

## Pollination in Cranberries on the South Oregon Coast: Honeybees and Native Bees

Melissa McKenney, Sujaya Rao and William P. Stephen

Many cranberry growers on the Oregon coast are well aware that good pollination is necessary for quality fruit set. Multiple visits to the flower deliver more pollen, which can increase the percentage fruit set, number of seeds per berry, and mature berry weight. The better a bee is at delivering pollen to the flower, the fewer the number of visits required for adequate pollination. Typically growers rent hives of the European honeybee for cranberry pollination. However, honeybees have exhibited a general preference for lotus, gorse, other weeds and native plants over cranberry flowers. As a result, growers must bring in enough hives to saturate the surrounding area so that at least some of the honeybees will have no choice but to forage in cranberry beds. In addition, honeybees forage primarily in fair weather. Multiple studies have shown (and many people have observed) that honeybees will retreat to their hives once it begins to rain. Often, they will retreat even when the skies become overcast, which is not ideal behavior for working in stormy coastal weather. Further, with the recent concerns about Colony Collapse Disorder, attack by mites and other diseases, the supply of available hives has decreased. This shortage brings to light the need for an alternate pollinator—a native species that is not susceptible to the ills of honeybees.

In the Pacific Northwest, there are over 200 species of native bees. Those species native to Oregon are acclimated to Oregon weather. Several species of bumblebees begin foraging hours before honeybees are active, and cease foraging at dusk when the honeybees have already been inactive for an hour or two. The advantages of having bees forage longer hours are obvious—the more time they spend foraging, the more flowers they will pollinate. In addition, Oregon's native bee species are often sighted foraging when it is drizzling while the warm-weather preferring honeybees are in their hives.

Currently, little is known about the number and diversity of bee species present on the southern Oregon coast. This information is required for determining whether a better pollinator than honey bees is available for cranberries. By determining which species are present during bloom it will be possible to select a species that flies during bloom, and one that is also loyal to cranberries.

### Methods

Sampling for native bees: In 2007, blue vane traps (Figure 1) were set out in four farms on the south coast from Bandon to Sixes. The four farms were surrounded by habitats ranging from pastures to woodlands. The traps are extremely attractive to bees, making them good sampling devices. A total of 8 traps, 2 at each of the four sites, were set up. At each site, one trap was set up between two cranberry beds while the other was set up at the border of one of the beds to maximize capture of bees foraging in the beds. The traps were set up at dawn and taken down at dusk. Sampling was initiated just prior to bloom in mid-May and continued until late July. The bees were transported to the lab and preserved by freezing. Each bee was pinned, labeled and identified.

Estimating the abundance of bumble bees foraging on cranberry flowers: Visual observations were made of bumble bees foraging on cranberry flowers. The number of bumblebees belonging to each species observed during 2-minutes while walking up and down the same patch of a cranberry bed was recorded. Bumble bee species differ in color patterns hence it was possible to determine the identity of the bees on the flowers.



Figure 1. Blue vane trap used to sample bees in and around cranberry beds.

## Results

Sampling for native bees: The traps provided information on which species were present in and around cranberry beds. Over the seven sampling days, 545 specimens were collected during cranberry bloom (Figure 2). This included bees belonging to four families, thirteen genera and over twenty-six species. *Apis*, the European honeybee, was less abundant than the genera *Agapostemon* (green metallic sweat bees), *Bombus* (bumblebees), *Evylaeus* (small black bees) and *Melissodes* (long-horned bees). These four appear to be promising for cranberry pollination considering their large presence near the beds. However, *Melissodes* only occurred in large numbers after bloom. The other three species reached maximum populations during bloom, and hence these are likely candidates for domestication.

