

# **Putting the Buzz Back Into Your Garden**

## **Pollination by Insects**

Generally speaking the transfer of pollen, carried by foraging insects, from one flower to another is accidental. Bees forage for pollen and nectar. Nectar supplies the insects' carbohydrate needs. Pollen is the insects' dietary source of essential minerals and proteins. The pollen they take back to their nests does not benefit the source plant at all. Pollinating insects' bodies are covered with hairs. As the insect travels through the air these hairs develop an electrical charge. When the insect forages within the flower, some grains of pollen are drawn to these charged hairs. As the insect goes from one flower to the next, some of those pollen grains are brushed off and replacements attached. In the course of these transfers, pollination occurs.

Many plants require insect pollination to produce seeds. For these, the importance of pollinating insects is obvious. Just as important is the sharing of genetic material between plants of a species. This sharing of genetic material is what gives native plants many of the qualities we find so desirable. The plants' adaptation to the local environment and parasites is the product of eons of cross-pollination. Much of that shared genetic material rode from plant to plant on the hairs of insects.

## **Today's Bees and Their Problems**

### **Honey Bees**

Honey bees are surely the most studied insect. They produce an agricultural commodity; honey. They are important pollinators for a number of food crops. They have influential support groups; American Honey Producers, American Bee Federation, Almond Growers Assn., etc. Native insect pollinators don't enjoy those same, influential advocates. Yet, they are every bit as important.... probably more.

Fortunately much of the research conducted concerning honey bees also applies to other insect pollinators.

You've likely heard about Colony Collapse Disorder (CCD). Many large, commercial beekeeping operations have lost tens of thousands of colonies of bees. It's been estimated that over 30% of the commercial bee colonies were lost last year. The losses are unprecedented in both magnitude and symptoms. An apiary or holding yard containing vigorous, populous colonies of bees one day and the next day most of the bees have disappeared.

Consider this:

Many of the effected hives are from migratory beekeeping operations. Those bees are trucked across country to meet agricultural pollination contracts. As you might imagine this puts tremendous stress on those bees.

Those same hives are often placed in temporary holding yards along with as many as thousands of other hives from all across the country. Since the area surrounding these

yards cannot possibly provide enough forage for that many bees, those colonies are fed mixtures of sugar syrup (or high fructose corn syrup) and pollen substitutes. These artificial foods cannot possibly supply a balanced nutrition for the bees like a diverse, natural population of blooming plants would. The bees are malnourished.

In addition, if any colony of bees within one of these holding yards has parasites or contagion, all of the colonies are exposed.

The bee hives are moved to the target crop. These crops are typically grown in huge monocultures. The only nectar and pollen available are those supplied by the crop. No single plant species provides complete nutrients. The bees continue to be malnourished.

Honey bee colonies in this country and around the world have been parasitized by a variety introduced, exotic pests. Over the past thirty years tracheal mites, varroa mites, small hive beetles and now Israeli Acute Paralysis Virus (IAPV) have made their way from around the world and found a host in *Apis mellifera* (European honey bee). The general health of honey bees in this country has declined significantly as a result.

During some of the initial investigation of CCD testing was conducted to determine if these collapsed hives had been exposed to high doses of pesticides. Both failed and apparently healthy colonies had their beeswax (essential nesting material for developing brood) and pollen (food for developing brood) tested for common pesticides. Both healthy and CCD colonies contained significant amounts of a wide range of pesticides.

During these same investigations two new ailments, Nosema (*Nosema ceranae* – a protozoan) and Israeli Acute Paralysis Virus (IAPV) were discovered in US bee colonies. IAPV was found in every CCD colony. It was also found in a number of apparently healthy colonies.

### **Native Bees**

Sheila Colla is a bumble bee expert at York University in Toronto. She has been taking field surveys of a variety of species of bumble bee. She traveled to numerous sites in Ontario and Quebec as well as sites in 14 states. The results of her surveys are cause for concern. Out of 14 species found in 1970, she could only find 11. Of those 11 remaining species four were in decline. One of those four, the rusty-patched bumble bee, Colla was only able to locate a single specimen. What made that especially troubling is that the rusty-patched bumble bee used to be one of the most common bumble bees on the east coast.

