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Attracting Butterflies with Native Plants

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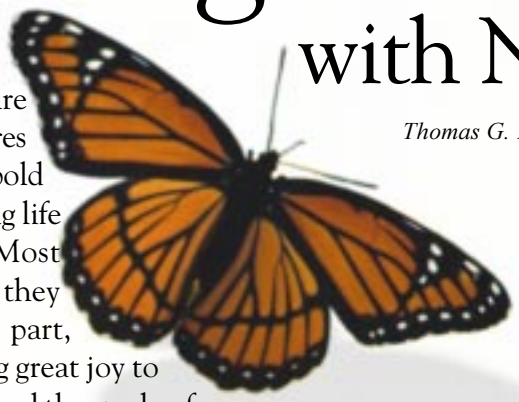

Flying flowers, as butterflies are sometimes known, are creatures of tantalizing beauty, flashy and bold colors, dazzling flights, interesting life history, and endless variety. Most people appreciate them because they are delicate and, for the most part, completely harmless. They bring great joy to those who watch them float around the garden from spring through fall. Their remarkable diversity and beauty draw people to develop gardens in an effort to bring them closer.

Zabulon skipper on cut-leaf prairie dock.

As natural butterfly habitats are destroyed and agricultural interests continue to use insecticides that are harmful to the butterfly, gardeners have discovered they can provide new areas where these delicate creatures can breed, find food, and lay eggs for future generations to enjoy. In providing for the needs of butterflies, the gardener has the pleasure of watching these colorful insects around them and the opportunity to keep in touch with nature. They also provide additional benefits in opportunities for education and photography and the pure enjoyment of their beauty.

Butterfly gardening can be as simple or complex as you want to make it, depending on the amount of time and money you wish to devote to it. However, to be successful you must look at the world through the eyes of a butterfly. By understanding some basic butterfly biology and ecology, you can provide for the basic needs of a butterfly and attract more of them to your yard.

Butterflies belong to the group of insects called *Lepidoptera*, which means "scaly wings" in Greek. The beauty of butterflies arises from the pigmented scales that cover their wings. There are more than 165,000 different species of butterflies and moths in the United States. The majority of *Lepidoptera* are moths. Of the 165,000 *Lepidoptera* in North America, only about 700 are butterflies. In Kentucky, 143 species of butterflies have been observed, and more than 2,200 species of moths are found in Kentucky.

How can you tell the difference between a butterfly and a moth? Perhaps the easiest method is to look at the insect's antennae. Butterflies usually have clubbed antennae, whereas moths have fuzzy antennae. Another useful characteristic for identification is behavior. Moths are generally active at night, and butterflies are usually active during daylight hours. Finally, butterflies are generally more colorful than moths. However, there are exceptions to all these rules. For example, the hummingbird moth is somewhat colorful, and it can be seen feeding on flowers during the daylight hours.

Butterfly anatomy consists of a head, thorax, abdomen, six legs, and a pair of antennae. One of the most remarkable characteristics of butterfly biology is that these insects undergo a process called complete metamorphosis. This is a fancy way of saying that adults lay eggs, the eggs hatch into larvae (called caterpillars), the caterpillars eat and ultimately pupate to form a chrysalis, the pupa emerges as an adult to continue the life cycle. The primary advantage of this lifestyle is that it allows the caterpillars and adults to live in different places.

What can we learn about their anatomy and lifestyle to help us attract them to the garden? Butterflies use the tips of their legs to "taste" a food source before drinking. Their mouthparts

Life cycle: Adult female black swallowtail lays eggs on fennel, a host plant. Eggs develop into a caterpillar, which pupates. An adult will emerge from the cocoon, and the life cycle begins anew.

Adult

Eggs

Caterpillar

Cocoon

are modified into a long tube, called a proboscis, which is coiled at rest. The length of this tube and legs limits the types of flowers an adult butterfly can use to obtain food. For example, only the skippers and swallowtails, which have long nectar-sipping tubes, can drink from the beardtongue (*Penstemon*) flower. Some butterflies, like those in the goatweed group, which includes species like the hackberry, tawny emperor, red-spotted purple, and mourning cloak butterflies, don't particularly like nectar and feed on aphid sap, rotting fruit, tree sap, dead and decomposing critters, or animal dung. Often these butterflies have a very short proboscis. With its slender nectar-drinking straw tube, an adult butterfly could not possibly obtain enough nutrition to reach full size without the caterpillar life stage.

