

Gardening for Insects - *or not!*

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Basic Premise: Provide (or eliminate) aspects of the environment that are required for optimal growth and development of insects found in/around yards/gardens/homes:

Food for immature stages;

Food for adult stages;

“Special needs” (water, mud, plant resins, plant hairs);

Shelter (primarily for nesting).

Butterfly Gardening

People garden for many purposes: to provide fresh produce, to make landscapes more attractive, and to attract wildlife. One form of wildlife that is quite easily attracted to a yard are butterflies. In recent years, butterfly gardening has become an increasingly popular form of landscaping in the United States, following a long history in England and other areas of Europe.

At its core, the principles of butterfly gardening are simple - purposeful plantings to attract and retain local species of butterflies to the site. This is done by providing for the basic needs of the insects - foods used by both the adult and caterpillar stages of the butterflies as well as attention to shelter requirements.

Shelter needs are fairly easily provided for in most yards. Garden sites chosen for a butterfly garden should provide some protection from the strong winds common to the region. A hedge or windbreak of some sort is useful for butterfly gardens established in more exposed locations. In residential neighborhoods this is usually provided by the buildings and landscaping already in place.

The most obvious feature of a butterfly garden are nectar-bearing flowering plants. Plants commonly visited by butterflies are those which provide sugary nectar used by many species as an energy source. Types of flowers vary greatly in this regard and many commonly used bedding plants such as geraniums and petunias are rarely visited by butterflies, although the latter may be visited at dusk by the large 'hummingbird moths' which are the adult stage of hornworm caterpillars. Table 1 provides a list of some of the better plants to use for attracting adult butterflies.

However, many butterflies are not primarily nectar feeders, particularly the brushfooted butterflies (Nymphalidae). These may often be seen feeding at sap flows, on fluids of rotting fruit, and even animal dung. Periodically placing cut fruit around the garden or providing fruit-bearing trees may be useful for attracting these species.

Table 1. Some nectar-bearing flowering plants commonly visited by butterflies.

Asters	Bee balm (<i>Monarda</i>)
Butterfly bush (<i>Buddleia davidi</i>)	Milkweeds (<i>Asclepias</i> spp.)
Bush cinquefolia (<i>Potentilla fruticosa</i>)	Cosmos (<i>Cosmos</i> spp.)
<i>Gaillardia</i>	Joe Pye weed
Larkspur	Common lilac (<i>Syringa vulgaris</i>)
Rubber rabbitbrush (<i>Chrysothamnus nauseosus</i>)	Sunflower (<i>Helianthus</i>)
Sweet pea	Thistles
Verbena	Zinnia

Males of some butterflies also visit damp areas, sometimes collecting in large groups. The purpose of these 'mud puddle clubs' is unclear, but it is thought that dissolved minerals are useful nutrients for the butterflies. A small pool or area of moistened soil can provide for the needs of these butterflies.

When designing a butterfly garden, attempt to make mass plantings of butterfly food plants, which are more attractive than are scattered plantings. Also, give consideration to providing a sequence of desirable flowers and plants throughout the season. Although some butterflies may be present during the entire growing season, butterfly visits typically peak during mid to late summer so it is particularly important to provide nectar and other adult food sources at this time of the year.

Also very important in a butterfly garden are food plants used by the caterpillar stage of the butterflies (Table 2). These plants are actively sought by the female butterflies for egg laying and the presence of caterpillar foods can allow establishment of a 'native' population of butterflies. Furthermore, the caterpillar stages are often unusual in form or color and can be particularly interesting to observe. Use of caterpillar food plants can allow one to observe all stages of butterfly development (eggs, caterpillars, chrysalis, adult) increasing enjoyment of the butterfly garden.

There *are* some conflicts which arise with butterfly gardening, as with all other landscaping designed to attract wildlife. Most obvious are the caterpillar food habits which involve eating some of the plant leaves. Although caterpillars of most butterflies never occur at levels that would damage plants, there are a few that can be considered 'pests' in some settings. Most obvious is the cabbage butterfly, the common 'cabbageworm' of home gardens. Unfortunately the caterpillars of this insect all too often spoil a head of cabbage or broccoli and may need to be controlled on these plants.