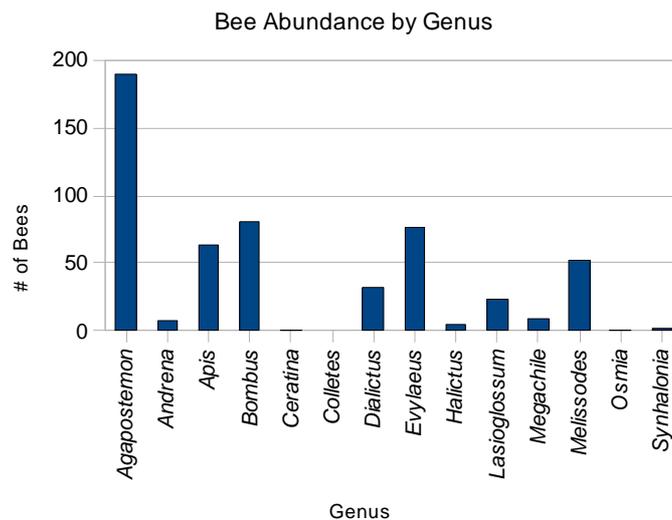


Figure 2. Number of native bees belonging to various genera collected in 2008.

Two species of *Agapostemon*, *A. virescens* and *A. texanus/angelicus* were collected but the latter species was the dominant species. It was not possible to separate the species belonging to *Evylaeus*.

While five species of bumble bees were collected, the two closely related species, *B. caliginosus* and *B. vosnesenskii*, were collected in much higher numbers compared to the remaining 3 species (Figure 3). Of the three genera that were abundant in the traps *Bombus* has the greatest potential for domestication since two species of bumble bees that are present in other parts of the world have been domesticated.

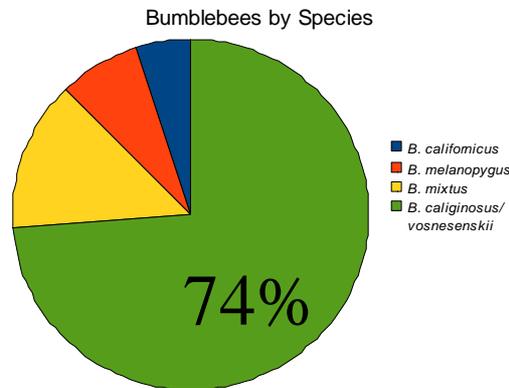


Figure 3. Relative abundance of bumble bee species collected in the traps.

Estimating the abundance of native bees foraging on cranberry flowers: During visual observations, four genera / species of bees were recorded foraging on the flowers (Figure 4). These varied in the periods when they were most abundant. On many days, the bumblebees were observed foraging as early as 8:30 am, while the honeybees did not increase in numbers until 10:30 am or past noon. The number of honeybees outnumbered bumblebees 10:1 on warm days and in the afternoon. It is possible that when they are abundant, honey bees force bumblebees to forage elsewhere.

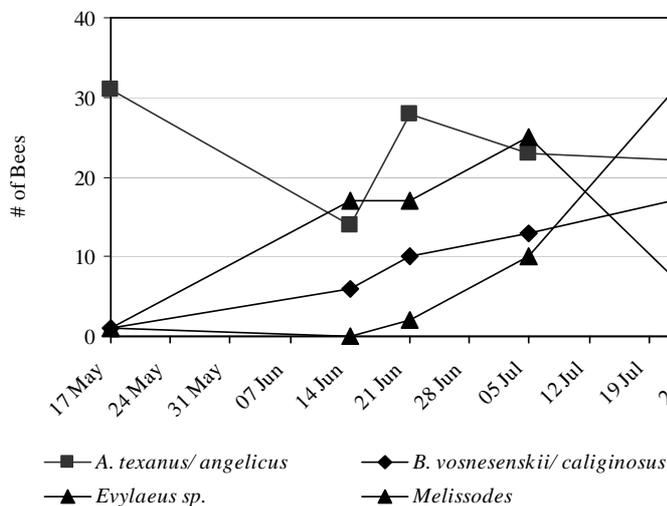


Figure 4. Abundance of native bees observed foraging on cranberry flowers throughout bloom.

To compare pollen collection between honey bees and bumble bees, 58 bees were collected. After chilling them in a cooler, the pollen was removed and the bees released. The pollen will be weighed and examined to determine what percentage of each pollen ball consists of cranberry pollen.

Research on native been diversity, abundance and foraging in cranberry beds will be repeated in 2009 to determine potential year to year variation, if any.

The research was supported by the Oregon Cranberry Growers' Association. If you have any questions, comments or if are interested in being part of the study, please contact Linda White ([linda.white@oregonstate.edu](mailto:linda.white@oregonstate.edu)) or Melissa McKenney ([mckennem@onid.orst.edu](mailto:mckennem@onid.orst.edu)).