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Science Policy and Outreach

Sunflowers Linked to Reduced Varroa Mite Infestations in Honey Bees

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A new study indicates a benefit to honey bees of local sunflower cropland. Even low levels of sunflower acreage nearby correlate with reduced Varroa mite infestation in managed colonies, researchers found, and supplemental sunflower pollen helps ward off the mites, as well. (Photo by Lillian Wong via Flickr

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By Paige Embry

Varroa destructor is aptly named. It is a parasitic mite of Asian honey bees (Apis cerana) that jumped to European honey bees (Apis mellifera) and then romped around most of the world

(https://entnemdept.ufl.edu/creatures/misc/bees/varroa_ mite.htm), wreaking havoc. In 1987 it arrived in the United States



Paige Embry

(https://americanbeejournal.com/varroa-control-past-and-future/), where it wins the dubious award of being the most problematic (https://undark.org/2019/09/25/honeybee-fearsome-enemy-mite/) of the honey bee's many pests and diseases.

Scientists long thought that Varroa mites were tick-like—bloodsuckers that transmitted diseases—and that the bulk of the harm they caused came from the diseases they spread. Even without spreading diseases, Varroa mites damage bees because they don't actually eat replaceable hemolymph (a bee's blood-equivalent); rather, they eat its fat body

(https://www.pnas.org/doi/10.1073/pnas.1818371116https://www.pnas.org/doi/10.107 3/pnas.1818371116). It sounds benign because the name is misleading. A bee's fat body is a bit like a human's liver. It plays a role in the bee's immune system and its ability to survive the winter and detox pesticides. Any method of lowering Varroa loads would be a huge boon to honey bees and their keepers.

A new study published in December in the Journal of Economic Entomology (https://academic.oup.com/jee/advance-

article/doi/10.1093/jee/toac196/6961488?searchresult=1) provides early evidence that the humble sunflower (Helianthus annuus) may provide some relief from those fat body-destroying mites.

The pollen and nectar of sunflowers (and some other members of the Asteraceae family) are protein-poor and generally considered a subpar source of nutrition for bees. From an overall health perspective, however, sunflower pollen and nectar look like great food because they may help reduce parasites. Evan Palmer-Young, Ph.D., a postdoctoral fellow at the U.S. Department of Agriculture's Bee Research Lab in Beltsville,



Evan Palmer-Young, Ph.D.

Maryland, is lead author on the new study. Previous experiments on bumble bees had shown that sunflower pollen strongly reduced infections by a specific parasite, so, Palmer-Young says, "We wanted to see whether honey bees might derive similar, infection-reducing benefits from sunflowers."

The study covers four different experiments that looked at two parasites and several viruses, but only two experiments showed significant results. The authors sum up their findings: "Although we did not find significant effects of sunflower pollen on endopasrasites [Nosema ceranae] or viruses in laboratory or field settings, sunflower pollen was associated with reduced levels of Varroa mites in honey bee colonies."

In one experiment the scientists provided supplemental pollen (sunflower pollen, wildflower pollen, or artificial protein patties) to field colonies of honey bees in late summer when Varroa levels often begin to rise. The colonies given supplemental sunflower pollen saw a 2.75-fold diminishment in *Varroa* infestation levels relative to bees receiving artificial pollen patties. (The group receiving wildflower pollen had more mites than the ones fed sunflower pollen, but the difference was not statistically significant.)

Perhaps the most significant finding was from the experiment that looked at the association of Varroa mite infestation levels and sunflower crop acreage. The scientists found that honey bees located near sunflower cropland had lower mite levels—even when the total land cover by sunflowers was scant (a median of 0.32 percent). Their models predicted that each doubling of sunflower acreage within two miles of an apiary would lead to a 28 percent decrease in mite infestation. The researchers note that this pattern is a correlation, and some other factors related to having sunflowers in the vicinity different management practices by beekeepers or pesticide exposure, for example—may be the cause for the lower mite loads. Nevertheless, Palmer-Young says a big takeaway from the work is, "that sunflowers appear to be protective against a major threat to honey bees (i.e., mites), whereas the amount of U.S. sunflower cropland is declining—potentially limiting bees' access to sunflowerassociated benefits."

Total crop area devoted to sunflowers in the U.S. has decreased by 2 percent per year since 1980. The authors note that market and policy shifts that led to changes in agriculture in the Dakotas played a role in that decline. In the 1980s, low-quality farmland was converted to (flower-rich) grasslands as part of the Conservation Reserve Program (CRP)—a change likely beneficial to bees of all sorts. Post-2000, both sunflower crop area and CRP acreage were replaced by corn and soybeans. The authors note, "Between 2006 and 2016, 53 percent of CRP land surrounding existing North and South Dakota apiaries was converted to crop production, but only 8 percent was used for beefriendly crops." This area hosts 75 percent of U.S. sunflower acreage as well as 40 percent of U.S. honey bees during the summer.

The authors write that they don't have enough evidence yet to recommend specific changes in land use, but Palmer-Young says, "If sunflowers are as big of a factor in mite infestation as indicated by our landscape-level correlations ... having a few more acres of sunflower within a mile or two of apiaries could bring colonies below the infestation levels that require treatment of hives with acaracides (i.e., mite-controlling chemicals)."

Palmer-Young provided a poetic summary for the paper:

Fields of sunflower blooming in sight yield for many a bee a delight. But with bright yellow joy Displaced by corn and soy, Honey bees could lose balm for their mites.

In other words, if additional research supports sunflowers as an antiparasitic for Varroa mites, don't be surprised if beekeepers start tossing out sunflower seeds everywhere they go.

Read More

"Sunflower-Associated Reductions in Varroa Mite Infestation of Honey Bee Colonies (https://doi.org/10.1093/jee/toac196)"

Journal of Economic Entomology



Paige Embry is a freelance science writer based in Seattle and author of Our Native Bees: North America's Endangered Pollinators and the Fight to Save Them. Website: www.paigeembry.com (http://www.paigeembry.com/).

- Research News
- ◆ Apis cerana, apis mellifera, Evan Palmer-Young, Helianthus annuus, honey bees, Journal of Economic Entomology, managed honey bees, nectar, Paige Embry, pollen, sunflowers, Varroa destructor, varroa mites

4 Comments »

Natural abundant nutrition will ALWAYS be the major factor in the survival of honeybees. Artificial diets are causing a great deal of harm by stripping away the bees immune system which is derived from their diet. Sadly, this aspect gets little or no attention as there is no money to be made by big Ag by leaving bees with their vital natural raw honey and plant produced pollen they collect.

RFPLY

Good article. Nutrition is vital to the hive health. All the non native ornamentals cause harm as well as good. More research needed on how to get bees on sunflowers. I see bumble bees but rarely my honey bees. In Romania they have vast fields of sunflowers. The beekeepers haul their wagons of hive in field. Guaranteed harvest nothing else around.

REPLY

The problem is that a lot of ornamental sunflowers in home gardens don't have that much pollen. I think there needs to be more research on using thyme and oxalis plant pollen as ways of naturally controlling varroa mites. Also, while it would be expensive, lining the hive supers with Cuban mahogany veneer ought to be tried as well.

REPLY

They say that sunflower was no better than wildflower.

RFPIY

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