The caterpillar stage is very important and is perhaps more important than the adult stage. Caterpillars have large jaws and a huge gut. Their primary goal in life is to eat and grow to a size where they can pupate. While an adult can roam over the landscape, caterpillars are pretty sedentary, meaning they don't move much. Their entire world can consist of a single leaf or plant. Although they have huge appetites, they are highly selective about what they eat. The adult female lays an egg in the right spot on the right plant for the caterpillar. The caterpillar then eats and eats and eats until it pupates.

From a gardener's point of view, you must know what plants caterpillars like to eat. By attracting the caterpillars, you will most surely get the adults that will feed on a variety of flowers. For instance, the spicebush swallowtail feeds exclusively on spicebush and sassafras. The black swallowtail feeds on parsley, dill, fennel, and members of the carrot family. The monarch caterpillar feeds exclusively on milkweeds. This knowledge of larval food plants (see Table 1 for a listing of common species) will help you to understand which butterflies can be attracted to urban environments. For instance, the Diana fritillary, found in eastern Kentucky, would not be found in central Kentucky because the plants its caterpillar eats, a particular violet, are not found there. You may be able to attract unusual butterflies to the garden by planting larval foods. Although it is highly unusual to find a pipevine swallowtail in Lexington, one was sighted there because it was flying by and found Dutchman's pipevine planted in a yard there. Caterpillar food plants should become your garden's foundation plants if you are a serious butterfly aficionado.

All butterflies go through complete metamorphosis. However, each species varies in the number of generations (called flights or broods) that are produced in a single year. For example, tiger swallowtails can have two or three flights per year, and the

Great purple hairstreak on dogbane.

Pearl crescent and spicebush swallowtail on butterfly weed.

Red admiral and pearl crescent on black-eyed susan.

Clouded sulphur on narrow-leafed purple coneflower.

Edward's hairstreak has one flight from late June to early July. The two best times to see butterflies in Kentucky are the mid-June to mid-July period and the mid-August to mid-September period. These two periods coincide with major brood productions by many species. Hence, many of the excellent butterfly-attracting flower species bloom during these two periods.

Like many insects, butterflies do not live very long. In some species, the entire life cycle can be completed in a month or two. The adults may live only a week or two. The mourning cloak is a granddaddy among butterflies because it overwinters as an adult, and some of these individuals may be 11 months old when sighted the following summer. Other members of the brushfoot family overwinter or hibernate as adults.

Butterfly hibernation boxes were designed to provide overwintering habitat for these butterflies. The little research that has been done on these boxes show that they are not used much at all. There are better methods of providing this type of habitat: you can save old wooden fences and trees that are dead or dying, plant trees like river birch with exfoliating bark, and leave old loose siding on outbuildings.

Although the brushfoots overwinter as adults, other species, like the monarch, migrate to the southwestern states and Mexico. Monarchs are particularly abundant in the late summer, and, as they travel southward, they find asters and goldenrods that provide an excellent source of nectar. Another life history strategy used by the red-spotted purple is to hibernate as a caterpillar. For this caterpillar, you would need to provide oaks, poplars, willows, wild cherry, and hawthorns. Some species, like the hairstreaks, overwinter as eggs. For the

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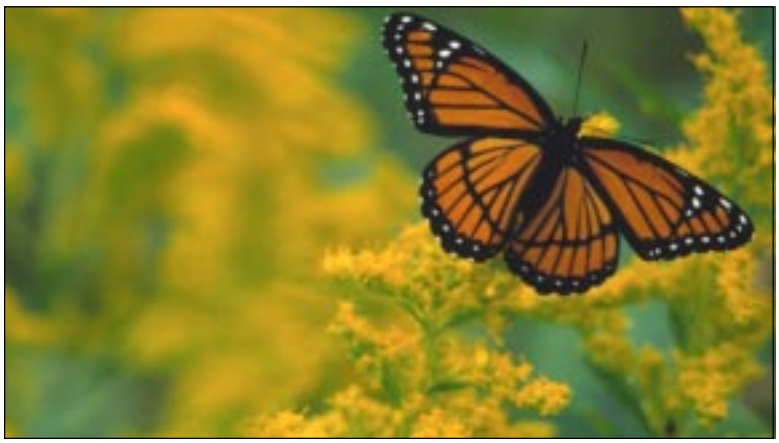
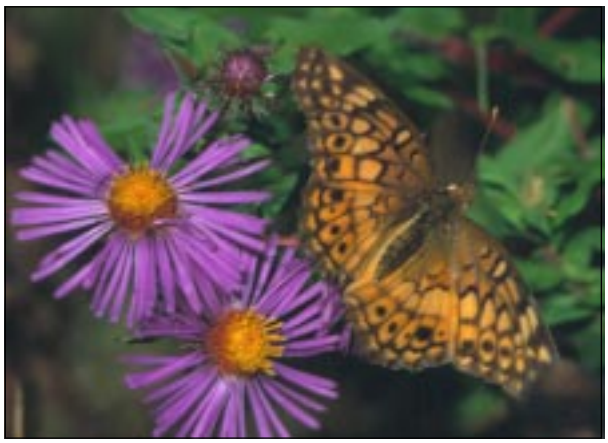