A few other caterpillars may feed on some garden plants. The strikingly colored caterpillar of the black swallowtail butterfly, also known as the parsleyworm, is a caterpillar familiar to gardeners who make plantings of parsley, fennel, or dill. The painted lady may munch on a few hollyhock leaves when it is not on dining on thistles and the caterpillar of the variegated fritillary often resides in a patch of pansies. However, in larger plantings designed for ornamental purposes the feeding by these

insects will rarely be noticeable.

Butterfly gardens also tend to look a little more 'wild' than formal garden designs. Some of the best plants useful for attracting butterflies do not have a compact growth habit and some of the plants used by caterpillars and butterflies are even considered weeds in some settings. Careful landscape design can minimize this problem.

Finally, most insecticide use is incompatible with a butterfly garden. Caterpillars are very susceptible to most insecticides, including *Bacillus thuringiensis* (Dipel, Thuricide). Adult butterflies are less sensitive to insecticides, but also can be killed or repelled by some ingredients. Furthermore, most fungicides, selective miticides and insecticidal soaps *can* be safely used on plants visited by butterflies or caterpillars. A conscious decision must be made try not to treat the butterfly garden plantings, something that is made easier by selecting plants prone to few other pest problems.

Special Note: Over the past decade much of the state has become heavily colonized by the European paper wasp, *Polistes dominula*. This wasp feeds on live insects, particularly caterpillars, and often will devastate caterpillar populations in yards/gardens. Although the caterpillars fed upon by the European paper wasp include many garden pests (e.g., “cabbageworms”, “hornworm”) they also feed on many caterpillars in gardens that develop into desirable butterflies.

Table 2. Plants used by the caterpillar stage of several butterflies common in eastern Colorado.

Butterfly	Caterpillar food plants
Painted lady	Thistles, hollyhock, mallow, various legumes
Western tiger swallowtail	Aspen, willows, wild cherry, ash
Twotailed swallowtail	Ash, chokecherry, hoptree
Alfalfa butterfly/Orange sulfur	Alfalfa, sweetclover, other pea family (Fabaceae) plants
Clouded Sulfur	Alfalfa, clover
Checkered white	Many plants in the family Brassicaceae, <i>Cleome</i>
Imported Cabbageworm/Cabbage Butterfly	Mustards (including broccoli, cabbage, etc.)
Monarch	Milkweeds (<i>Asclepias</i>)
Milbert's tortoiseshell	Nettles
Mourning cloak	Willow, aspen, elm, hackberry
Buckeye	Snapdragons, toadflax, plantain,
Weidemeyer's Admiral	Willow, aspen, cottonwood
Hackberry Butterfly	Hackberry
Mourning Cloak	Willow, aspen, elm, cottonwood
Wood Nymph	Grasses
Melissa Blue	Wild licorice, alfalfa, other plants

Variegated Fritillary
Edwards Fritillary
Gorgone's Checkerspot
Checkered Skipper
Silverspotted Skipper

Pansy, many other plants
Nuttall's violet
Sunflower
Mallow, hollyhock
Wild licorice, locust, others

Additional resources: Butterflies and Moths of North America (<http://www.butterfliesandmoths.org/>) can generate a county-level checklist of butterflies and moths and provides basic information on biology and larval hosts.

Notes on Hummingbird Moths

Sphinx moths (hawk moths) are adults of insects in the family Sphingidae. Larvae of most are known as “hornworms”, as most possess a stout spine on the hind end of the body.

Day flying species are popularly known as “hummingbird moths”. The most common species of “hummingbird moth” in the western US is the whitelined sphinx, *Hyles lineata*.

Although hummingbird moths will visit many flowers, most often they use deep flowers high in nectar. Many of these flowers are also used by hummingbirds.

