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Beyond Butterflies:
Gardening for Native Pollinators

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> A garden is only as rich and beautiful as the integral health of the system; pollinators are essential to the system – make your home their home.
> *– Derry MacBride, National Affairs and Legislation Chairwoman, Garden Club of America*

Introduction

Plants have a remarkable mechanism to guarantee reproduction. Unlike animals, which are free to roam about and seek mates, plants are rooted to one spot in the ground. Pollination allows plants to reproduce sexually with other plants over large areas. Over millions of years, plants developed a remarkable range of strategies to guarantee that the male and female parts of the flower get together to produce offspring, or seeds.

Pollination is the name of the process through which *pollen* is transferred from the male parts of a flower to the female parts of the same flower, or to a different flower of the same species. Some plants are self-pollinated or wind-pollinated, but most depend on insects, birds, bats and other organisms, collectively referred to as *pollinators*, to transport the pollen for them. Pollination is essential to successful reproduction in more than 90 percent of the 250,000 flowering plant species now in existence. More than 100,000 varieties of insects, including bees, moths, butterflies, beetles and flies, serve as pollinators, as do at least 1,035 species of vertebrates, including birds, mammals and reptiles.

Pollinators play a significant role in producing:

- More than 150 food crops in the United States
- Fibers we use
- Medicines that keep us healthy
- More than half of the fats and oils in our diet

Unfortunately, there is increasing evidence that the health and populations of many pollinator species are in decline. This poses a significant threat to biodiversity, global food webs and human health. Using some basic principles, home gardeners and landscapers can create pollinator-friendly gardens to preserve native pollinator populations and enjoy the beauty and interest they provide.

Pollination's Importance

When most people hear the word "pollen," they think of allergies. A recent survey showed that three-quarters of the visitors to a pollination exhibit related pollen to allergies but did not recognize its role in plant reproduction. Both pollen and pollination are vital to the well-being of humans and are also an essential part of a healthy ecosystem.

Pollinators are also vital to agriculture. They play a significant role in the production of more than 150 food crops in the United States, including apples, alfalfa, almonds, blueberries, broccoli, cucumbers, peaches, soybeans, strawberries, kiwis, melons, onions, pears, plums and squash. In fact, every third bite of food we eat comes from a plant that depends on insect pollinators. They are essential to the fibers we use, the medicines we take to keep us healthy and more than half of the fats and oils in our diet. Healthy pollinator populations increase the amount and quality of the fruit produced, and help make fruit larger, too. For farmers, this increases the production per acre. The annual value of all pollinators (exclusive of managed honeybees) to U.S. agriculture is estimated between $4.1 and $6.7 billion.

In addition to their value to agriculture, native pollinators are essential for maintaining the structure and function of a wide range of natural communities in

North America. In the wild, an abundant and healthy population of pollinators increases biodiversity and creates more food for wildlife. The availability of native pollinators is as important as moisture, sunlight and soil fertility to the reproductive success of nearly half the world's flowering plants.

How Pollination Works

All grasses and many trees rely on the wind to move pollen, but animals can transfer pollen from one flower to another more efficiently as they search for food. Insects are the most common animal pollinators. They have physical characteristics that make them extremely efficient at locating flowers and transferring pollen from one flower to another.

Pollination is defined as the transfer of pollen from the male parts of the flower to the female parts. The male parts of a flower are collectively called the *stamens*. Each stamen is made of a slender, elongated *filament* holding an *anther* at the tip. At the right time, the anther releases *pollen grains* that carry the male genetic material.

The female parts of the flower are collectively called the *pistil* and are made of three parts: the *ovary* with the *ovules*, a stalk-like *style* and a sticky *stigma* on the end. When a pollen grain lands on a receptive stigma, the pollen grain forms a *pollen tube*, which grows down the style to the ovary. Male genetic material passes down the pollen tube and fertilizes an ovule. The ovule becomes a seed and the surrounding ovary develops into the fruit.

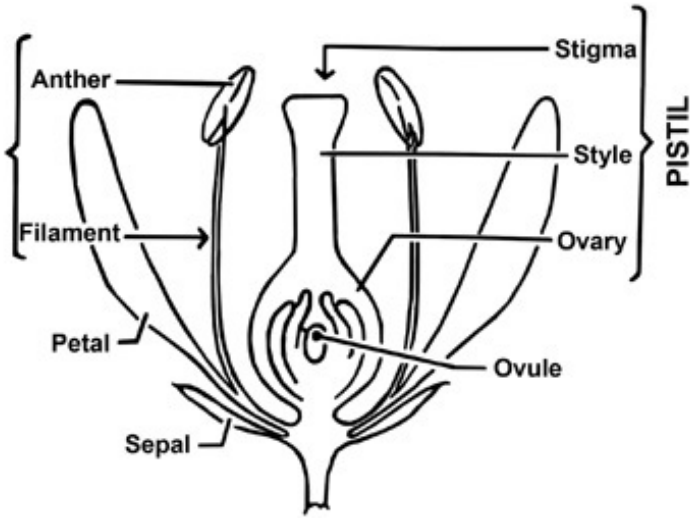

Figure 1: Parts of a Flower.

