

B-CHECK: screening for American foulbrood disease

B-CHECK is a portable sensor device that can screen beehives for American foulbrood disease without opening the hive. The sensor will improve the efficiency of screening hives under the national bee biosecurity program – saving beekeepers time and money.

Using the American foulbrood biomarkers discovered by the CRC for Honey Bee Products, the CRC joined forces with the Department of Agriculture, Water and the Environment and AgriFutures Australia to develop a real-time, non-invasive sensor to detect American foulbrood, a bacterial honey bee disease.

For biosecurity protections, as soon as a hive with American foulbrood is detected, it is immediately isolated and a method to kill the colony is employed. The hive is either burnt or sent for irradiation.

Early detection of American foulbrood is crucial to prevent outbreaks from spreading to nearby beehives and minimise hive losses within, and between, apiaries.



CRC HBP
FOR HONEY BEE PRODUCTS



bee health



biomarkers



biosecurity



CRC researcher Dr Julia Grassl inspects a beehive infected with American foulbrood disease





Current field diagnostics for American foulbrood rely on skilled beekeepers opening their hives and visually inspecting every frame for symptoms. The presence of the disease can be as discreet as a single diseased larva in an apiary. Symptoms can be easily confused with other diseases, such as European foulbrood or sacbrood.

Molecular analysis of a sample of the brood is required to confirm an apiary is infected with American foulbrood. This is a time-consuming and invasive process, particularly in large-scale commercial apiaries. A rapid and non-invasive diagnostic tool to identify American foulbrood in the field would revolutionise the early detection and management of this devastating disease.

Using the CRC's American foulbrood disease research outcomes, researchers used a group of highly specific volatile biomarkers to develop a sensor array that can detect the disease when it contacts the air in an infected hive. The sensor array consists of a colourimetric sensor strip that changes colour when exposed to hive air. The array is read by an optical sensor which signals to a decision-making tool to detect American foulbrood. This innovative sensor design has been patent protected.

Laboratory testing for specificity and sensitivity of the sensor array has already occurred, and local field testing is showing positive results. This will be followed by wider testing across Australia and internationally.

The sensors will be incorporated into B-CHECK - a portable device that can sample air and provide an 'on-the-spot' diagnostic decision tool.

Once finalised, B-CHECK will be a cost-effective, user-friendly and robust portable device that provides rapid and accurate American foulbrood test results in the field.

B-CHECK will allow beekeepers to detect American foulbrood infections in the early stages of the infection and take appropriate management steps before the disease spreads. This is particularly important for pollination services when multiple hives from a range of beekeepers accumulate at a single site.

This real-time and non-invasive sensor has the potential to transform disease detection for American foulbrood on a global scale. Controlling this devastating disease will reduce the stresses affecting honey bees and will improve bee health.



Top: testing the sensor array in the brood of a healthy hive. Bottom: colourimetric sensor strips used in B-CHECK