Some good plants to see evidence of “hummingbird moths” include:

- Desert evening primrose (*Oenothera caespitosa*)
- Four o'clocks (*Mirabilis*)
- Gentian
- Honeysuckle
- Larkspurs
-others?

Miller Moths and Landscaping

The adult stage of the insect known as the army cutworm (*Euxoa auxiliaris*) is regionally known as the “miller moth”. This insect makes an annual migration in late spring from the eastern plains to the mountains, during which it crosses the major population centers of the Front Range. At this time many of the moths incidentally enter buildings and vehicles, which can be considered a significant nuisance.

A common observation made during the miller moth migrations is that some homes/buildings tend to have many more moths indoors than do other nearby homes/buildings. Although this may have several causes (e.g., unsealed entry points into structures, outdoor lighting) landscaping is probably most important in determining the number of moths around a building.

During migrations miller moths are seeking nectar sources and suitable daytime shelters. The former is provided by flowering plants present on a property during miller moth migration periods, which usually occur between early May and mid-June. If miller moth flights are early, flowering fruit trees and lilac are very heavily used by the moths (as are dandelions). Spirea and cotoneaster are plants commonly used by miller moths used a bit later in the season. Late in the course of the miller moth flights the most important plant that they use is often Russian olive.

During daytime, miller moths settle in dark areas for shelter (including cracks and crevices buildings and vehicles provide). Dense vegetation is particularly favored, such as is provided by sheared shrubbery and densely growing evergreens.

Homes/buildings surrounded by property with large amounts of favorable flowering plants coincident with miller moth migrations, and the presence of dense daytime shelter spots will likely have many more miller moths than properties that lack these food and shelter needs.

The Use of Flowering Plants by Beneficial Insects

Many insects important in the biological control of plant pests have special food needs during their adult stage. For example, syrphid (flower/hover) flies are important predators of aphids in their larval stage but adults must feed on pollen or nectar to mature eggs. Many other insects use pollen and nectar (and honeydew) to sustain them, often allowing them to survive longer, produce more progeny and provide an overall higher level of biological control. Lady beetles, green lacewings, tachinid flies and parasitic wasps are among the natural insect enemies that utilize nectar and pollen in this manner.

As the mouthparts of these insects are not greatly enlarged to access deep sources of nectar shallow flowers are those used by these insects. Also, flowers that are broad and allow the insects to easily perch are also favored. Many plants in the families Apiaceae (carrot family) and Lamiaceae (mint family) are particularly meet these criteria and are commonly utilized by natural enemies of insects. A list of these and some other plants to consider for gardens to promote the activity of these insects is in Table 3.

Table 3. Some plants that are utilized as nectar/pollen sources for natural enemies of insect pests.

Moon carrot (<i>Seseli gummiferum</i>)	Coriander (<i>Coriandrum sativum</i>)
Fennel (<i>Foeniculum vulgare</i>)	Dill (<i>Anethum graveolens</i>)
Sweet alyssum (<i>Lobularia maritima</i>)	Basket-of-gold (<i>Aurinia saxatilis</i>)
Yarrow (<i>Achillea</i>)	Carpet bugleweed (<i>Ajuga reptans</i>)
Lavender globe lily (<i>Allium tanguticum</i>)	Dyer's camomille (<i>Anthemis tinctoria</i>)
Master wort (<i>Astrantia major</i>)	Dwarf alpine aster (<i>Aster alpinus</i>)
Four-wing saltbush (<i>Atriplex canescens</i>)	Purple poppy mallow (<i>Callirhoe involucrata</i>)

English lavender (*Lavandula angustifolia*)
Edging lobelia (*Lobelia erinus*)
Monarda fistulosa
Sulfur cinquefoil (*Potentilla recta*)
Solidago virgaurea

Spike speedwell (*Veronica spicata*)

Sea lavender (*Limonium latifolium*)
Mentha x piperite
Penstemon strictus
Sedum
Crimson thyme (*Thymus serpyllum*
coccineus)

Honey Bees

The issue of honey bees is more complex than with some other insects found in gardens. These insects are well recognized for their highly beneficial activities as pollinators and as producers of highly valued products such as honey and bees wax. In this regard one may wish to provide plantings that are utilized by honey bees.

