

## Insectary Gardens

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### It's a bug-eat-bug world

Garden insectaries are places where insects can live out their entire life cycle. It must offer food, water, shelter and a place to breed new generations. These habitats are common in nature, where indigenous insects evolved with indigenous plants. But they are not so common in the average home garden where the balance of nature has been greatly altered.

The purpose of a garden insectary is to attract beneficial insects – the pollinators, predators, and parasitoids. The gardener's job is to provide a safe and supportive habitat. In return for the free room and board, the beneficials will pollinate flowers that result in fruits, vegetable, and seeds and prey on pest species that cause damage to desirable plants.

Companion planting is one form of insectary planting, but they are not exactly the same. Companion planting includes plants that have other beneficial effects, such as nitrogen fixing, shading, or flavor enhancement. Companion planting for pest control pairs the insectary plant with one or more related species of target or trap plants during their growing season. Insectaries are designed to attract a broad variety of beneficials on a permanent basis.

### Beyond the home garden

As interest in using more natural means of pest control grows, even commercial operations are turning to beneficials. Farmers are including wide bands of insectary plants planted between plots. Wholesale growers are importing beneficial species to release in their greenhouses. Botanical gardens are managing enclosed insectaries to breed their own insects for release in their gardens and incorporating insectary plants into their garden design. It is a valid and effective way to work with nature in a positive and non-damaging way.

### Types of insectary gardens

Insectaries can be incorporated into the home garden in several ways:

- **Insectary Beds** - a bed dedicated specifically to insectary plants. The bed needs to be large enough to support a permanent colony of beneficials that can regularly patrol the garden. It is most effective when it is located close to the target plants, such as beside a vegetable garden.
- **Under-planting** – insectary plants used as a cover crop under fruit trees. Some of these plants also have other beneficial effects, such as root exudates that combat soil borne diseases.
- **Companion groups** – insectary plants interspersed into existing plantings. The numbers need to be large enough to support the insects, and diverse enough to attract many species.
- **Pocket Insectaries** – islands of insectary plants dotted around the landscape. These can be planted in the ground or in containers. Containerized insectaries can be moved around the garden in close proximity to target plants as problems are observed.

## Components of an Insectary Garden

An insectary garden is a habitat, no matter what size it is. In order to provide a welcoming and supporting habitat, you need to provide all of the things these insects need – food, water, shelter, security and a place to breed and raise new generations.

- **Food** for pollinators is usually pollen and nectar. Food for predators will be provided in the form of the pest insects, but many predatory insects also need nectar and pollen in part or all of their life cycle. Tiny predatory wasps and flies prefer the nectar of small flowers that are borne in large flower heads. An example of this is Queen Anne's Lace where the umbel is a large head comprised of very small flowers. The flowers of radishes, mustards, lettuces, and many herbs are also small and attractive to predatory insects.
- **Water** is necessary for all life. Some insects will find all of the water they need in the dew that falls on plants. Others, like bees and wasps, require fresh open water, and a lot of it. The easiest way to provide water for insects is in a shallow dish. You can use a bird bath, plant drain saucer, pie plate, or pretty much anything that is shallow and will hold water. Partially fill the dish with gravel or sand. Place a few large rocks in the dish so insects can rest and drink without drowning. Fill the dish until there is a shallow level of water over the top of the sand or gravel – 1/8" to 1/4" or so. This replicates a mud puddle, where many insects seek water in nature. One of the things they are seeking from the damp mud is minerals. You can add a couple of pinches of rock minerals or natural sea salt to provide the minerals in a natural way. Don't overdo this, it just takes a bit. If you have recently added minerals to a bed in the garden, just add a scoop of your soil to the dish.
- **Shelter** is a little harder to address in the insectary garden due to the varied needs of the different species. Many just rest on the undersides of leaves; others prefer to hide in mulch, grass, and ground covers. Some, like Mason bees, actually need a home of sorts. A Mason bee house can be purchased from the nursery and there are all kinds of DIY ideas on the internet and in books about pollinators. Butterflies and beetles like to hide in little brush piles. Find a hidden spot where pruned limbs can be stacked. Just add to it as the limbs decompose.

Avoid "insect hotels". They do not replicate natural insect habitats and can lead to increased predation, parasitism, and disease transmission. If you wish to have this look in your garden, build many small "cabins" and space them throughout the garden rather than one large "condo".

- **Safety** is in your hands only to a limited extent. You cannot prevent birds, frogs, lizards and snakes from snacking on your beneficials. It is just part of nature. Be happy knowing that you have increased the population as much as you can and have returned a natural cycle to your garden. The shelter you provided will allow the beneficials a natural method for hiding and nature itself provides a bit of camouflage. The main thing you can do to provide for the safety of your beneficials is suspend the use of all synthetic pesticides and herbicides in your garden. These chemicals are generally considered "broad spectrum" and will kill indiscriminately. If you find a need to use an organic chemical control, do all you can to protect your beneficials –

isolation, time of day, time of year. Once you return a balance of pest and predator to your garden, you will most likely find that you do not need to use any chemical controls. No pesticides of any kind should be used in the insectary garden itself.

