Improving plant industry access to new genetics through faster and more accurate diagnostics using next generation sequencing (MT18005)

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A new project, funded by Hort Innovation using the Raspberry and Blackberry R&D levy and contributions from the Australian Government, seeks to improve the efficiency and effectiveness of virus detection in plant genetic material in post-entry quarantine facilities, through the adoption of next generation sequencing.

In 2018, the Australian horticultural sector exported an estimated $2.4 billion – highlighting the importance of investment in the detection of exotic plant pests at the border, for both improved biosecurity and gaining access to valuable markets.

Run by The Queensland University of Technology (QUT) in collaboration with Agriculture Victoria, the Department of Agriculture (DA) and New Zealand Ministry of Primary Industries (NZ MPI), this project aims to develop a useful tool for plant pathologists, enabling users to conduct shorter, more efficient and accurate plant pest screenings.

Utilisation of this sequencing technology will improve current methods and techniques to allow for quicker access to new genetic stocks. As a more cost-effective option, the technology has the potential to increase business resilience by allowing the import of a larger panel of genetic stocks to adapt to local environmental conditions. Past research has found utilising next generation sequencing has great promise; strongly correlating with methods currently used at post entry quarantine (PEQ) facilities. The project will perform large-scale side by side comparisons of next generation sequencing methods and techniques with existing PEQ protocols, enhancing confidence surrounding the better detection of exotic viruses and bacteria among regulators and industry stakeholders.

Although the project is looking to compare new and pre-existing techniques, it is also an opportunity to identify different ways to utilise new technologies across the plant diagnostic space and develop methods that combine existing and new quality control points. This includes:

- How genetic information is collected
- Leveraging from the plant immune response to viruses and how it enables diagnosis at the border
- Implement reproducible end-to-end data analysis tools and resources incorporating best practices and harmonised international standards for the detection of exotic plant pests

The project aims to screen up to 200 imported plants using the next generation sequencing technology for viruses and viroids (small infectious particles), and half of those plants are also expected to be screened for key exotic bacteria.

The project has recently kicked off with the first face-to-face meeting in Melbourne; establishing strategies and logistics to deliver across each project milestone and providing an opportunity to engage with the broader community including diagnosticians, industry and regulator groups in Australia and New Zealand. The meeting brought together project members from QUT, collaborators from Agriculture Victoria, and various key stakeholders from the government and industry.

The project team is partnering with policy regulators from the program offset and aims to ensure all industries are represented throughout the duration of the project. To share project findings and insights, the QUT team will organise an annual open workshop. In the meantime, keep an eye out for more updates as the project progresses!