

How Can Bumblebees do all That Work? Its All About the Buzz!!

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As I travel from state to state visiting growers who raise everything from apples, blueberries, and cherries to watermelon, cucumbers, and cranberries; there is a common question that I am asked almost without exception. How can 300 bumblebees do the same job as 40,000 honeybees? And honestly I think it is a question if left unanswered stops a lot of growers from using bumblebees.



My answer to this very important question is that there are a lot of factors that make this possible and I will discuss a few of them further, but the most important factor that absolutely separates the bumblebee from the honeybee is an activity known as "Sonication". Sonication is the bumblebee's special ability to release tightly held pollen from many important crop plants using sonic vibrations. This ability, unique to bumblebees, is commonly known as "buzz pollination". Using sonication, a buzzing bumblebee explosively extracts pollen from blossoms hundreds of times faster and much more efficiently than a honeybee can. These

energetic high-pitched buzzes are produced by rapid contractions of their flight muscles. These muscle contractions produce physical vibrations of approximately 400 Hz that are transmitted throughout the pollen-containing anthers of the flower, releasing clouds of pollen. The bumblebee's body fuzz captures this airborne pollen. Some of this pollen is distributed to nearby flowers by the bumblebee, thereby guaranteeing a new crop of fruit for growers to market and consumers to enjoy. Sonication gives the bumblebee the unique ability to fully pollinate a blossom in a single visit. Honeybees by contrast must visit that same blossom multiple times to complete the same task, depending on the plant somewhere from 5 to 25 times.

When making the decision of which pollinator to use, it needs to be understood that while bumblebees and honeybees have many similarities, they are vastly different animals. We tend to think that because bumblebees and honeybees both live in hives, have workers, drones, and a queen, and collect nectar and pollen, that most everything else about them is basically the same. This is simply not the case. And while sonication is arguably the most important factor separating bumblebees from honeybees, it is just the beginning.

Bumblebees will forage in much lower temperatures. This is especially important in crops like apple, cherries,

blueberries, and wild blueberries. Many times these crops are in full bloom at times of the year when on average it is simply too cold for honeybees to actively forage.



Bumblebees will aggressively visit flowers with no or low sugar content nectar if they produce pollen, such as cucurbits. These are flowers that honeybees will ignore if another flower in the area is available.

Bumblebees work in windy conditions, rainy conditions, and these visit more flowers per minute and go on longer foraging runs.

In the end, what it comes down to is this: bumblebees and honeybees are different animals and need to be evaluated by a different set of standards. Let's equate it to something we all enjoy like a good dessert. You make them both with flour, chocolate, eggs, and butter, but in the end a chocolate chip cookie and a chocolate cake just aren't the same, even though they both use many of the same ingredients and they both taste great. Important information to remember the next time you are choosing your pollinator or your favorite after-dinner treat.

Melon Grower Weighs in on the Effectiveness of Koppert Bumblebees

Candidly answering a few questions posed to him by Koppert's Pollination specialist, Will Hales allows fellow customers an inside look into his experiences with using bumblebees to pollinate his melon crop.

Q: Tell us about your farming operation.

Hales: We are located on the Delmarva peninsula, which if you look on a map of the east coast is the small peninsula that is shared by Delaware, Maryland, and Virginia. The farm was started by my father Donald Hales back in 1955. We are involved in grain production, vegetable seed sales, and wholesale produce production and sales. We raise grain crops like corn, soybeans, and winter wheat, and produce such as tomato, pepper, cantaloupe, strawberry, and seedless watermelon. In fact, my father was one of the dozen or so original growers of the seedless watermelon here in the United States twenty-seven or twenty-eight years ago. We sell our wholesale produce direct to the supermarket. If you've been to the produce section of Super Valu, Ukrop's, or Costco you've probably brought some of our produce into your home.

Q: Last year was your first year using bumblebees. How did you hear about them?

Hales: We first heard about bumblebees from Brent Jackson, a watermelon and produce grower in Autryville, North Carolina and some seed reps. Finally, we saw you guys last year at the National Watermelon Association convention and we decided to give bumblebees a try in our seedless watermelons.

Q: What was it about what you learned that made you want to give bumblebees a try?

Hales: We learned that the bumblebee didn't need perfect situations to get out and forage. Also, they only need to visit a flower once to fully pollinate it. We just felt they would be more effective in seedless watermelons, because their flowers are open and ready to be pollinated before the sun even comes up. A bumblebee can get out there early and get those visits done before the heat of the day stresses out the plant. Honeybees just get out in the field a little to late to work the flower when the flower would benefit most.



Q: What do you find to be the main challenges in growing seedless watermelons?

