



HONEY DNA

Dear John,

This package contains everything you ever wanted to know about your honey.

Honey itself is made primarily of water and simple carbohydrates. However, every flower that a bee visits provides the bee the same simple carbohydrates. This makes it very difficult to determine exactly where your honey came from. However, we've found a way to follow your bees on their journey from flower to flower and bring all that information to you.

Honey does not only contain carbohydrates but also has other nutrients, minerals, enzymes and even protein in the form of pollen. Pollen is another source of food for the bees. Bits of pollen make their way into the honey that the bees create. Pollen happens to contain genetic material - DNA. Using your sample, we amplified these strips of DNA and then coded their unique genetic sequences. We cross referenced these DNA sequences with our extensive database of genomes. The genomes that are currently known by science allow us to compare certain sequences. The result of our genomic translation is a comprehensive list of names of the plants your honey was made from. For a number of the pollen sources found in your honey, we were able to find which plants your bees were visiting down to the family and genus classification. For other types of pollen we were able to determine the type of plant precisely down to the name of the species.

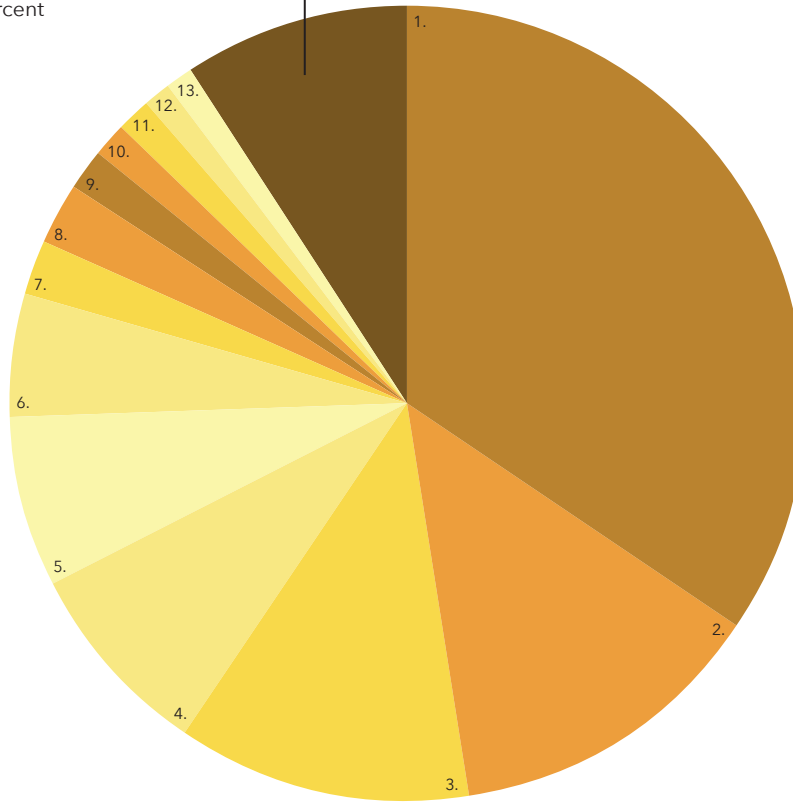
Your HoneyDNA sample is aiding further research in honey bee health. This newly discovered method is a revolutionary way of determining where bees collect the pollen and nectar that they transform into honey. This helps us, as beekeepers, better understand honey bees and what they need, like, and want. This data also helps the general public know exactly which flowering plants feed bees, and further inform humanity about specifically which habitat helps bees most.

Sincerely,
The Best Bees Company

HONEY DNA

SAMPLE S011849

8.96%
119 Species appearing
in concentrations
of less than one percent



#	PERCENTAGE	COMMON NAME	SCIENTIFIC NAME
1.	34.50%	Red Raspberry	Species <i>Rubus idaeus</i>
2.	13.21%	Pines	Genus <i>Pinus</i>
3.	11.87%	Buckthorn	Genus <i>Frangula</i>
4.	7.86%	Clover	Genus <i>Trifolium</i>
5.	7.10%	Sub-Family of Rose Family	Sub-Family Rosoideae
6.	4.89%	Honeysuckle	Genus <i>Lonicera</i>
7.	2.42%	Vetch	Genus <i>Vicia</i>
8.	2.38%	California Coffeeberry	Species <i>Frangula californica</i>
9.	1.71%	Birchleaf Buckthorn	Species <i>Frangula betulifolia</i>
10.	1.46%	Pecan	Species <i>Carya illinoensis</i>
11.	1.22%	Alder Buckthorn	Species <i>Frangula alnus</i>
12.	1.19%	Stonefruit	Genus <i>Prunus</i>
13.	1.12%	Bear Oak	Species <i>Quercus ilicifolia</i>