- **Breeding areas** are the easiest of your chores as an insectary garden host. If the beneficials have food, water, shelter and safety, insects will do what comes naturally. Predatory insects often lay their eggs on the same plants their prey is found on or on the plants they use daily for food. If your insectary garden is diverse, and your garden is likewise diverse, your beneficials will reproduce naturally.

### **When will you see results?**

Results of natural controls are never instant. Predators need prey. And they need prey in sufficient numbers. The natural cycle is that you will first see the pest, and you may even see the pest population start to rise enough to see damage to the plant. Be patient, if you have a stable population of predators, they will find the pests and begin to control them. The predator population will also rise at this time. Once they have decreased the pest population, the predators will recede. Your goal is that they will recede to the safety and comfort of the insectary garden and maintain sufficient numbers to be available for the next attack.

Remember that predators need pests. Your goal is not to eliminate every single pest in your yard. It is to keep them at a level where damage does not exceed a natural or tolerable level. The weakest plants will be the first ones that are attacked. Keeping plants healthy with proper soil building, watering, fertilization and foliar feeding will lower the stresses that make them attractive to pests in the first place.

### **Supplementing your insectary garden**

Although this is seldom required, should you decide you need to add a specific beneficial to your garden artillery, your insectary garden will prove to be a benefit. For example, say you have not observed praying mantises in your garden for several seasons. This can happen in urban “islands” where insect migration is interrupted by miles and miles of development. If you wanted to add a few purchased egg cases, your insectary garden is a good place to release them. The insectary garden will attract all kinds of insects, and the mantises will find sufficient prey to sustain their population. Yes, you will lose a butterfly, bee or moth here or there, but your colony of beneficials will be more diverse and better able to balance itself.

Without an insectary garden, when people purchase beneficials to take care of an infestation, the predator population will be lost as soon as the pest population decreases. There is not a sustainable habitat to support the beneficials long term. They will move on or die off. With the support of the insectary garden, they can stay and stabilize.

### **How to plant a Pocket Insectary Garden**

Pocket Planting is one of my favorite ways to plant in any garden. It is easy, quick, and is a part of a long term soil building program when it is done properly, and with the right materials. Pocket planting

is just what it sounds like - finding a spot in your garden and creating a pocket of rich, biologically active soil in which to plant.

You will need one bag of your favorite compost-based (no peat, please!) potting soil and one of your favorite slow release organic fertilizer (SROF). Push any mulch back uncovering a spot that is roughly 18" – 24" in diameter. Dig or scrape out a depression in the existing soil; like the shape of a big wok. You want the center of the pocket to be about 3" deep at the center and taper out to grade level at the sides.

Pour the bag of media in the center of the pocket. Sprinkle 1-cup of SROF over the soil and mix it in loosely. Spread the mix evenly into the pocket, hilling it up a bit in the center. Depending on the size of the spot you prepared, the pocket may be slightly raised above grade. This is desirable, so don't try to correct it. Your pocket is now ready to plant, water, and mulch.

Pocket insectary gardens can also be planted in containers using the same soil & fertilizer. You will need to have a container large enough to plant 5 – 7 plants minimum to support a variety of beneficial insects. Annuals are often a good choice for containers because they can be renewed regularly and do not require as much root space as a perennial. Pocket insectaries can also be created from groups of containers holding single insectary plants that are at the right stage to attract beneficials.

### **Getting to know the beneficials**

It's easy to see and identify some beneficials. Most of us are familiar with butterflies, bees, lady beetles and praying mantis. But there are some insects that are not as readily considered as "friends" in the garden. Wasps and spiders are two of the most beneficial inhabitants of the insectary gardens. They are very efficient hunters and prey on a wide variety of pest species. They are not as pretty as butterflies, and not as cute as bees, but we need to learn to appreciate and respect them all the same.

Predators either chew the pest with a set of mandibles or pierce the body with a tube-like mouth part and suck out the body fluids. Parasitoids lay their eggs in or on the pest. When the eggs hatch, the larva feeds on the pest. Adult predators whose larvae are also predators often lay their eggs very near the pests during an outbreak. In this manner, the hatching larvae don't have to travel far to find their food. You can sometimes see both generations feeding on an outbreak at the same time.

Many predatory insects are very small. Some can barely be seen. Don't let their size fool you – if they were any bigger, it might get scary for us! After seeing a Praying Mantis hunt, I have always been thankful they didn't grow six feet tall!