Flowers Attract Pollinators

Flowers produce nectar, a highly nutritious substance containing sugars, B-vitamins, amino acids, lipids and other organic materials. Nectar is an important food source for pollinators. The flower petals, which are usually the most noticeable parts of flowers, are designed to attract and provide landing platforms for insects and other pollinators. The base of many petals contains nectaries, which produce the nectar. Pollinators visit flowers to collect pollen and nectar as food. Since this desirable food source is tucked deep into the flower, a pollinator is coaxed into touching the flower's reproductive organs, and thus getting pollen stuck to its body. The insect transfers the pollen when it visits the next flower to collect nectar and pollen. Pollen itself is a way for many animals to get the proteins they need to grow. In addition, a few plants reward their pollinators with fatty oils, resin or wax, which provide other nutrients they need to grow and reproduce.

Important Pollinators

Flies are economically important pollinators of a number of ornamental annual flowers and bulbs—including cacao, the main ingredient in chocolate. Bats and some birds serve as pollinators to certain plants. Many bat species live in tropical areas where they pollinate fruit-bearing plants such as the banana tree, and trees used for timber, silk cotton, and balsa wood. However, insects—especially beetles, flies, ants, bees and wasps, butterflies and moths—are the most important pollinators.

Among insect pollinators, bees are especially efficient because they eat pollen and nectar exclusively and visit many flowers of the same species during a single trip. They have hairy bodies that easily pick up pollen grains, making pollen exchange or transfer possible. There are more than 3,500 species of native ground-nesting and twig-nesting bees and wasps in the U.S. Also called pollen bees, these native bees are very efficient pollinators. Pollen bees are usually gentle and have only a mild sting or don't sting at all.

The bumble bee is another common, native ground-dwelling bee of the southern United States. Bumble bees live in small colonies of up to 200 individual bees with a single queen. Only the queen lives through the winter, beginning the colony again in the spring. Bumble bees are especially good pollinators of blueberry, tomato, eggplant and pepper.

One of the most important bees—the honey bee—is native to northern Europe. Honey bees were brought to the U.S. for the honey and wax they make. A hive of honey bees may have more than 30,000 individuals living together. The bees live through the winter and have the ability to keep the temperature of the hive at 63 degrees F even in the coldest weather. Honey bees are important pollinators because they can be kept in managed hives by beekeepers. Honey bee hives can be easily moved from one crop field or orchard to another, as needed for pollination. In the United States, the added value to agriculture from honey bee pollination is more than $15 billion annually. In Georgia, bee hives are rented to farmers to pollinate apples, blueberries, cucumbers and watermelons. Bee-pollinated forage and hay crops, such as alfalfa and clover, are used to feed the animals that supply meat and dairy products. In addition, colonies of wild honey bees can be found in most of the U.S.

Butterflies and moths are also effective pollinators. When a butterfly or moth visits a flower to eat nectar, tiny scales covering their bodies brush against the anthers and pollen sticks to the scales. When the butterfly or moth visits the next flower, the pollen stuck to its scales brushes onto that flower's stigma. Since butterflies are attractive and interesting, we often create special gardens to attract them to our living spaces.

Declines in Native Pollinator Populations

There is increasing evidence that the health and populations of many pollinator species are in decline. More than 50 pollinator species in the U.S. are listed as threatened or endangered by the U.S. Fish and Wildlife Service, including the Mexican Long-nose Bat from the southwestern U.S. For most pollinator species, the lack of long-term population data and the incomplete knowledge of even basic taxonomy and ecology make it difficult to know exactly what is happening to their populations.

The services provided by pollinators contribute to the productivity of crops as well as to the survival and reproduction of native plants. In order for pollinators to survive and flourish, they require the following things:

- Food, shelter, water;
- Living space;
- A place to reproduce undisturbed; and
- Nesting materials.

These things can usually be found when the natural environment is undisturbed.

Two of the greatest threats to native pollinators are loss of habitat and the natural landscape being broken up into smaller pieces. Food supplies and nesting sites are jeopardized when undeveloped land is converted to subdivisions, agriculture, roads, parking lots or pastures. Isolated plants can't attract a variety of pollinators or visitors with enough frequency to sustain themselves and their pollination partners. Overuse and misuse of broad-spectrum pesticides are also a major threat to insect pollinators.