YOUR SAMPLE EXPLAINED

Red Raspberry

The first most common pollen found in your honey sample came from the species *Rubus idaeus*, or red raspberry. These perennial plants flower in late spring a few years after planting. Later in the season they produce the well known raspberry fruit. Raspberries are both cultivated and found in the wild. Though they can self pollinate, over 90% of their pollination relies on honey bees. Without proper pollination, certain parts of the fruit remain small and immature, causing the raspberries to be misshapen and inedible. Your honey bees were likely foraging for both pollen and nectar from the small white blossoms produced in the spring. The direct relationship of raspberry growth success to honey bee pollination is a direct example of how vital pollinators are to so many of our major sources of food!

Pine

The next highest pollen concentration in your honey came from the genus *Pinus*. This native tree does not bloom so it is not a source of nectar, but it is still an important component in the colony's life. In springtime, pine pollen can be found on the ground, on plants, and pretty much everywhere there are pine trees. Your bees likely obtained this pollen while in search of resin from these trees for propolis. Pine trees are a vital resource for bees because of the resins, sap, and tree buds that bees use to make propolis. Propolis is a red or brown multi-purpose resinous substance that honeybees produce by adding saliva and beeswax to the exuded tree resins and saps. Bees use propolis to reinforce the structural stability of the hive, reduce vibration, make the hive more defensible by sealing alternative entrances, prevent diseases and parasites from entering the hive, and inhibit fungal and bacterial growth. The high pine pollen content of your honey is a sign that your bees have good access to the tree resins and saps needed to make this important substance. Bees also forage pine trees to make honeydew. Unlike floral honeys, which derive from the nectar of flowering plants, honeydew honey is obtained from secretions of the living parts of plants or excretions onto them produced by sap-sucking insects. Your honey bees could have picked up some pine pollen while foraging for this resource, as well.

Buckthorn

The third most common pollen found in your honey belongs to the genus *Frangula*, or buckthorn. About 35 species of flowering shrubs and small trees comprise this genus. Buckthorn species produce berries and nuts as fruits. One likely species of buckthorn contained in your honey may be *F. alnus*. This species grows in the northeastern United States and is considered invasive. *F. alnus* grows densely in areas that normally allows tree seedlings to sprout. However, the species' thick canopy prevents light from reaching the forest floor, preventing healthy growth of new forest. Although this species is invasive, it is easily managed. Thus, it should not be a worrisome plant, considering it is a good source of pollen and nectar for bees.

Clover

We identified the fourth most common pollen in your honey sample as from the *Trifolium* genus, likely White Clover or Alsike Clover. Clover is a well-known native source of nectar and pollen for honey bees. It starts to bloom in late spring and throughout the summer. If clover is present on your property it is best to wait a few days after it blooms before cutting it so the bees might reap the benefits of the nectar-laden blossoms.

Sub-Family of Rose Family

The fifth highest concentration of pollen is from the subfamily Rosoideae. The Rosoideae subfamily has over 850 species, including many roses, wildflowers, and berries. Not all roses look like the iconic red rose we all know. A lot of flowers from this genus have only five petals. While honeybees are attracted to these plants, usually only pollen is collected from the roses because they generally have many cumbersome petals and are low in nectar. The berry plants have a 30% sugar concentration in their nectar -- an average concentration for flowering plants -- and the five-petaled flowers in this subfamily usually have ample nectar and pollen.

Your honey is truly unique, sourced primarily from *Rubus* *Idaeus* & the Genus *Pinus*. All 153 species found in your honey provide your bees with the nutrition they need to thrive. Identifying and recording the pollen concentrations of your honey will help us to reinforce and redefine the nutritional needs and preferences of honeybees. Your sample gives us a small snapshot of bee nutrition in your location - as we analyze more samples, we will eventually have a complete picture of a healthy bee's diet. Let this information be a guide to your land, giving you answers to what bees desire on their forage, and to your taste buds as you enjoy your honey. Thank you for being among the first to take part in this exciting and revolutionary project!