Viceroy on tall goldenrod.



Meadow fritillary on aster.

Silver-spotted skipper on buttonbush.

Gulf fritillary on dense blazing-star.

gray hairstreak, this would mean providing hibiscus, legumes, or strawberries as a place for them to lay their eggs.

Some basic butterfly biology will help you understand the biological reasons behind various recommendations designed to attract adult butterflies. Just like reptiles and amphibians, butterflies are "cold-blooded," and they use their behavior to regulate their internal body temperature. They can fly when the ambient air temperature ranges from 60° to 108°F. Optimal internal temperature ranges from 82° to 100°F. They regulate their body temperature by using a behavior called basking, when they spread their wings on a light-colored rock, sand, or leaf. Flat rocks in the garden that warm up quickly in sunny locations are commonly used as basking perches by adult butterflies. Furthermore, butterflies prefer feeding in sunny areas protected from wind. This would be important to consider when you are deciding where to put your butterfly garden.

When butterflies get too hot, they head for shade, close their wings, and orient themselves parallel to the sun's rays, or they seek cool areas like a moist sand "puddle." As a gardener, you can develop shady areas with a salt/sand puddle. The males of some species will congregate at shallow puddles or damp mud, sipping water to obtain minerals such as salt, which is thought to be important for successful reproduction. You can create a simple "mineral spa" in your backyard by installing a water dripper over an area of bare sand, soil, or gravel in the shade. Adding stale beer, salt, manure, or rotting fruit to this area will make it even more attractive to butterflies.

Flat rocks in the garden that warm up quickly in sunny locations are commonly used as basking perches by adult butterflies.

Butterflies require cover for resting out of view of predators and for laying eggs. Species that overwinter as adults or larvae seek cover under loose tree bark, in tree cavities and log piles, and under leaf litter and mulch for hibernating.

Although caterpillars are highly selective in what they eat, adults are not so picky. What are they looking for in flowers? Nectar is the good stuff for butterflies. It is nothing more than sugar water with a few other goodies like amino acids, vitamins, proteins, flavonoids, and enzymes. Its sugar content can vary from 8 to 76 percent, but most flowers have about 20 to 25 percent. High-quality nectars often do not have the highest sugar content but do have larger amounts of nitrogen-rich amino acids. Flowers make the best nectar on a clear, hot day preceded by a cool night. That is why you see these wonderful creatures flitting and dancing around the flowers in the late afternoon on the hot, humid "dog days" of summer. There is good stuff to be eaten under these conditions.

Butterflies are amazing insects in that they have compound eyes and can see color. However, they are very nearsighted and are more attracted to large stands of a particular type of flower. For a garden to be most effective, it should contain large splashes of color. The solid masses of color make the flowers easier to locate, and each butterfly has to expend less energy flying from one location to another to acquire the fuel it needs to remain active and grow. This

Monarch on common milkweed.

Olive hairstreak on early goldenrod.

cannot be overemphasized. The biggest problem with most butterfly gardens is that they have too few of any one particular species. It would be better to plant 50 of one species rather than five plants of 10 different species within any one period. For instance, if you are planting for the late June-early July period you might want to plant 50 purple coneflowers instead of 10 coneflowers, 10 black-eyed susans, etc. If you have sufficient space, the optimal design is to plant 50 individuals of 10 different species.

