



Hive Haven V10 OATH hybrid native stingless bee hive

Business Innovation Grant snapshot



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Overview



This project delivered an Australian stingless native bee hive assembly, known as the Hive Haven V10, which efficiently and effectively produces a range of native bee products to support the commercial future of the Australian native stingless bee industry.

The V10 can be used in a range of climatic conditions to enable the ongoing harvest of food-grade native honey and propolis, while assisting in the pollination of food crops. The hive is manufactured in Australia from recycled-blend plastic and contains a 70 mm hollow insulation cavity that can be filled with different insulation to alleviate hive overheating.

The hive provides both agricultural and horticultural industries with a durable, robust home for native bees that won't rot, require painting or overheat.

Industry challenge

Native bee honey has been enjoyed for thousands of years by Indigenous Australians as a source of food and medicine. It has various reported health benefits, including but not limited to low glycaemic index, antimicrobial and antibacterial properties, and antioxidant content. Additionally, stingless native bees produce propolis, which possesses antioxidant activity and promotes wound healing by preventing oxidative stress and stimulating cell proliferation during the early stages of repair.

These benefits and more, however, are at risk. Most stingless native bee species that are cultivated in artificial hives are susceptible to hive overheating once temperatures reach 40 °C. Industry participants have identified that special methods and a range of hive designs that consider thermal properties are important for bee health and welfare (Reynolds and Robinson 2022).

Objectives

The objective of this project was to develop a commercially viable insulated bee hive to bolster the native bee farming sector, thereby enhancing Australia's agriculture industry. The project aimed to foster industry confidence and promote widespread adoption of innovative manufacturing methods within the sector.

Methodology

Research indicated that roto-moulding utilising recycled-blend plastic was the most cost-effective way to manufacture the V10 native bee hive prototype. The project was conducted in stages:

Stage 1: Conduct a thorough research and environmental scan of existing commercial and hobbyist native bee hives, identifying the dimensions of the industry-standard OATH design.

Stage 2: Create 3D-printed prototypes, experimenting with various insulations (hard-cell foam, water gel and sawdust), and assess their field performance.

Stage 3: Partner with Sunshine Coast company Ozzi Kleen to manufacture moulds for the hive.

Stage 4: Test prototypes with different insulations at the University of the Sunshine Coast, exposing them to a week-long temperature range from 4 °C to 45 °C.

Stage 5: Transfer samples of *Tetragonula* spp. and *Austroplebeia* spp. stingless native bees into the V10 hives, placing them in various geographic locations to evaluate hive performance and durability.

Stage 6: Implement ongoing monitoring to record hive temperatures, bee health and the production of honey, pollen and cerumen/propolis.

Key findings

This project yielded the following key findings:

1. Water gel insulation effectively regulates temperature at 45 °C but is unsuitable for bee health in 4 °C conditions. This issue can be resolved by positioning the hive in direct sunlight in winter.
2. Both hardwood and hard-cell foam insulation maintain consistent temperatures in varied conditions, proving effective for year-round use irrespective of exposure to sunlight or shade.
3. An internal observation window in the field hives significantly aids in monitoring, and is especially beneficial during the early stages of transfers and inductions.
4. The material used in the V10 is durable, resistant to rotting and cracking, and can be easily cleaned to maintain its appearance.
5. The V10 shade sail enhances temperature efficiency and is essential for optimal performance.

Overall, the V10, made from high-density polyethylene (HDPE), is suitable to be placed in orchards and greenhouses, and is capable of withstanding continuous direct sunlight over a 24-hour period.

Industry impact

The V10 provides farmers and commercial pollination contractors with a native bee hive that delivers a high return on investment over a long period. The hive won't rot, require painting or be eaten by white ants. Material used in the V10 does not 'sweat' or pose a threat to bees any greater than that posed by timber hives. The hollow insulation cavity can be filled with a variety of insulations to suit the species and the geographical region.

The success of the hive should encourage others in the industry to adopt similar manufacturing techniques, and to use material other than timber in native bee hive designs. Further, the use of shade sails to enhance hive efficiency by protecting them against heat and rain is becoming more popular across the industry. The V10 shade sail's collapsible design saves storage space and reduces packaging and shipping costs compared to metal and timber alternatives.

The emerging native bee sector is poised to produce high-value, export-quality products tailored to the nutraceutical/pharmaceutical sector. Anticipated developments within the next five years include the establishment of a standard for native stingless bee honey, increased investment from agricultural industries such as macadamia, and mainstream adoption of native stingless bees in greenhouse pollination. The availability of a portable, durable hive suitable for stingless native bees is crucial to support this expected sector growth.

Actions and next steps

Hive Haven will persist in researching and monitoring colonies in the V10 to track temperature, bee growth and health, and yield. The promising long-term viability of HDPE plastic hives bodes well for both the native and European *Apis* bee industries. Their innovative hive assembly, facilitating insulation in solid and liquid forms, sets a precedent for future industry development and commercialisation. Further, Hive Haven remains committed to refining the design and adjusting the hive shade sail based on industry feedback and rigorous testing.

Acknowledgements

The project team acknowledges Ozzi Kleen for manufacturing the moulds, the University of the Sunshine Coast for testing insulation options, and AgriFutures Australia for funding support.

References

Reynolds, O. L. and Robinson, M. (2022). *Australian Native Bee Strategic RD&E Plan (2022-2027)*. AgriFutures Australia. <https://agrifutures.com.au/product/australian-native-bee-strategic-rde-plan/>

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WATCH: Hive Haven's Ann Ross describes the motivations behind the V10 native bee hive and how it could protect the health of Australia's native bee population.

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Ann Ross, Hive Haven's
Managing Director, with the
V10 stingless native bee hive.





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by Ann Ross
March 2024

AgriFutures Australia publication no. 24-088
AgriFutures Australia project no. PRO-015753

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