

VERIFLI SOLUTIONS

FREQUENTLY ASKED QUESTIONS



Q: How do beekeepers benefit from growers grading their hives using Verifli?

A: Verifli uses infrared image analysis to measure colony size. Verifli is non-invasive, so your hives won't be opened and your bees will remain undisturbed. Growers receive Verifli results within 48 hours to react quickly to any hive strength issues before bloom begins.

Growers are anxious about pollination because it's out of their control. They rely on beekeepers to deliver strong bees and the beekeepers to rely on the weather to cooperate. When growers use Verifli, it is to protect their crop — not to expose beekeepers. Growers understand that any number of factors can cause a good beekeeper to have a bad year. Your grower just wants to know whether they need to rent more hives and where to place them.

Q: What factors does Verifli's hive strength model take into account?

A: Honeybee colonies have a remarkable ability to regulate temperature within the hive. Colony temperature regulation has been the focus of many academic studies, making it one of the best-understood behaviors in bee biology. Thanks to the work of these researchers and the countless studies we've conducted in the field, we built a model to predict how much heat is generated by colonies of various sizes.

Infrared cameras don't 'look through' objects. They measure surface heat, so we can't directly measure the bee cluster's heat without opening hives. To get around this, we added another layer to our model; after predicting how much heat a colony generates, it calculates how much of that heat will reach the surface of a hive box.

Infrared cameras work best in a climate-controlled setting. Since we grade hives out in the field, we need to make corrections to the data captured by our cameras to account for differences in weather conditions. Verifli uses the capture time and GPS coordinates to pair each image with real-time weather data, which we use to adjust the data for environmental factors.

Q: When our team grades hives, what does that process look like?

A: We capture images at night when infrared is most reliable. Our teams use digital maps provided by the grower to navigate in the dark and collect an evenly-distributed sample from hive drops across each orchard. We pair up two staff members on each image capture team. Each team includes at least one person with a beekeeping background and a driver with experience navigating orchards at night.

When image capture teams arrive at an orchard, they check the map to see which drops to visit and how many to grade at each drop. The cameraman will stand about six feet in front of the hives to capture the images, they will choose hives at random until the quota of hives to be graded at that site has been reached. They'll make a small mark on the side of the hive using a lumber crayon to indicate which hives were graded. If there's tall grass or a branch obstructing the front of the hives, the camera man might try to tamp it down or stuff it under the pallet. Other than that, our teams will avoid any contact with the hives.



Q: How do you confirm that Verifli is more accurate than performing manual inspections to grade hives?

A: The Verifli hive strength model is built upon colony size data collected from real hives over the past three years. For one week each month, our data collection team travels to different parts of the country to gather data from a variety of commercial hives.

Our rigorous data collection process incorporates several different methods of measuring the true colony size. Simple frame counts just don't cut it. To build an accurate model, we use a much more reliable measurement: colony mass. Our team wakes up early to capture IR images while it's still dark. After sunrise, we break down the same hives one at a time, carefully shaking the bees off each frame into a bin. Once all the bees are accounted for, we weigh the bin, rebuild the hive and replace the bees.

We treat each data collection trip as a new test for the Verifli model. We feed the IR images into the Verifli model and compare Verifli's results to our data collection records, much like an answer key for an exam. After comparing the results, we incorporate the new data and re-train the model so that it improves with each data collection trip.

Q: Are you able to determine colony health (e.g. queenless, mite load, Nosema) from the thermal image?

A: Currently, our focus is accurately measuring colony size. Though our mission is to create tools that improve the lives of beekeepers, our resources are limited. We're always open to discussing new product ideas, but right now, we're laser-focused on improving Verifli.



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