American farmers and home gardeners are concerned over the decline in wild honeybee populations. Two exotic parasites—the Varroa mite and the tracheal mite—introduced to the U.S. in the 1980s have virtually wiped out wild honeybees. Managed honey bees are also susceptible to these mites, and are also threatened by a mysterious new disease known as colony collapse disorder. Scientists believe a combination of pesticide exposure, stresses from the environment, nutritional stress, new pathogens and a new virus contribute to the loss of bee colonies. Destruction of nesting sites and food plants by human activities also threatens ground-dwelling native bee populations.

Creating Pollinator-Friendly Habitat

Home gardeners and landscapers can create pollinator-friendly gardens to preserve native pollinator populations and enjoy the beauty and interest they provide. If you are interested in creating a butterfly garden, expand that idea to include other native pollinators as well. It is important to think beyond butterflies to provide favorable environments for our many other native pollinators.

Plant a wide variety of nectar- and pollen-rich flowers. Choose plants with a diversity of colors, shapes and sizes. Some native pollinators are attracted to flowers of certain colors or shapes. A wide variety of colors and shapes will attract more pollinators and encourage them to make your garden their home. Planting large groups of flowers of the same color or kind together attracts pollinators much better than single, individual flowers scattered through the garden.

Use local native plants when possible. Native plants and native pollinators go together. The pollinators need the plants for their preferred food, nesting or egg-laying sites. In fact, certain pollinators cannot survive without a specific native plant that they or their young feed on. To learn which native plants provide large quantities of

nectar and pollen, and what insects visit them, see Table 1. Try to include both shrubs and trees in and around your pollinator's garden.

Include a variety of flowers that bloom throughout the season. In early spring, food may be scarce for native pollinators. Provide some plants that bloom in the early spring, some that bloom in the summer and others that bloom into the late fall. This will allow many different pollinators to find something they need in your garden throughout the growing season. The flowers of certain trees, shrubs, vines, and annual and perennial flowers attract native pollinators. When planning a pollinators' garden, include a variety of annual flowers, annual and perennial herbs and perennial shrubs such as those listed in Table 2.

Provide food sources and over-wintering places for eggs and larva. Adult pollinators usually prefer to feed on nectar, but the young larvae may eat leaves. For example, adult monarch butterflies feed on many plants that provide abundant nectar, but monarch butterfly caterpillars only eat plants in the milkweed family, such as *Asclepius tuberosa*, or butterfly weed. To have this type of butterfly in your garden, you should plant milkweeds for the larvae.

Provide water. Pollinators such as butterflies will gather and sip at shallow pools, mud puddles, shallow bird baths and saucers filled with water. Adult male butterflies will gather to suck mineral salts from the mud puddles. Bees and wasps will use the mud as building material. Insects need only shallow water, so a deep bird bath or pool is not as useful.

Avoid using pesticides, herbicides, insecticides and fungicides. Your pollinators' garden should be a pesticide-free space since many pesticides will kill them. Herbicides that eliminate weeds will also eliminate many food sources, hiding places and nesting places for native pollinators. The pollinators' garden is a good place to let the garden go wild.

Provide sites and materials for nesting and over-wintering. Leave twigs and brush in small piles. Leave tall plant stems uncut. Put out pieces of string or other light fibers to provide nesting material. Turn a cracked or broken clay flower pot upside down to provide a winter home. Place a log, stump or large tree branch in the garden as a place for native pollinators to hide, and as a place for butterflies to perch in the sun. Build a rock pile or wall, or make a pile of limbs for a hiding or resting place. A good pollinator's garden may look messy to some, but to the pollinators it looks like home.

