

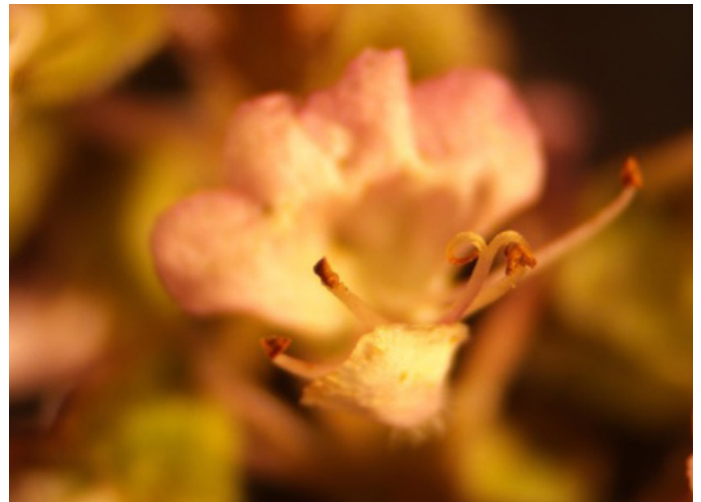


Honeybee Pollination in Arizona

Anne Lesenne

Pollination is the process of sexual propagation by angiosperms which involves combining the male pollen with the female ovule and intermixing the genes to create offspring. Flowers can have male parts, female parts or most common, both. The male part of the flower is called the anther, and on the tip of the stamen is where the pollen grains are produced. The female part of the flower is called the pistil and has the stigma and ovule (where the seeds are formed). Each species of plants has a unique form and shape of pollen, and only compatible pollen can successfully pollinate the flower. The transfer of pollen grain from the stamen to the pistil and eventually the ovule is pollination. Flowers are what develop into fruits and vegetables for our food supply and give us seed to grow more plants. This important work is carried on by many insects, but the honeybee is exceptional because of their willingness to pollinate so many types of flowers, and our ability to manage their colonies and move them to the location of where we need pollination to occur.

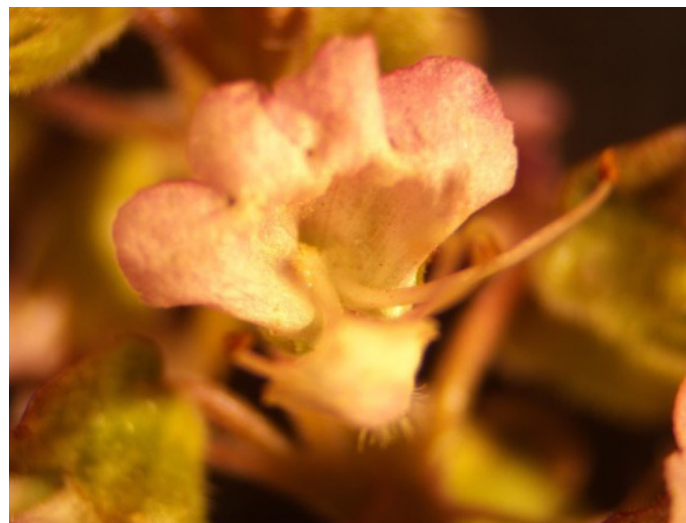
All flowers need to be pollinated for fruit set to occur. Flowers that have both male and female parts can be self-pollinated, and they will successfully set fruit. Flowers can



Anthers



Bee collecting nectar and pollen



Nectary

also be cross pollinated with another plant that is closely related, such as from one squash to another. Cross pollination typically increases fruit set, fruit quality, and seed quality by up to 70% in some crops. This cross pollination is where bees excel and provide us so many benefits. When a bee lands on a flower she picks up pollen grains on the hairs of her body, she takes a drink of nectar and moves onto

the next flower. The pollen grains stuck to her body then brush up against the often-sticky stigma and can then grow down to the ovule to achieve pollination. This same bee will visit somewhere between 50 and 300 flowers during this trip, and when added to the efforts of her hive sisters, they will visit around 225,000 flowers in a day. Keep in mind that bees will favor the flowers that offer the best source of nectar first and work it until all the nectar is gathered. Flowers can refill with nectar, so given time, they will be visited again. Flowers communicate their full or empty status to bees without making the bees land and insert their tongues to search the nectary. As bees hover over a flower, they use their very sensitive antennae to feel the signal of the flower, and if the flower is empty, they will move on to the next flower. Since nectar is mostly water, well-watered flowers are able to provide the most nectar over their bloom period. Roots of plants provide the ability to absorb water from the soil, so plants with larger root systems can provide more and faster replenishment of nectar in flowers, if soil moisture is available. This is part of why flowering trees are excellent floral resources and preferred by bees.