We know that butterflies see most colors, but findings differ about their color preferences. Some researchers say butterflies have preferences; others say they do not. What we do know is that butterflies find little attraction to flowers in the blue-green or greenish-blue range. Many seem to navigate toward the pinkish-light lavender, mauve, or light purple colors. Others like white or red or orange. There is some new evidence that butterflies can actually "learn" which species of flowers have the good stuff and return time and time again to these individual plants or species. In addition to color, many plants also have visual cues or lines that lead butterflies into the "garden of nectar Eden." However, we may not see these cues because the butterflies see them in ultraviolet light.

In locating nectar, butterflies may actually cue in more on fragrance than color. Have you ever noticed how sweet common milkweed smells when it is in bloom? Have you also noticed how many of the "good" butterfly-attracting flowers are quite fragrant? Many species have a strong odor when the flower is making nectar. After pollination, the color and odor change because the flower shifts from making nectar to producing fruit.

In addition to color and fragrance, flower shape is very important in determining butterfly use. For example, the short-tube flowers of lantana, phlox, and verbena have nectaries that are at the base of the tube and are readily available to butterflies. Most butterfly-pollinated plants also have many flowers in a flat-topped cluster or have a large landing platform (i.e., large petals). Furthermore, each of the individual flowers often has a narrow entrance to keep bees and other insects out.

The ideal butterfly flower would have:

- 20 percent sugar
- lots of nitrogen-rich amino acids
- small, short-tubed flowers with wide, flat rims
- clustered flowers, and
- many clusters per plant.

What, then, are the best plants to attract butterflies? Native plants are best because butterflies have adapted to using them over thousands of years. In some cases, the insects have co-evolved with their particular caterpillar- and adult-food plants. Other reasons to use native wildflowers include their natural hardiness. These plants are adapted to whatever nature hurls at them, including extended periods of drought or excessive rain. They can tolerate cold or heat. Furthermore, there is a great diversity of species that are beautiful and adapted to any growing condition a gardener might face. In her book *Butterfly Gardening*, Jo Brewer makes the point that the best

European skipper on mistflower.

Gray hairstreak on woodland sunflower.

Red admiral on purple coneflower.

wildflowers to add to your garden are native plant species that you purchase. She describes her experience in Texas with seeing a wild lantana shrub covered with butterflies, but when she tried to achieve the same effect in New England by planting a purchased pot of lantana in her garden, she was disappointed that butterflies ignored the plant.

Also, when selecting native plant species, try to purchase pure "wild" stocks if you want maximum butterfly use. In the process of selecting traits for horticultural purposes, such as disease resistance, bigger blooms, longer bloom period, etc., small changes may occur to the fragrance, shape, invisible color or lines, or structure of the individual flowers. We might not notice the changes in the flowers, but the butterflies might.

Native wildflowers should not be confused with naturalized wildflowers, which are nonnative plants that persist in the wild without cultivation. Many Eurasian species like Queen Anne's lace, chicory, ox-eye daisy, yarrow, and dame's rocket have become naturalized. In some situations, several of these plants have become quite invasive and have degraded thousands of acres of natural areas.

Although most butterflies do not have specific flower preferences, some do prefer a certain flower. For instance, the blazing-star *Liatris ligulistylis* has a specific odor that only attracts monarch butterflies. As you can imagine, it is a monarch magnet. The blazing-star skipper is known to prefer *Liatris punctata*. The genus *Liatris*, or the blazing-stars, seem to be one of the butterfly's favorite plants. They all have the characteristic light-purplish flowers clustered on a stalk. The members of this genus range in size, and different species bloom from late June through the first frost. The following species are native to Kentucky: *L. squarrosa, L. cylindracea, L. spicata, L. microcephala, L. scariosa, L. pynchnostachya, L. squarrulosa,* and *L. aspera*.

In your quest to select the "best" or most attractive species, consider the following information. Forty-two species of butterflies are known to use common milkweed. Twenty species are known to use swamp or red milkweed, and an additional nine are known to use butterfly weed. If you are serious about butterflies, you are serious about milkweeds. Unfortunately, milkweeds do not like heavy clay soils, and they can be difficult to grow in the typical urban yard. For several species, it may take three to four years for plants to mature and produce flowers. If you do not want milkweeds to reproduce via seed, deadhead the blooms. These are a must for monarch caterpillars.

Because the best times to observe butterflies in Kentucky occur during the two distinct periods mentioned previously, these additional "best" nectar flowers are grouped by midsummer or late-summer.