On the other hand they sting. And, although while foraging they are not aggressive and will not sting unless confined (perhaps accidentally), they do often produce anxiety. Large numbers of honey bees foraging at sites with high human traffic may not be desired in some situations

The following is a list of plants that are highly visited by bees - the "Bee List". It is followed by plants that are not visited by bees. These constitute the extremes among over 200 species of plants that were evaluated between 2006-2010.

Several plants are heavily visited by honey bees with plants in the families Lamiaceae, Asteraceae and Cleomaceae particularly well represented:

Table 4. The "Bee List" (Plants Highly Favored)

<i>Agastache foeniculum</i>	<i>Allium tangiticum</i>
<i>Aster novae-angliae</i>	<i>Berkheya purpurea</i>
<i>Berlandiera lyrata</i>	<i>Bulbine frutescens</i>
<i>Calamintha nepeta ssp. glandulosa</i>	<i>Caryopteris 'Blue Mist Spirea'</i>
<i>Chamaebatiaria millefolium</i>	<i>Chrysanthemum serotinum</i>
	<i>'Herbstern'</i>
<i>Cleome</i>	<i>Cotoneaster</i>
<i>Echinops exalta</i>	<i>Eremurus stenophyllus</i>
<i>Ericameria nauseosa</i>	<i>Eriogonum jamesii</i>
<i>Eryngium giganteum "Miss Willmott's Ghost"</i>	<i>Euphorbia "Diamond Frost"</i>
<i>Gaillardia aristata</i>	<i>Geranium 'Jolly Bee'</i>
<i>Geranium himalayense</i>	<i>Helianthus 'Lemon Queen'</i>
<i>Heliotropium</i>	<i>Inula royleana</i>
<i>Kniphofia typhoides</i>	<i>Malva alcea</i>
<i>Nepeta cataria</i>	<i>Nepeta x fausonii</i>
<i>Origanum</i>	<i>Ocimum</i>
<i>Penstemon eatonii</i>	<i>Origanum "Hopley's Purple"</i>
<i>Satureja montana</i>	<i>Salvia nemorosa</i>
	<i>Scabiosa</i>

Sedum spectabile
Silphium laciniatum
Spirea x bumalda
Teucrium orientale
Tilia (linden, basswood)
Veronica spicata ‘Sunny Border Blue’
Veronica longifolia “Lavender Charm”

Senecio
Solidago
Teucrium chamaedrys
Thymus kotschyanus

Several plants are not visited by honey bees. Some plants are not normally pollinated by bees and do not suitably provide nectar or pollen. Other horticulturally modified plants may become non-attractive, such as cultivars with “doubled” blossoms.

Table 5. Plants not Visited by Honey Bees

Acanthus hungaricus

Achillea millefolium “Moonshine”
Achillea taygetea
Alyssum
Amaranthus caudatus
Anemone coronaria
Angelonia
Aquilegia caerulea
Arabis
Artemisia ‘Bwis Castle’
Aster dumosus
Begonia tuberhybrida
Callistephus chinensis
Campanula carpatica
Celosia (most)
Cerastrium tomentosum ‘Silver Cape’
Clematis
Crossandra
Dahlia (doubled)
Delosperma floribundum
Delphinium
Diascia integerrima
Galium verum
Geranium (ivy)
Geranium sanguineum
Goodenia
Helichrysum basalticum
Hosta
Hypericum frondosum
Ismelia carinata
Laurentia
Manicaria chamomilia

Achillea filipendula “Coronation Gold”
Achillea ptarmica
Alcea rugosa
Allium moly
Ameria meritima ‘Victor Reiter’
Anemone sylvestris
Anthemis tinctoria
Aquilegia flavescens
Argyranthemum
Aster sericeus
Aster x Finalist
Brachycone
Camassia quamash
Catharanthus roseus
Centranthus ruber
Chrysanthemum (most)
Cornus kousa
Cosmos (doubles)
Delosperma dyeri
Delosperma rugigenum
Dianthus (most)
Eustoma
Ganzia krebsiana
Geranium richardsonii
Gomphrena globosa
Heuchera x bressingham
Helleborus orientalis
Hyacinthoides hispanica
Hypericum perforatum
Lathyrus latifolius
Leucanthemum
Mercardonia sp.