Table 1: Some Native Plants that Attract Pollinators			
Botanical Name	**Common Name**	**Flowering Time**	**Visited By**
Trees and Shrubs			
Aesculus parviflora	Bottlebrush Buckeye	July-Aug	Butterflies, bumblebees
Aesculus pavia	Red Buckeye	April-May	Hummingbirds, butterflies, bumblebees
Aronia arbutifolia	Chokecherry	March-May	Butterflies, bees, wasps
Asimina triloba	Pawpaw	April-May	Butterflies, bees, wasps
Bacharis halmifolia	Saltbush	August-October	Butterflies
Callicarpa americana	American Beautyberry	June-July	Bees, wasps, butterflies
Celtis occidentalis	Hackberry	April-May	Butterflies
Cercis Canadensis	Redbud	March-April	Butterflies
Clethra alnifolia	Sweet Pepperbush	July	Butterflies, bees, wasps, hummingbirds
Cyrilla racemiflora	Leatherwood	May-July	Bees, wasps, butterflies
Fothergilla gardenii	Fothergilla	March-May	Bees, wasps
Ilex vomitoria	Yaupon	March-May	Bees, wasps
Illicium floridanum	Anise Shrub	April-May	Hummingbirds, bees, wasps, butterflies
Itea virginica	Virginia Sweetspire	May-June	Butterflies, bees, wasps
Lindera benzoin	Spicebush	March-April	Butterflies
Liriodendron tulipifera	Yellow Poplar	April-June	Butterflies, bees, wasps
Magnolia grandiflora	Southern Magnolia	May-June	Beetles, bees, wasps
Myrica cerifera	Wax Myrtle	April	Bees, wasps
Prunus serotina	Black Cherry	April-May	Butterflies
Sabal minor	Dwarf Palmetto	June-July	Bees, wasps
Sassafras albidum	Sassafras	March-April	Butterflies
Viburnum nudum	Possum Haw	April-May	Butterflies, bees, wasps, beetles, flies
Yucca filamentosa	Spoonleaf Yucca	April-June	Yucca Moth
Herbaceous Perennials			
Asclepias spp.	Milkweeds	June-August	Butterflies and moths, bees, wasps
Baptisia australis	False Blue Indigo	April-May	Butterflies
Boltonia asteroides	Boltonia	July-October	Bees, wasps
Echinacea purpurea	Purple Coneflower	June-August	Butterflies
Erythrina herbacea	Coral Bean	May-July	Butterflies
Eupatorium spp.	Joe-pye Weed	August-October	Butterflies, bees, wasps
Hibiscus coccineus	Scarlet Hibiscus	July-August	Butterflies
Liatris spp.	Gayfeather	May-August	Butterflies, bees, wasps
Lobelia cardinalis	Cardinal Flower	June-August	Hummingbirds, butterflies
Monarda didyma	Bee Balm	June-August	Butterflies
Phlox spp.	Phlox	April-August	Butterflies
Pycnanthemum spp.	Mountain Mint	July-September	Butterflies, bees, wasps
Rudbeckia spp.	Black-eyed Susan	June-August	Butterflies
Solidago spp.	Goldenrod	July-October	Butterflies, bees, wasps, beetles
Stokesia laevis	Stoke's Aster	May-August	Butterflies, bees, wasps
Vernonia angustifolium	Ironweed	August-October	Butterflies, bees, wasps

Table 1: Some Native Plants that Attract Pollinators (Continued)			
Botanical Name	**Common Name**	**Flowering Time**	**Visited By**
Vines			
Aristolochia macrophylla	Pipevine	May-August	Butterflies
Bignonia capreolata	Cross Vine	April-May	Hummingbirds, butterflies
Campsis radicans	Trumpet Creeper	June-July	Hummingbirds, butterflies
Gelsemium sempervirens	Carolina Jessamine	March-April	Bees, wasps, flies
Passiflora incarnata	Maypop	May-July	Butterflies
Wisteria frutescens	American Wisteria	April-May	Butterflies
Table adapted from: Selecting Plants for Pollinators: A Regional Guide for Farmers, Land Managers, and Gardeners in the Outer Coastal Plain Mixed Province. http://www.pollinator.org			

Table 2: Twenty-five Garden Plants that Attract Pollinators	
Common name	**Type or Use**
Abelia	Perennial Shrub
Anise Hyssop	Perennial Herb
Aster (many varieties)	Perennial Flower
Basil	Annual Herb
Black-eyed Susan	Both Perennial- and Annual- Type Flowers
Butterfly Bush	Perennial Shrub
Calendula	Annual Herb
Chives and Garlic	Perennial Herb
Cosmos	Annual Flower
Dill and Fennel	Annual Herb
Egyptian Starflower	Annual (Perennial in Coastal Georgia)
Goldenrod	Perennial Flower
Impatiens	Annual Flower
Lantana	Perennial Shrub in Coastal Georgia
Marigold (single-flowered types are best)	Annual Flower
Mexican Sunflower, or *Tithonia*	Annual Flower
Milkweed	Perennial Flower
Mint	Perennial Herb
Oregano	Perennial Herb
Petunia	Annual Flower
Salvia	Both Annual and Perennial Types
Sunflower (multi-flowered types)	Annual Flower
Thyme	Perennial Herb
Verbena	Both Perennial- and Annual- Type Flowers
Zinnia	Annual Flower

Conclusion

The availability of native pollinators is as important as moisture, sunlight and soil fertility to the reproductive success of nearly half the world's flowering plants. In addition to their value to agriculture, native pollinators are essential for maintaining the structure and function of a wide range of natural communities in North America.

Native pollinators need food, shelter, water, space, a place to reproduce undisturbed and places to nest or hide in order to survive and flourish. These things can usually be found when the natural environment is undisturbed.

Creating a pollinator-friendly habitat is as easy as any other type of gardening. By supporting pollinators' habitat needs, we support our own needs for food and support diversity in the natural world. This helps preserve native pollinator populations and bring them into our gardens so that we may enjoy the beauty and interest they provide.

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