Midsummer Blooming Native Wildflowers

Purple coneflowers are used by at least 22 species. There are numerous species and cultivars of this classic plant. Species well adapted to our area include *Echinacea purpurea, E. pallida*, and *E. simulata*. These hybridize easily, and, by planting different species and collecting seed, you can get some wonderful and interesting coneflowers.

Two interesting shrubs that are excellent are buttonbush and New Jersey tea. New Jersey tea is used by at least 13 species. This is a small shrub with clusters of white flowers. Buttonbush is a wetland shrub that has a ball of white flowers. It grows well in urban soils and is used by at least 13 species. I have observed dozens of swallowtails fighting over one cluster of flowers.

One final group of plants to mention are actually the number-one butterfly-attracting flowers, the dogbanes. More than 43 species of butterflies have been observed feeding on this plant. These plants are often quite weedy, and many homeowners may not want to include them as part of a flower garden. You can purchase seed if you have an out-of-the-way location. This species, along with the butterflies attracted to it, may be one you just want to enjoy in the wild.

Late-Summer-Blooming Wildflowers

Our native asters are used by at least 19 species of butterflies. While the native asters are worthwhile plants for any garden, you must be careful which species you use and where you put them. Many species are aggressive and will sprout easily from seed. They are all late-August to October bloomers and come in a variety of colors ranging from white to light blue to dark purple. Some of the species available in nurseries include aromatic, Short's, western silky (this one is definitely not invasive and is spectacular in color), New England, and calico.

Pearl crescent on red or swamp milkweed.

Black form tiger swallow on joe-pye-weed.

Right behind the asters is our state flower, the goldenrod, which is used by at least 18 species. Contrary to popular mythology, this species does not cause hay fever or allergic reactions to the pollen. Some species are not recommended, like Canada or tall goldenrod, because they are aggressive and allelopathic (containing chemicals that inhibit other plants from growing around them). Some nonaggressive species are Ohio, showy, rigid, and gray.

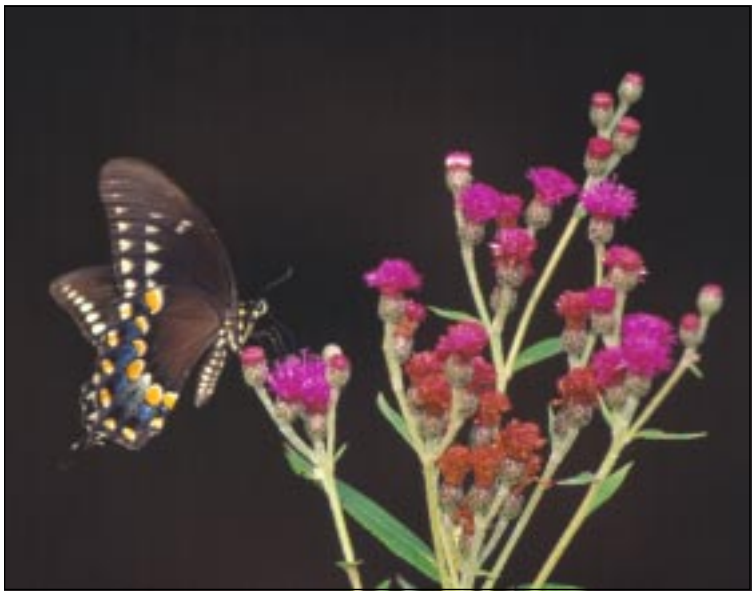
Plants in the Genus *Eupatorium*

The joe-pye-weeds native to Kentucky are *E. fistulosum* and *E. maculatum* (spotted). These are large plants reaching 10 to 15 feet tall that bloom in late summer. To keep them at a manageable size, cut the stalk when the plant is about 4 feet tall. All the *Eupatoriums* are excellent in attracting butterflies. Mistflower (*E. coelestinum*) has bluish-purple flowers that skippers love. Finally, if you have an out-of-the-way place, put in a little ironweed and vervain.

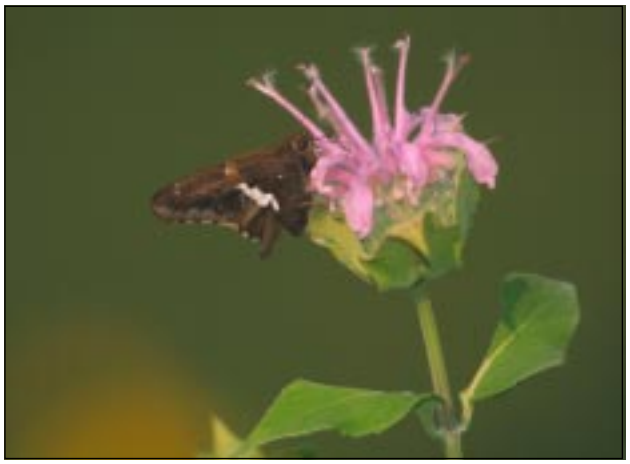
Here are a few additional suggestions that may help you bring those flying flowers into the garden.