Mirabilis multiflora
Nicotiana
Nymphaea 'William McClane'
Osteospermum barberiae compactivum
Penstemon rostriflores
Petunia
Philadelphus coronarius 'Silver Showers'
Phlox paniculata
Pinellia spp.
Polygonum
Pycnanthemum
Rudbeckia triloba
Ruta graveolens
Scrophularia macranth
Syringa villosa x reflexa
Verbena (all)
Veronica pectinata
Vinca (all)

Nemesia fruticans
Nierembergia
Oenothera missouriensis
Penstemon pinifolius
Penstemon 'Phoenix Violet', 'Red'

Phlox subulata
Platycodon
Portulaca (most)
Rheum arstrale
Rudbeckia "Denver Daisy"
Sanvitalia
Stachys officinalis
Teucrium lucidum
Veronica austriaca ssp. teucrium
Veronicastrum virginicum
Viola (all)

Bumble Bees

Honey bees and bumble bees may both visit many of the same flowers. However, bumble bees can access the nectar/pollen from some plants that honey bees do not. Usually these are somewhat deeper flowers or that have their pollen resources more hidden. For example, bumble bees will visit many night shade family plants (Solanaceae) that are avoided by honey bees since bumble bees “buzz pollinate” and can shake the pollen from blossom. Some of the plants often visited by bumble bees include the following:

Plants Noted to be Most Heavily Visited by Bumble Bees

Agastache rupestris
Cuphea
Echinops
Nepeta
Perovskia atriplicifolia
Solidago
Veronicastrum virginicum
Anemone nemororosa
Echinacea purpurea
Hypericum frondosum
Penstemon x. mexicali
Sesili gummiferum
Symphylum officinale

The Curious Case of the Wool Carder Bee

The wool carder bee, *Anthium manicatum*, is a member of the leafcutter bee family (Megachilidae). Members of this family are solitary bees, each female producing her own nest. The leafcutter bees either use existing cavities or excavate cavities out of soft materials (pith of plants, rotted wood, etc.). The most common leafcutter bees (*Megachile* spp.) then line the cavity with fragments of leaves they cut from plants and

form into cells. However, the wool carder bee instead lines these cavities with plant hairs.

Therefore, one is likely to find the wool carder bee where one plants “woolly” leaved plants. Lamb’s ear (*Stachys*) is a particularly good plant to encourage the local activity of this insect.

Shelter/Nesting Needs of some Garden Insects

Insects that create nests have special shelter needs that also must be met if they are to be encouraged in a garden. This need is widespread among many of the bees and wasps. Among these are the following, along with the type of shelter that can assist their establishment.

Mason bees (*Osmia*). These are solitary bees in the leafcutter bee family, some of which have been heavily promoted as good, early season alternatives to honey bees for pollination of fruit crops. These bees create separate nesting cells through use of mud partitions. Nests that they use are existing cavities. These can be provided by use of predrilled wood blocks, with a diameter of about 1/4-3/8 inch. Alternately, bundled soda straws are useful for nesting.

Leafcutter bees (*Megachile*). These are the most commonly recognized of the leafcutter bee family as they produce characteristic semicircular leaf cuts when harvesting leaf fragments for nest construction. These will nest in predrilled wood, similar to the mason bees. They will also excavate their own cavities out of rotten, soft wood. Large diameter branches or stems of pithy plants may be used by some species.