What's ailing our native bees?

If a number of parasites and diseases have been inadvertently introduced to honey bee populations, then is it a stretch to imagine that similar exotics have been brought to the native bee population? In fact, some researchers theorize that the decline of some bumblebee species may have a disease that originated in Europe.

It's apparent that honey bees bring a variety of pesticides back to their nests from foraging. It's surely just as likely that natives are bringing home those same pesticides.

Problems unique to natives:

Loss of habitat – nesting and forage. In the mid-West and on the West Coast huge areas of farmland have been cleared and planted with monocultural crops. Add to that the RoundupReady crops. In the past when cultivated fields were planted, a variety of weeds germinated between the rows and at the fields' edges. These weeds provided some forage for insects. In RoundupReady fields those weeds are nonexistent. In many of these areas there is a nearly complete loss of nesting habitats and loss of forage. In North GA we don't have the same level of land cleared for agriculture. On the other hand, anyone who's driven through Oconee County during the last decade will have seen substantial habitat loss. Residential and commercial development is another significant source of habitat loss.

## **Some Important Pollinators in GA**

### **Social Bees**

#### **Honey Bees (*Apis mellifera*)**

The image that comes to most people minds when they hear the term insect pollinator. They are the most studied insect. Honey bees are highly social with nests containing as many as 60,000 individual bees at any one time. A sizeable population overwinters within the nest. Although a feral population exists, most honey bee colonies are managed and maintained by humans. As individuals, honey bees in general are not the most efficient pollinators. What they lack in ability they more than make up for in sheer numbers. Nearly half of the human managed honey bee hives are used for migratory crop pollination. It has been estimated that a third of what we eat is a result of insect pollination. Much of that pollination would not occur without honey bees. Honey bees aren't considered 'native'. Europeans introduced them in the mid 1600s.

#### **Bumble Bees (*Bombus* spp.)**

Bumble bees are very effective pollinators. Bumble bees are eusocial. Unlike the truly social honey bees, bumble bees have less structured nests that contain anywhere from one to five hundred bees and only a mated queen overwinters. They build their nests, often underground in old rodent burrows but also underneath fallen plant matter and on occasion in abandoned bird nests. A bumble bee colony is annual; the entire colony dies out each year and leaves only a single mated queen to hibernate through winter. A bumble bee queen single-handedly starts a new colony each spring. After she raises the first workers, she concentrates on laying eggs. Some bumble bee workers collect food while others maintain the nest and the young larvae. Colonies raise males and new queens towards the end of the growing season, usually between August and October.

## **Solitary Bees**

### **Carpenter Bees (*Xylocopa* spp.)**

Carpenter bees are some of the largest bees and have a blue-black, green or purple metallic sheen. They excavate their own nest tunnels in wood, rather than use pre-existing cavities, but they will re-use old nests. They burrow into dry wood pretty much anywhere they can find it, but they prefer softwoods like pine, and avoid wood that is painted or covered with bark.

A nest consists of a round entrance hole (½” in diameter) and a tunnel back from it that can extend up to several feet. Carpenter bees become active when temperatures climb into the 70s in the spring. Mating occurs in April. Carpenter bees are longer-lived than most solitary bees. Although carpenter bees can pollinate many types of plants, these bees often “rob” flowers by cutting into the side of flowers with their strong mouthparts to gain easy access to nectar instead of pollinating them.

