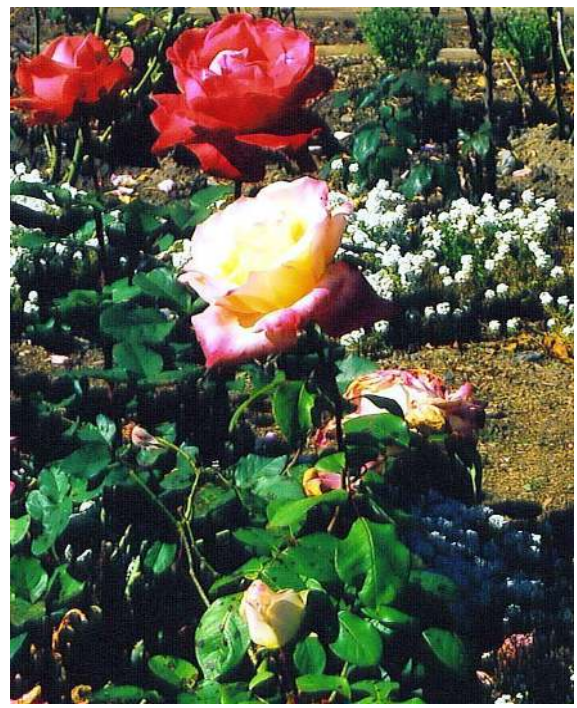
- **Dill:** These tiny greenish blossoms are arranged in large flat umbels. Dill grows quickly from seed and self sows once established. Sow it several times in succession, especially around vegetables, to provide flowers all season. Dill is especially useful for lady beetles and lacewings because their mouthparts fit the flowers.

- **Coriander/Cilantro**: This quick flowering annual herb has a rich nectar supply for small insects. Plant every 2-3 weeks to provide a succession of flowers. If you allow plants to self sow, there will usually be plants in bloom somewhere in the garden all summer. Like dill the flowers are very attractive to lady beetles and lacewings.

- **Sweet alyssum**: Annual and perennial alyssums are particularly good for attracting aphid predators and parasites. Annual sweet alyssum blooms in as little as 6 weeks from sowing; it is widely available where bedding plants are sold. It grows readily in any type of soil, makes a good rockery plant and can be grown as an edging, in borders or to follow spring bulbs.

- **Calendula**: Self-sowing, trouble-free annuals, calendulas bloom throughout the summer and fall. The flowers come in shades of orange, bright yellow, cream or apricot and are a rich source of pollen. Collect the seeds in late summer and spread them around.

- **Candytuft** (*Iberis*): There are perennial and annual varieties in colours ranging from white to lavender, pink, purple and red. Perennials bloom very early in the spring; annuals, which can be sown in either fall or spring, bloom later. Grow candytuft as a neat border or edging plant. Clip back flowers once they have bloomed to stimulate further flowering.



Sweet alyssum attracts aphid predators to these roses.

- **Thymes:** The tiny flowers of thyme are wonderfully attractive to insects, as are most of the common culinary herbs (sage, rosemary, savory, oregano). Thymes tolerate poor soil if it is well drained and limed. There are many different varieties, culinary as well as ornamental. They make excellent rockery plants.

- **Lovage**: One plant is enough for any garden as lovage grows to a broad, dense clump, with flower stalks reaching 1-1.5 m in height (5-7 feet). It thrives in a back corner of a garden. Not only do the large flat umbels of creamy flowers provide nectar for insects, the leaves are also favoured food for the caterpillars of anise swallowtail butterflies.

- **Yarrow** (*Achillea*): Wild yarrow is white, but horticultural varieties come in cream, yellow and rosy pink. Yarrow blooms all summer and quite late into the fall. You will often see lady beetles among the flat topped heads of tiny blossoms. Yarrow is very hardy, adapted to poor soil and needs little water once established.

- **Daisies:** All kinds, perennial and annual, are excellent pollen sources. This includes black-eyed Susan, dwarf sunflowers, Rudbeckia, golden glow, Shasta daisies, marguerites and others. Those with yellow flowers are especially attractive to syrphid flies.

- **Goldenrod** (*Solidago*): Although it grows as a roadside weed in some areas, horticultural varieties are also available from nurseries. The flower heads are shaggy bright yellow spikes, rich in pollen from late summer through fall. They are particularly attractive to pirate bugs.