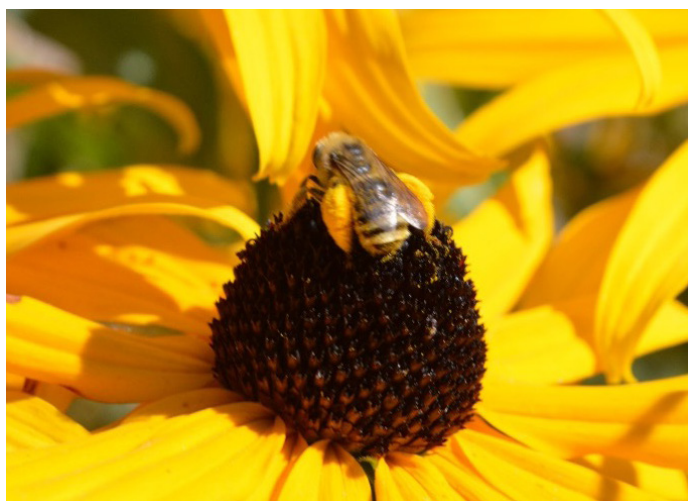
On any given day approximately 80% of the foragers will be in search of nectar and 20% will be gathering pollen. A small 15% of foragers can be collecting both nectar and pollen. These work assignments will be adjusted according to the needs of the colony. When the colony starts getting too hot, foragers start bringing in water instead of food, as well as fanning the colony to adjust the temperature as needed.

In a full-strength hive of 50,000 bees, you will have between 16,000 to 25,000 foragers. About 1,100 will die each day. Some will die from viruses, and some will wear out their wings and die from pure exhaustion. Most of them die while out foraging. During the summer months worker bees only live about six weeks, so they focus their efforts on being very efficient. Bees will fly up to 3 miles from the hive foraging, but much prefer to stay within 1 or 2 miles if there are enough floral resources. It is in your best interest to provide as many floral resources within a short distance for the whole year as possible. The further they have to fly, the longer each trip takes, so they will make less trips every day, which means less collected pollen and nectar.

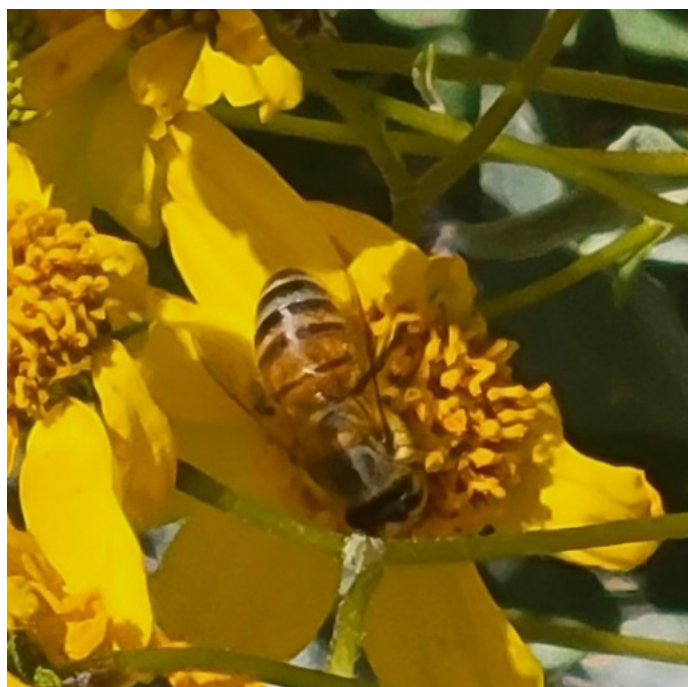
Not only does every flower need to be pollinated, but most need to be pollinated by several bees for full pollination. Each seed in the fruit needs a pollen grain to fertilize it. One apple or one cucumber has several seeds, and if they aren't fully pollinated, they will develop lop sided, which makes them less valuable or even unmarketable. A female cucumber flower is only open one day and it needs to be visited by 20 bees during that day for complete fertilization. Since many crops have a short flowering window it is suggested that you place one or two strong hives per acre on crops that need bee pollination.



Bee collecting nectar and pollen



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Flowers that rely on bee pollination have coevolved with bees to make their continued existence sure. Bees can't see red, so they prefer flowers that are yellow, orange, blue, violet, green or have ultraviolet markings. These ultraviolet markings often form a target to let the bee know right where the nectar source is. Even the fact that flowers developed nectar to offer as a lure to get bees to come perform pollination has evolved over the years. Some flowers will make their nectar sweeter, or some will add a little caffeine so that they are highly attractive. Some flower petals are iridescent to bee vision, which they associate with sugar, so they are highly attractive.

There are over 90 crops that rely on bees to pollinate them. Fruit trees, canola, sunflowers, asparagus, cucumbers, cantaloupe, watermelon, and many vegetables need honeybee pollination for 90% of their crop. Farmers should be willing to pay for colonies to be brought into their fields during bloom time to ensure a good crop. You should be sure that they haven't treated with any pesticides that will harm your bees, especially systemic pesticides that will be part of the nectar and pollen and have an agreement that they won't spray any pesticides during the bees' stay in their field. There are also great opportunities to partner with farmers that grow large acreage of crops that may not rely on honeybees for pollination, but their yields are highly improved by the presence of honeybees. These farmers may not be willing to pay for your hives to be placed around their fields, but you may be able to harvest enough specialty honey to make it worth your while. As with any potential location, you will want to investigate the area to be sure there are no pesticide treated fields nearby that your bees may wander over to.

As with any good partnership, if a farmer allows your bees on his farm and you've harvested the benefits, you should definitely share some of the honey with him.

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