

# Recent research on honey bee colony stocking density in Michigan blueberries

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## Background

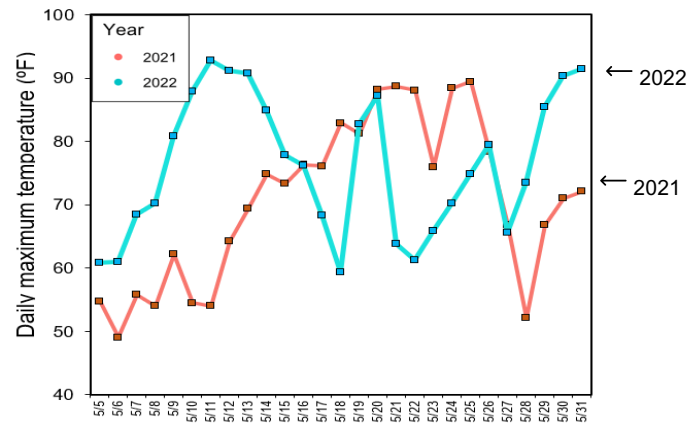
During 2021 and 2022, Michigan State University entomologists collaborated on a project funded by USDA-NIFA to assess how honey bee stocking density and placement affects blueberry pollination. We also placed pesticide collecting bands on the outside of colonies to determine the amount of pesticide residue detected on colonies near to, and away from, the blueberry fields.

## Project approach

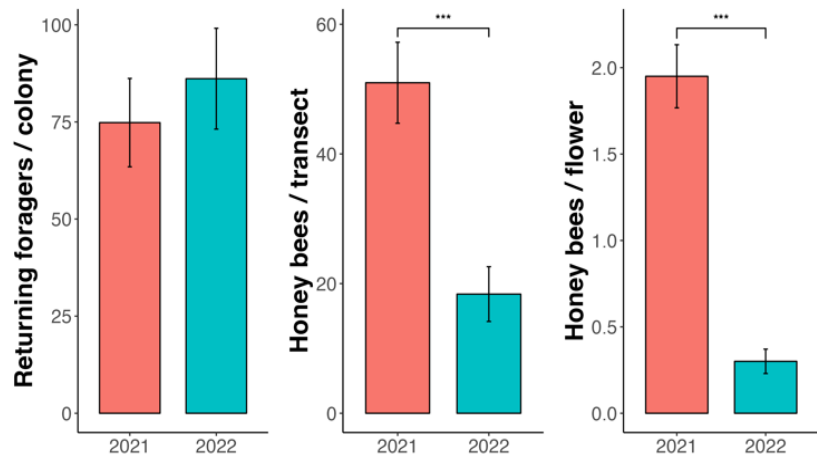
Six commercial 'Bluecrop' blueberry farms between Paw Paw and Nunica were sampled in 2021 and 2022. Each farm contained fields that were either stocked with the grower's standard density of colonies per acre under contract from commercial beekeepers or with two additional hives per acre. This resulted in fields with a range from 1-6 colonies/acre. We also compared fields with colonies spread along the edge of the field or in a few concentrated drops near the crop to determine if placement affected pollination. Colonies at all farms were sampled for frames/colony, and their activity was assessed on the crop by visual observations and by video at the colony entrances.

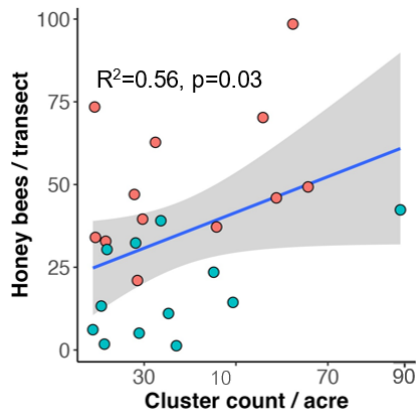
## Contrasting seasons

The two springs of the project were very different in terms of weather conditions, with 2022 having a very rapid increase in temperature at the start of bloom. Most cultivars came into bloom rapidly in comparison to 2021 which had a more gradual warmup. This resulted in very different situations in the two years, with much higher flower density and faster flower ageing in 2022 than in 2021.



Our assessments of colony strength indicated very similar colony size in both years, with an average of 9 frames of bees per colony. The number of returning foragers per minute was also very similar in the two years. However, big differences were seen in terms of the bees per transect (a 10 minute count) and the bees per flower. These counts were much lower in 2022, with the bees being diluted in the much higher flower density we observed across bushes, cultivars, and in the wider landscape.

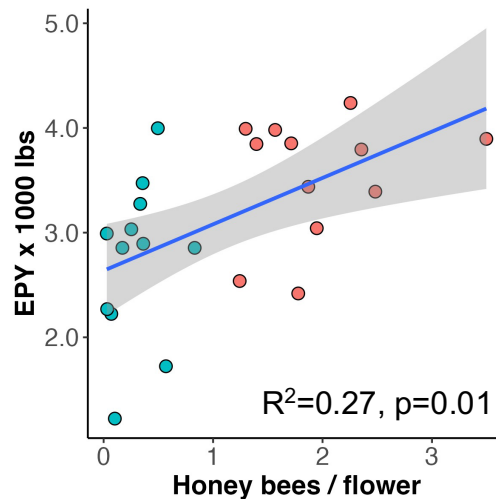
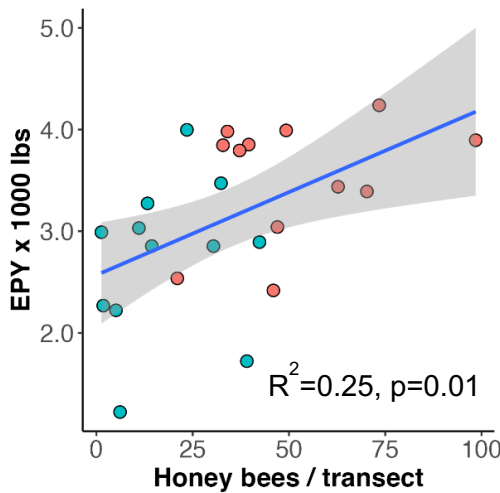




When the colony stocking density per field was compared to the density of bees on the flowers, we DID NOT find a significant correlation. This may be because of adjacent farms, since a related study has demonstrated that colony density at the 1km radius is a better predictor for pollination.

However, in this study when the strength of the colonies was taken into account by combining the colony strength with the number of colonies per acre, there was a positive correlation to honey bees per transect on the bush. This highlights that increasing colony size can increase bee density on the bushes.

At each farm we also harvested berries from the fields with the different honey bee treatments, and measured fruit set, berry weight, seed, and estimated the partial yield from the section we sampled. These measures were used to determine if the bee treatments affected the blueberry pollination and crop production.



The Estimated Partial Yield results (above) showed that this measure of blueberry production increased as the number of honey bees per transect sample or the density of honey bees per flower increased across the two growing seasons.

**As blueberry production in Michigan changes to adapt to the new cultivars and new production practices, pollination strategies need to adapt. These will likely require honey bee stocking densities based on the expected flower density during peak bloom.**

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