### **Mason Bees (*Osmia* spp.)**

Bees in the genus *Osmia* are found throughout the U.S. These bees are usually smaller than a honey bee. These solitary bees don't excavate their own nests, but use existing holes in wood left behind from old beetle tunnels or nail holes. Mason bees are so called because they typically seal their nests with mud. Eggs are laid in tubular cells, with up to 11 cells per nest. The female lays male eggs closer to the entrance hole. This serves two purposes. First, the males are more accessible to predators than females, and second, males emerge several days before females. Once the nest has been provisioned and sealed it will remain that way until the following spring at which time the new brood will emerge and the cycle will begin again. Artificial nests can be made by drilling 5/16” holes into wood blocks. Mason bees' nests should be positioned so that they receive morning sunlight. Placing the nests close to streams helps as well, since mud for nest building can be collected there. Put the nests up in late winter or very early spring, before the bees begin nesting

### **Soil Nesting Bees (*Andrena*, *Colletes*, and other species)**

This group includes thousands of species. Two important species in the Southeast are polyester bees and southeastern blueberry bees. These bees excavate nests in the ground, leaving small mounds of soil aboveground. They are solitary, but some nest in dense aggregations. These bees pollinate a variety of plants. They are small and drab and rarely noticed, yet they are probably the most abundant wild pollinators in the field. Polyester bees are so called because they line their nests with a secretion that looks shiny and synthetic. This material is waterproof, highly resistant to decay, and protects larvae while they are in the ground.

### **Sweat Bees** (Halictidae family)

Sweat bees take their name from their habit of landing on people to lick the salt from their skin. Like most solitary bees, sweat bees are nonaggressive and will sting only in self-defense. Though most species of this small bee are black or brownish, some, such as *Agapostemon femoratus*, are bright metallic green. Halictids have a range of nesting habits, from dispersed solitary nests to densely situated ones with individual bees sharing common entranceways to primitive social arrangements.. Unlike other soil nesting bees, halictid females mate before hibernating for the winter, so they can begin nesting earlier in the spring. This allows them to raise only daughters during the growing season, much like bumblebees.

## **What Can I Do?**

### **Become a beekeeper.**

### **Give a mason bee a home.**

Mason bees are one native bee that will nest in man-made nests. Mason bee nests are readily available for purchase. They are also easy to make. Drilling 3/16 to 7/16 inch holes into a block of wood and mounting that block in a south facing, protected location will provide a nesting site for mason bees.

### **Pesticides**

Insecticides kill bees and herbicides may destroy plants that provide shelter and food.. Try to eliminate or reduce pesticide use. If insecticide use is necessary use the least harmful formulations. For example granules are safer than finely ground powders. Many pesticides break down quickly. Apply late in the day, preferably soon after dark when bees aren't active and by the following day the insecticide residues will be less toxic. Avoid drifting and overshoots. Apply according to label instructions.

## **Habitat**

### **Conservation**

Two fundamental principles exist for maintaining a habitat for bees. First, an area needs to support a density and diversity of nectar and pollen producing plants. Second, the area must offer suitable nesting sites. Bees do best in sunny, open areas with an abundance of flowering, forage plants. Open areas with soil that isn't tilled or compacted by heavy equipment offer more nesting sites and can support a variety of flowering plants.

Open meadows, field edges, exposed banks, roadsides and forest/field boundaries can all be bee sanctuaries. Idle farmland offers an opportunity to create a bee sanctuary at little or not expense to the property owner. Any of these areas left undisturbed will, over time increase in both plant and bee diversity. With that in mind, conservation of bee habitat should be long term. Undisturbed means no plowing. One plowing event can destroy many of the existing soil nests. Mowing once a year, preferably in winter, on the other hand is necessary to keep the area from becoming overgrown with scrub or shading tree

growth. Mowing should with as low weight equipment as possible to avoid compacting the soil.

When not posing a threat, allow dead trees to remain standing. These will provide natural nesting holes for mason bees.

### **Planting Bee Pastures**

When possible, plant meadows. Regular applications of fertilizers and herbicides along with frequent mowing make the conventional lawn uninhabitable for bees.

Bees thrive and reproduce best in a habitat with a season long, uninterrupted succession of bloom. When planning a bee pasture try to choose a collection of plants that will provide an unbroken succession of blooms. In the Southeast natural nectar and pollen production occurs in the early spring and at a reduced level in the fall. In between, during the summer a dearth exists. Whenever possible, choose plants that bloom during times of natural dearth.

Generally speaking, perennials make a better bee pasture than annuals. Perennials typically produce more nectar and provide dependable forage from year to year which results in repeated and expanded nesting in the area.