Providing Water

Many beneficial insects, especially the tiny parasitic wasps, aphid midges and other very small insects, benefit from a water supply during the driest part of the summer. While leaf-eating insects have the moisture from plants to keep them going, the predators and parasitic insects must find other water. They normally sip dew for liquid but in mid-summer it can be so dry that there is no dew in the morning.

In research I did decades ago, I found that aphid midges would lay twice as many eggs when they had a water supply. After finding that research on other insects also showed similar results, I started providing a safe drinking water source for insects in my garden. Any type of container will do as long as insects can't drown in it. Parasitic wasps, for example, are terrible at coming in for a landing; they often flip over when they alight, so they can drown in a pan of water if there is nothing to climb onto. A shallow bird bath with a rough surface, or a large clay plant saucer, is ideal. Put rocks or gravel in the water to provide safe islands for insects to perch upon while drinking.

Many species of wasps, both large and small, visit water sources and some of them can sting. If you have small children that might play in the water or pets that might drink from it, it is a good idea to set the insect watering dish well out of their reach.

A safe drinking water source for beneficial insects.

Table 4. Plants That Attract Beneficial Insects

	Annuals & Biennials	*Perennials*
Ornamentals	Asters Calendula Candytuft Coreopsis Cosmos Feverfew Heliotrope Lobelia Mesembryanthemum Mignonette Phacelia Safflower Salvias Schizanthus Sweet Alyssum	Alyssum Basket-of-Gold (*Aurinia*) Beebalm (*Monarda*) California lilac (*Ceonothus*) Candytuft Coneflower Daisies Golden Marguerite (*Anthemis*) Goldenrod Potentilla Rudbeckia Speedwell (Veronica) Stonecrop (Sedum) Tansy Verbena (especially *V. bonariensis*) Yarrow
Herbs	Coriander/Cilantro Dill Caraway Fennel Parsley Summer savory	Angelica Anise Hyssop Catnip Lavender Lemon Balm Lovage Mints Rosemary Sage Thyme & creeping thyme
Vegetables	Broccoli Chinese greens and mustards Kale Radishes Leeks and onions	
Weeds	Lamb's quarters Pigweed Wild mustards and cress	Dandelions Queen Anne’s lace (wild carrot) Chicory Yarrow Hawkweed Goldenrod

Lady Beetles (Family Coccinellidae)

Life size: —

Adults of two common species of lady beetles.

Description & Life Cycle: Many, but not all, species of lady beetles are bright orange with black spots. Most are small, 4-8 mm long (about ¼ inch), round with hard, shiny wing covers. The spider mite destroyer (*Stethorus* species) is solid black, while other lady beetles are cream, yellow, orange or pinkish red with 2 to 20 black spots on their wings. The larvae are dark brown or grey, alligator-shaped, with short spines and orange or yellow markings. Eggs are distinctive, bright yellow, laid on end in small clusters on leaves and twigs.

In the fall the adult beetles creep into leaf litter or under garden debris for the winter. Some species aggregate in large numbers before crawling into overwintering sites. After feeding for a short period in the spring they start to lay eggs. The eggs hatch in 3-5 days and larvae feed for 2-3 weeks. When full grown they fasten themselves to a twig or protected leaf, then moult into a pupa. After 7-10 days the adult beetle splits open the pupa and emerges.

Both adults and larvae are valuable predators of aphids and other small, soft-bodied insects. Some, such as *Stethorus,* feed on spider mites.

Life size: —

Lady beetle larva.

Attract & Protect: Adult lady beetles also eat pollen and are particularly attracted to dill, yarrow and coriander flowers (for more on attracting them, see pg. 105)

Use as Biological Control: There are many native species of lady beetles so there is usually no need to buy them. Most lady beetles sold by suppliers are of little value outdoors because their instinct is to fly away when released. This instinct can be thwarted by spritzing the beetles with 7-UP to stick their wings together (the liquid and sugar doesn't hurt them) to keep them in the area until they lay eggs. Beetles of the second generation don't tend to fly away. Some suppliers sell 'conditioned' lady beetles that have been fed and are ready to lay eggs when they arrive; these are more likely to become established in a garden. If you need aphid predators for a garden or greenhouse, however, aphid midges (pg. 111) are a better investment because they don't have the migration instinct.