Hales: Well honestly, pollination used to be a big challenge until we discovered the bumblebees last year. Now I would say labor is probably the biggest challenge. We are in a situation right now where we are waiting on politicians to decide on how farmers should deal with the migrant worker situation.

Q: What were your initial thoughts about the bumblebees when you got them off the truck?

Hales: It was a really hot day, about 95 degrees and to tell you the truth I was worried that they had made the trip alive. They were alive and we only lost one

QUAD which you guys replaced quickly with no issues.

Q: How about placing them in the field, how was that experience?

Hales: That was fine. After we learned from you guys what we needed to do it was not a problem. Nobody even got stung. In fact, no one on our harvesting crews got stung either. Which happens more than a few times in fields were we used honeybees.

Q: What were your initial field observations?

Hales: It was hard to see the bumblebees. They weren't swarming around over the vine like honeybees do. The bumblebees usually stayed in the vines working the flowers one after the other. I've even got some footage on my cell phone, about 15 seconds of it, with a bumblebee going from flower to flower very quickly. Like three or four flowers in that short time. The bumblebee is a low profile worker. They just do their job and come back home to their hive. They don't spend a lot of time flying around.

Q: By the end of the bloom had your impressions changed?

Hales: My impressions were more solidified than changed. I have to say I was a little worried about stepping outside the box and going with bumblebees, but as the season progressed we saw that on some of our varieties we had the best crop ever. Until I saw melons sizing up into the five and ten pound range I was a little nervous, but when we saw what the bumblebees had done we became believers.

Q: What was the payoff like? Were you satisfied with your yields?

Hales: We were more than satisfied with our yields. We had one particular variety that is traditionally not a high yielding melon, but it is a great looking high quality early melon that we like to raise. With the bumblebees this year we had a record crop. We were very surprised because this was the sixth year we raised this variety and we didn't think it was capable of the yield it produced, but the bumblebees did a great job.

Q: Will you use bumblebees again?

Hales: Yes!

Q: What would you tell a farmer who is contemplating using bumblebees for the first time.

Hales: I would like to tell that farmer not to use bumblebees because I'd like to keep them for myself! (laughing) But for the good of the common man, I would say that using bumblebees instead of honeybees is a no-brainer. When a grower is thinking of using bumblebees I would say that their best bet would be to use the bees in early or late plantings. In the early blooms it tends to be cool, cloudy and windy and the honeybees just stay in the hive while the bumblebees work. Later plantings bloom during the heat of the summer and the honeybees do not have a very large window of working time. Bumblebees are working earlier in the morning and allow you to maximize your yield and better utilize your land. Basically they work great just like you told us they would!

More commercial bee colonies lost

May 6, 2008 - - updated 0348 GMT

SAN FRANCISCO, California (AP) - A survey of bee health released Tuesday revealed a grim picture, with 36.1 percent of the nation's commercially managed hives lost since last year.

Last year's survey commissioned by the Apiary Inspectors of America found losses of about 32 percent.

As beekeepers travel with their hives this spring to pollinate crops around the country, it's clear the insects are buckling under the weight of new diseases, pesticide drift and old enemies like the parasitic varroa mite, said Dennis vanEngelsdorp, president of the group.

This is the second year the association has measured colony deaths across the country. This means there aren't enough numbers to show a trend, but clearly bees are dying at unsustainable levels and the situation is not improving, said vanEngelsdorp, also a bee expert with the Pennsylvania Department of Agriculture.

"For two years in a row, we've sustained a substantial loss," he said. "That's an astonishing number. Imagine if one out of every three cows, or one out of every three



Bees are dying at unsustainable levels, the president of the Apiary Inspectors of America says.

chickens, were dying. That would raise a lot of alarm."

The survey included 327 operators who account for 19 percent of the country's approximately 2.44 million commercially managed beehives. The data is being prepared for submission to a journal.

About 29 percent of the deaths were due to colony collapse disorder, a mysterious disease that causes adult bees to abandon their hives. Beekeepers who saw CCD in their

hives were much more likely to have major losses than those who didn't.

"What's frightening about CCD is that it's not predictable or understood," vanEngelsdorp said.

On Tuesday, Pennsylvania Agriculture Secretary Dennis Wolff announced that the state would pour an additional \$20,400 into research at Pennsylvania State University looking for the causes of CCD. This raises emergency funds dedicated to investigating the disease to \$86,000.

The issue also has attracted federal grants and funding from companies that depend on honeybees, including ice-cream maker Haagen-Dazs.

Because the berries, fruits and nuts that give about 28 of Haagen-Dazs' varieties flavor depend on honeybees for pollination, the company is donating up to \$250,000 to CCD and sustainable pollination research at Penn State and the University of California, Davis.

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