- When designing a garden, a very good color scheme is to plant warm colors (red, yellows, oranges) in the center of the garden and use cool colors (purples, whites, blues) for contrast. Try not to overdo the contrast. Keep in mind that most butterfly flowers are full-sun flowers and require at least six hours of full sunlight each day to produce blooms. Remember to use caterpillar plants as your garden foundation plantings.
- If possible, do not use a garden sprinkler to water the plants. Butterflies cannot feed while the sprinkler is in operation, and the water dilutes the nectar in the flowers. Use a soaker hose whenever possible.
- Try not use any commercial pesticides because these chemicals will destroy the very insects you are trying to attract. Most of the chemicals are indiscriminate killers and do not differentiate between a butterfly and a grub. The best defense against pests is to properly maintain your flowers so you have healthy plants. Make sure that they are planted in good soils, are well spaced, receive adequate moisture, and get lots of sunshine.

Most of all, enjoy the spectacular beauty these colorful insects provide you during the summer months.



Spicebush swallowtail on ironweed.



Silver-spotted skipper on bergamot.

Table 1. Food plants and puddle use of common Kentucky butterflies.

Butterfly		Caterpillar Food	Adult Food	Puddles
Anglewings	Comma	elm, hops, nettle, hackberry	sap, fruit, nectar	
	Question mark	hackberry, elm, nettle	sap, fruit	Yes
Blues	Eastern tailed	legumes	nectar	Yes
	Spring azure	dogwood, wild cherry, spirea, New Jersey tea, viburnums	nectar	Yes
Buckeye		monkey flower, plantain, verbena	nectar	Yes
Copper, American		dock, sorrel	nectar	
Fritillaries	Great spangled	violets	nectar	
	Gulf	passion flower	nectar	Yes
	Meadow	violets	nectar	
Hackberry		hackberry	sap, fruit, nectar	
Hairstreaks	Banded	hawthorne, hickory, oak	nectar	
	Gray	hibiscus, legumes, strawberry	nectar	
Monarch		milkweed	nectar	
Mourning cloak		birch, cottonwood, elm, hackberry	sap, fruit, nectar	Yes
Painted ladies	American	sunflowers, pussytoes	nectar	Yes
	Painted lady	sunflowers	nectar	Yes
Pearly crescent		asters	nectar	Yes
Red admiral		hops, nettle	sap, fruit, nectar	Yes
Red-spotted purple		hawthorn, hornbeam, oak, poplar, wild cherry, willow	sap, fruit, nectar	
Satyrs	Wood nymph	grasses	nectar, plant juices	
	Wood satyr	grasses	sap, rarely nectar	
Skippers	European	grasses	nectar	
	Fiery	grasses	nectar	
	Silver-spotted	locust, woody legumes	fruit, nectar	Yes
Snout		hackberry	fruit, nectar	Yes
Sulphurs	Alfalfa	legumes	nectar	Yes
	Clouded	legumes	nectar	Yes
	Cloudless	legumes, senna	nectar	Yes
	Dainty	sneezeweed	nectar	Yes
	Dogface	legumes, indigo bush, prairie clover	nectar	Yes
Swallowtails	Black	plants in the carrot family	nectar	Yes
	Giant	Hercules's club, prickly ash	nectar	Yes
	Pipevine	pipevine	nectar, fruit	Yes
	Spicebush	spicebush, sassafras, tulip poplar	nectar	Yes
	Tiger	hornbeam, paw paw, sassafras, spicebush, tulip poplar, wild cherry, wild plum	nectar	Yes
	Zebra	hornbeam, paw paw, spicebush, tulip poplar	nectar	Yes
Tawny emperor		hackberry sap	fruit, nectar	
Viceroy		apple, cottonwood, plum, wild cherry, willow	sap, fruit, nectar	Yes
Whites	Cabbage	plants in the mustard family	nectar	
	Checkered	plants in the mustard family	nectar	