Problem Lady Beetles: When lady beetles gather together in swarms in the fall they can be a nuisance. They are usually attracted to south facing walls of light-coloured buildings. They are looking for cracks in rocks to crawl into for winter—instead they end up inside buildings. Lady beetles overwinter safely in unheated outbuildings but if they stay in a heated home they will die before spring. If you find them indoors gently sweep them up and put them back outside.

The multicoloured Asian lady beetle (*Harmonia axyridis*) is a particular nuisance in this respect. This species was introduced in the southern US to control aphids in crops. It has multiplied and migrated throughout most of North America. These robust beetles sometimes dismay gardeners because they have strong enough jaws to nip tender skin. Several designs for traps are available to remove swarms of lady beetles invading homes in the fall. Light traps allow you to release the beetles outdoors; models based on sticky boards kill the beetles. Instructions for a homemade light trap are posted at: ipm.osu.edu/lady/blt1.htm.

Aphid Parasitic Wasps (Many species)

Life size: —

An aphid 'mummy'—the pupa of a parasitic wasp.
The adult wasp chewed the hole in the back when it emerged.

Description & Life Cycle: All species of parasitic wasps that attack aphids are tiny; most are less than 3 mm long (3/16 inch). They lay their eggs in aphids, one per aphid. The larva develops inside the aphid, eventually killing it. When it has reached full size the wasp larva also pupates inside the dead aphid. At that stage the parasitized aphids are easy to see among living aphids because they are rigid and fastened to the leaf. Depending on the species of parasitic wasp, the pupa turns black, brown or shiny tan. For every aphid 'mummy' you see, there are usually many other aphids that are parasitized but don't yet look it.

Attract & Protect: Plant small-flowered, nectar-rich plants to attract this group of insects (see pg. 108).

Aphid Midge (*Aphidoletes aphidimyza*)

Life size: ▬

Close-up of an aphid midge larva killing a winged aphid.

Description & Life Cycle: Adults are tiny, delicate, long-legged flies. They are rarely seen because they fly at dusk, laying their pin-point sized orange eggs among aphids. The larvae are small, up to 3 mm long (3/16 inch) maggots. They are always a shade of orange, ranging from pale to dark orange. The larvae are voracious predators on most species of aphids. After feeding for 10-14 days they drop to the soil to pupate. A generation takes about 3 weeks in summer so there are several overlapping generations over the season.

Attract & Protect: Aphid midge adults feed on nectar and honeydew. They are attracted to plantings of nectar-rich flowers and herbs, such as dill, coriander and alyssum (see pg. 108). In dry weather provide a water source, such as a shallow tray of water filled with pebbles.

Use as Biological Control: Aphid midges are one of the few insects sold commercially that can be useful in home gardens. They control aphids in fruit trees, roses and vegetables. They are also excellent predators in greenhouses that have in-ground growing beds or earth or gravel floors (the midges pupate in the soil). Aphid midges are not as likely to control aphids in sunrooms with finished floors, because many larvae die when they leave the plants to pupate. Midges are not effective on windowsill plants.

Before deciding whether to buy aphid midges, inspect the problem aphid colonies closely (use a magnifying lens). Aphid midge larvae and other predators are often already present so you may not need to buy more.

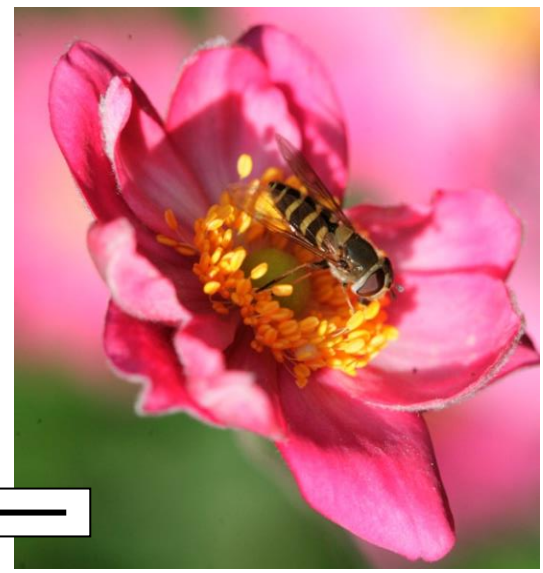
If you decide to buy aphid midges get the smallest number the supplier sells and follow the release instructions on the container. The midges are sold in the pupa stage, usually in small trays or vials which are left open to allow adults to fly out when they emerge. Make sure containers won't be flooded by rain or irrigation water.