Leafcutter bees (*Anthidium*). These leafcutter bees line existing cavities with plant hairs rather than leaf fragments. Lambs’-ear (*Stachys*) is the plant most often noted to be associated with nesting of this species.

Ground nesting bees (Andrenid bees, digger bees, sweat bees). Several groups of solitary bees nest in soil, rather than using aboveground cavities. Slope, soil texture, and surface debris are all critical in the selection of a nest site by these bees. It is difficult to develop a site that may be used by these bees; instead conservation of bee nesting sites that have been accepted and used by the bees is recommended.

Paper wasps (*Polistes*). These common social wasps can sting. However, they also have a tremendous appetite for many of the more important garden pest insects, notably caterpillars. The paper wasps for open-celled paper nests that hang and open downward. Nests are constructed in areas of shelter, typically some overhang (e.g., eaves) or in small cavities. Rough metal or wood surfaces are particularly acceptable by these insects. The paper nests are constructed from chewed wood fibers, often using weathered wood of fences, porches and similar materials.

Pith nesting hunting wasps. There are many common species of solitary hunting wasps in the family Sphecidae. These are docile (to humans) and specialize in certain insects. Each constructs their own nest, with some nesting in soil like the ground nesting bees. However, among the more common in yards/gardens are small wasps of the genus *Pemphredon*. These specialize in hunting aphids, which they paralyze and cache within the pith of plants. Old cane or other pithy plants provide excellent habitat for nesting.

These will also nest in cut rose canes; their subsequent nesting is confined to the pith area and causes very little, if any, harm to the plant.

Mud daubers. The black-and-yellow mud dauber (*Sceliphron caementarium*) can be a fairly common insect that produces a unique mud nest in the form of tubes. These wasps hunt spiders, which they paralyze and cache in the mud nest. The presence of a muddy spot is need for nesting by these insects. Nests are commonly established on the sides of buildings under some overhang shelter.

Mulch and Insect Migations into Homes

The use of mulch is a desirable practice for gardening in the region. However, the heavy use of some mulches – such as shredded bark/wood – when placed adjacent to building foundations can increase incidence of some insects entering buildings. This is particularly true for species that use the mulch for cover or that thrive in the conditions of relatively higher humidity that the mulches provide.

Some of the arthropods that may use increase within mulched sites – and then incidentally wander indoors – include the following:

Sowbugs/Pillbugs (roly-poly)	Pillbug hunter spider (<i>Dysdera crocata</i>)
Millipedes	Earwigs
Springtails	Odorous house ant
Field crickets	

“Double or Nothing” Insects

Some kinds of aphids and related insects require two different host plants to complete their life cycle. Often one of these is a woody plant on which they lay overwintering eggs in fall and then develop on during spring (winter host). In late spring they then produce winged forms that depart for different plants on which they feed in summer (summer host). When both winter hosts and summer hosts are present in close proximity the insects are much more likely to become abundant and damaging. If either host is absent, populations of these insects are usually greatly lessened.

Some examples of these “double or nothing” insects include the following:

Insect Species	Winter Host	Summer Host
Cooley spruce gall adelgid	Spruce	Douglas-fir
Carrot-willow aphid	Willow	Dill, parsley, carrot
Woolly elm aphid	American elm	Serviceberry (roots)
<i>Thecabius lysmachiae</i>	Black poplar	Moneywort
Sugarbeet root aphid	Poplars, cottonwood	Beet, lambsquarter (roots)
Lettuce root aphid	Lombardy poplar	Aster family (roots)

The Colorado State University Insect Information Web Site. The Insect Information is a central source for all manner of information related to insects that occur in Colorado – from bees and bed bugs to water garden insects. Over 200 fact sheets, various posters and booklets, and many other materials can be accessed at this site. (Powerpoint presentations for 2013 are also archived there – including the one which goes with this handout.)

To find the site visit the Department of Bioagricultural Sciences and Pest Management home page (a web search “BSPM CSU” should bring it up.) Go to “Extension” and click on “Insect Information”. You are there!

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