Here are some of the predatory and parasitoid insects we want to attract to the garden by planting a garden insectary:

- **Aphidius** – a tiny wasp that lays her egg in the aphid. The larva pupates within the aphid's mummified body. It chews its way out as an adult that feeds on honeydew and repeats the cycle.

- Aphidoletes – a tiny fly that feeds on aphid honeydew, then lays eggs on the infested plants. The midges hatch and feed on the aphids.
- Assassin Bug – mid-sized beetle with a pointed snout and a long, low profile. Often red-orange with black markings, but there are several species that are brown to dark brown with unremarkable marking. This is a general predator. (Carrot family – Queen Anne’s Lace, Bishop’s Lace, dill, fennel, chervil)
- Big-eye Bug – a true bug that feeds on aphids, spider mites, thrips, and caterpillar eggs. (Daisy family, yarrow, chamomile, marigolds, and many weeds)
- Damsel Bugs – a true bug that looks a little like a tan or black assassin bug. They feed on a variety of small insects such as thrips, mites, aphids, small caterpillars, leaf hoppers, cabbage loopers, and eggs of many pests. (Carrot family – Queen Anne’s Lace, Bishop’s Lace, dill, fennel, chervil)
- Dicyphus – a true bug that feeds on aphids, thrips, whiteflies and spider mites.
- Ground Beetles – several species that feed on slugs, grubs, and caterpillars.
- Hoverflies (Syrphid fly) – a fly that is often mistaken for a bee. They feed on aphids, mealy bugs, and other pests. (Flowers of all kinds – adults need pollen and nectar)
- Lacewings – small flying insect that feeds on scale, aphids, mites, and other soft-bodied insects. The larvae are voracious feeders and will move from insect eggs, mites and thrips up to mealy bugs, whiteflies and small caterpillars as they grow. (Carrot family – Queen Anne’s Lace, Bishop’s Lace, cilantro, fennel, dill; yarrow, tansy, helianthus, dandelion)
- Lady beetles – the familiar round beetle that feeds on aphids and mites. The larval stage is a more effective predator than the adult stage. There are several species of Lady Beetles. This family includes the Mealy Bug Destroyer. Any plant that will attract aphids will sustain a population of Lady Beetles. (Cabbage family, tansy, sunflower, sweet alyssum, chamomile, dill, goldenrod)
- Parasitic Wasps – several species that parasitize a wide variety of pest insects; whiteflies, moth larvae, beetle larvae, and fly larvae.
- Pirate Bugs – a true bug that feeds on thrips, scale, mites, aphids, whiteflies. (Cosmos, corn silks, sunflowers)
- Predatory Mites – several species of mites that prey on spider mites, thrips, and fungus gnats. They lay eggs as they feed and the hatching mites join the feeding.
- Soldier Beetles – a mid-sized beetle that is often red or orange with black wing covers. The adults feed on aphids. The larvae feed on soil borne insects such as grubs, caterpillars, and grasshopper eggs. (Goldenrod, daisy family, Cosmos)
- Spiders – many species that prey on a very wide variety of pests.
- Tachinid Flies – several species that parasitize a wide variety of pest insects; sawflies, earwigs, grasshoppers, codling moths, stinkbugs, squash bugs, peach twig borers, and leaf rollers. (Bishop’s Lace, sweet alyssum, cilantro, buckwheat)
- Wasps – several species that prey on caterpillars to feed their young.

## Insectary Plants

(This list is not exhaustive and could include many more! Think native, native, native.)

Agastache/Hyssop	Joe Pye Weed
Alliums	Lemon Balm
Aloysia (Flowering Verbena)	Lobelia
Alyssum	Marigold
Amaranth	Milkweeds
Asian greens (many!)	Mints
Asters	Monarda
Aztec Sweet Herb	Mullein
Bachelor's Buttons	Mustards
Basil, African Blue	Nepeta (Catmints)
Basil, Common	Oregano
Bidens	Oxalis
Bishop's Lace	Parsley
Bluebonnets	Patrinia
Borage	Phlox
Brassicas – (Kale, cabbage, broccoli, bok choy, mustards)	Pincushion Flower/Scabiosa
Calendula	Poppy
Camellias	Queen Anne's Lace
Candytuft	Radish
Caraway	Roses (single, open-faced)
Catmints	Rosemary
Celery	Salvias
Chamomile	Sedums
Chervil	Shasta Daisy
Chives	Statice
Cilantro/Coriander	Sunflower
Coneflower	Sweet Marjoram
Coral Vine	Sweet Alyssum
Coreopsis	Tansy
Cosmos	Thyme
Crinums (Milk & Wine varieties)	Tithonia/Mexican Sunflower
Dianthus	Viola/Johnny Jump Up
Dill	Yarrow
Dwarf Morning Glory	
Eupatoriums (White Mist, Blue Mist)	
Fennel	
Foxglove	
Gaillardia	
Goldenrod/Solidago	
Golden Yarrow	