The best time to release midges is while aphid populations are low. Because aphids reproduce so quickly, however, aphid numbers may be quite high by the time you have midges to release. If this is the case, knock aphid populations down with water sprays or sprays of insecticidal soap, then release the midges.

Note: Don't use pyrethrins as a knock-down spray; residues on the leaves repel female midges from laying eggs.

Syrphid Flies/Hover Flies (Family Syrphidae)

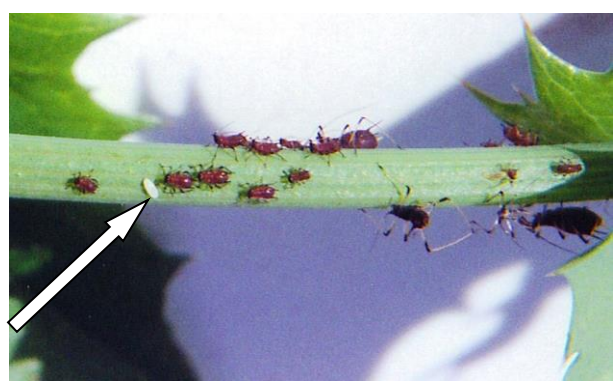
Two syrphid fly larvae eating cabbage aphids.



Adult syrphid fly eating pollen.

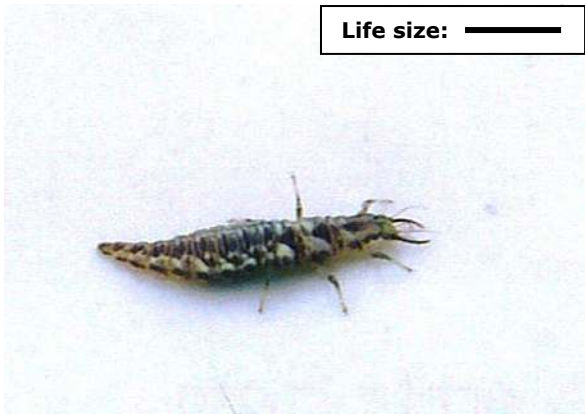
Description & Life Cycle: Adult syrphid flies are 1-1.5 cm long (about ½ inch), yellow-and-black or white-and-black striped, with big eyes. They are fast, strong fliers, with a hovering habit over flowers that makes them look like tiny hummingbirds. They emerge very early in the spring and are often seen on pussy willow and other early pollen sources. Females lay their tiny white eggs among aphids. The larvae are voracious aphid predators; they are light brown or greenish, somewhat mottled looking maggots. The larvae feed on aphids for 2-3 weeks, then drop to the soil to pupate. Adults emerge in 2 weeks and there are 4 or more overlapping generations per year.

Attract & Protect: Plant flowers to attract syrphid flies (see pg. 108). They are particularly attracted to yellow flowers as well as feverfew, lavender, sweet alyssum, yarrow, cilantro and dill.



Arrow points to a single white syrphid fly egg among aphids.

Lacewings (Family Chrysopidae)



Lacewing larva.

Brown lacewing adult. Photo: Joseph Berger, Bugwood.org

Description & Life Cycle: Adults are pale green or brown, 1 cm long (3/8 inch), with large eyes and long antennae. Adult lacewings look frail as they flutter through the evening on transparent wings netted with fine veins. In contrast the small, up to 1 cm long (3/8 inch), mottled, alligator-like larvae are quick, proficient predators; they have long curved jaws for piercing their prey.

Lacewing eggs are laid at the tip of a fine stalk attached to a leaf. Larvae feed on small soft-bodied insects, including aphids, thrips, small caterpillars, scales, as well as mites and insect eggs. Green lacewing adults mainly eat pollen and nectar, while adult brown lacewings are also predators.

Attract & Protect: Attract adults to the garden by planting flowers with a rich pollen and nectar supply: feverfew, yarrow, coriander, daisies and dill (see pg. 108).

Use as Biological Control: Lacewing eggs are sold by suppliers (see Resources, pg. 196) for control of aphids and other insects. Before buying look closely at the problem plants—these voracious larvae are probably already there. The brown lacewing, *Micromus variegatus*, is used in greenhouse crops as a general predator where it can be more successful as a biological control than green lacewings (*Chrysopera* spp.).

Lacewing eggs on stalks.