Beehive Scale Weight and Temperature Monitoring: summer benefits and feasibility 2019

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BeeBC

BC Peace River region beekeepers, Dawson Creek to Fort St John

Introduction

- Anywhere in the world, the foundation of bee health and beekeeping success is knowledge of the target blooming dates and production, for a bee colony's nutrition and foraging opportunities. Without this target, the most well-intentioned and resourced start-up will often fail, even with all the best equipment, bee stock and management practices.
- The target is generally developed through experience and with advice from experienced local beekeepers: a beekeeper's calendar. This information is often elusive or insufficient, sometimes contributing to beekeeping failure.
- Technology now may have a solution within grasp. This project is intended to see, using modern electronics and the internet, if beekeepers (either beginner or professional) of a region could more accurately adjust their existing management to take better advantage of the forage available, and achieve healthier colonies resulting in higher yield.

***Goal:* to see if available hive monitoring systems can enable beekeepers to manage their colonies for better health and yield.**

Methods

Six commercially available systems (search beeinformed scale option) for monitoring honey bee colonies were considered for use in the BC Peace Region. Based on features and cost: two systems were chosen for testing during the summer of 2019.
BroodMinder and SolutionBee.
Hardware for the test was distributed to five apiaries with co-operating beekeepers in the Peace River Beekeepers group.
Equipment was installed in May and operated continuously since then.
Data was collected almost every day. The BroodMinder system allows charts of current data posted to an internet site, to be viewable by other members or (if user allows) anyone from the public.

Hives with BroodMinder (left) and SolutionBee (right) scales.

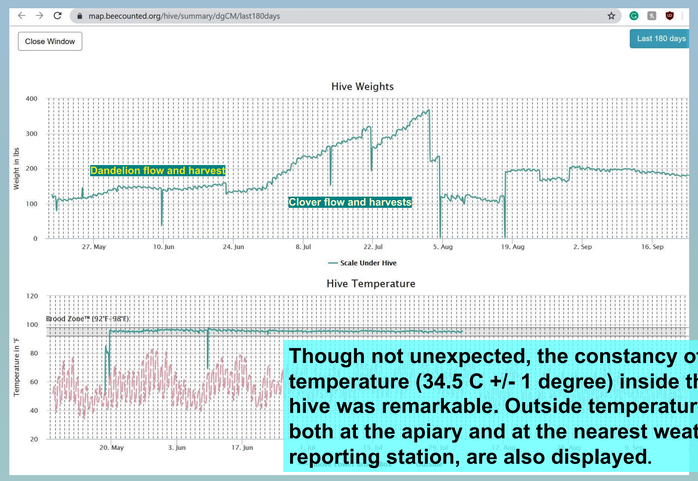
Both systems gave a good indication and record of nectar flow and reflections of colony behavior and health.

A cellular data sending accessory is available, but costs another $ 500 plus a service fee, so for this project we uploaded the info manually (a few minutes each day or when data is downloaded

Results

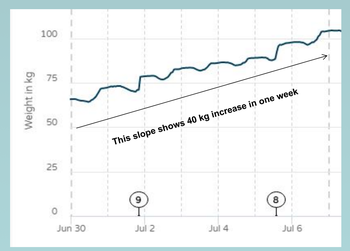
BroodMinder system

Has a data logger that records and stores data from a hive and transmits it by Bluetooth to an app on a smartphone. The information can also be sent to a website, visible to anyone on the internet. The information can include the WEIGHT of the hive which goes up in summer as bees gather food, and down through winter as the bees consume it. The system also has sensors for temperature and humidity that can be placed inside the hive to try to find out some details of how that colony of bees is behaving. The basic equipment for one hive was about C$ 300. delivered.



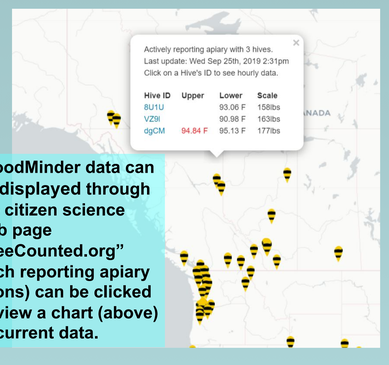
Though not unexpected, the constancy of temperature (34.5 C +/- 1 degree) inside the hive was remarkable. Outside temperatures both at the apiary and at the nearest weather reporting station, are also displayed.

More detailed data in the BroodMinder system is available through account sign-in. This can include notes (numbered circles below).

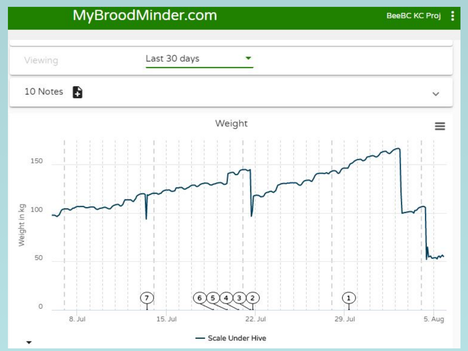


(above) Seven days record. Each day, weight drops in morning as foragers leave, increases as they return with nectar, then decreases as water is evaporated to make honey.

Although the scale is rated for only 150 lb., weights of up to 367 lb. (167 kg) were recorded, with no indication of problems.

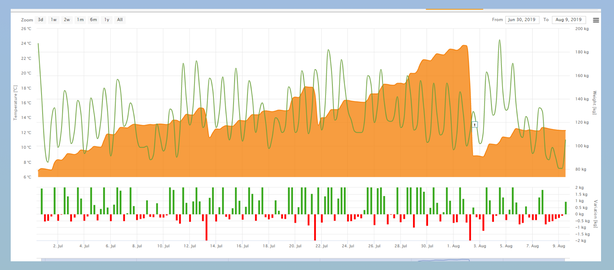


BroodMinder data can be displayed through the citizen science web page "BeeCounted.org" Each reporting apiary (icons) can be clicked to view a chart (above) of current data.



SolutionBee system

A significantly larger piece of equipment. Its possibly greater accuracy may not be significant. Information is transmitted electronically using NFC Near Field Communication, a system similar to Bluetooth, available on some late model smartphones. The scale cost about C$ 500. delivered.



Solution Bee web display July 1 through August 10, 2019: showing 317 lb removed in three harvests (honey only = 280 lb)

The orange shaded area represents the accumulated weight in the hive, while outside temperature is displayed by the green line. Vertical bars indicate increases (green) or decreases (red) in each 2 hour period, but they are truncated at 2 kg. so of limited use in our area. Actual weight gains were up to 10 kg in one day, 40 kg in one week.

Discussion and Conclusion

The scale records gave insights into various colony behaviors, including to nectar flow and colony buildup, swarming, reaction to formic acid treatment, and behaviors during supplemental feeding.

A major benefit of this project was the relationships built between beekeepers, sharing experience and skills. The hive weight scales enabled many new insights into bee colony activities. Temperature records (in-hive) seemed less useful (though they and humidity may be, for winter and spring). The BroodMinder system was preferred.

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