June 2023

Modern Technologies and Diagnostic Tools

Modernising our diagnostics system

Australia has a robust biosecurity system that reduces the risks posed by exotic pests and diseases, but we are always looking for ways to further strengthen and future-proof our system. A crucial component of our national biosecurity system is our diagnostics system. Diagnostics allow us to rapidly identify harmful pests and diseases at our border and effectively manage associated risks.

In 2021, the Australian Government launched a $22 million program to modernise our plant diagnostics system over 4 years. This program will deliver significant upgrades to our property, equipment and infrastructure, new training opportunities for our diagnosticians, and more support for our laboratories. Our diagnosticians make up a significant part of the national biosecurity diagnostics system, and so this investment will have major flow on benefits nationally.

Here are some of the recent activities delivered under the program!

The MALDI Biotyper® Sirius device

The MALDI-ToF Mass Spectrometry Biotyper has completed the first-year pilot phase and is now used routinely for preliminary identification of bacteria and fungi in plant samples submitted to the DAFF diagnostic laboratory at Mascot. Potential pathogens can be intercepted earlier thanks to the ease of MALDI-ToF analysis—improving the efficiency and timeliness of the department's border diagnostics. The speed and targeting of diagnostics are improved because MALDI-ToF Biotyper can identify or indicate pathogens in pure cultures or mixed cultures with relatively high-throughput, rapid analysis. To date, over 1000 samples from bacterial and fungal isolations have been tested and profiled successfully, with focus now turning to the holy grail of profiling pathogens directly from plant samples.

Significant improvements in MALDI-ToF profiles were achieved following custom adjustments to the instrument's settings and details of these adjustments and results have been compiled for an upcoming peer-review publication. These improvements also aim to keep procedures simple, robust and fast, ensuring minimal upskilling is required for routine use by diagnosticians.

Current deployment of the MALDI-ToF MS has facilitated enhanced testing capability and improved the allocation of resources for molecular diagnostic targeting for verification testing in the Mascot laboratory. An implementation plan for further adoption in the department has been approved and is underway.

University partnerships

The department now has formal engagement agreements in place with 5 Australian universities. As a result of these agreements the department is now, for the first time, co-supervising its first in-house PhD student at the Plant Innovation Centre laboratories at the national Post Entry Quarantine facility in

Victoria. An additional three MSc students have also completed placements with the department working on various projects to develop and modernise our diagnostic capability. In 2024 and 2025 the department will fund two new PhD scholarships to further our student engagement commitment, deepen our partnerships with Australian universities and support future capability needs.

More information

Email askMTDT@agriculture.gov.au

Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.