Testing once, testing twice … Keeping plants clean from viruses

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Viruses can be a menace to berry crops. A single breeding selection or mother plant can easily be propagated to millions of daughter plants, and if the mother plant is infected, all daughter plants will also be infected. An infected plant could translate to poor establishment and loss of yield and could possibly lead to the need for growers to replant. For these reasons, virologists put a lot of effort into virus testing and elimination. Virus elimination is a laborious procedure in which small pieces of meristematic tissue (in the millimeter range) are excised from plants grown in conditions that are restricted for virus replication and movement and then regenerated in tissue culture.

Scientists at the University of Arkansas/Arkansas Clean Plant Center for Berries in collaboration with the Oregon Clean Plant Center conducted a study to compare new detection technologies with the current testing standards to determine whether virus detection in production operations could be improved. Instead of the two testing regimes over a one-to-two-year period, the current standard in the industry, four testing regimes over the same time period using new detection technologies was tested. Current detection tests use either a genetic testing method called reverse transcriptase polymerase chain reaction (RT-PCR), biological indexing, or both. In RT-PCR, specific sequences of RNA/DNA (the genetic code) of the viruses are detected if present within a sample. In biological indexing, indicator plants that produce symptoms when infected with a virus are used to determine whether viruses are present within a sample. The new detection technologies use a process called high-throughput sequencing (HTS), in which the RNA/DNA of all the organisms and viruses in a sample are sequenced. The sequences are then compared to known virus sequences, which allows for the detection and identification of all viruses present within a sample.

Results from the study indicated that the new testing technologies not only provided better detection than the current standard testing methods but also had the capacity to detect new viruses, which current testing methods cannot do. In addition to these benefits, the new technologies could also eliminate a major bottleneck in the propagation pipeline by reducing the need to graft onto indicator plants, a tedious, expensive, and time-consuming step required for biological indexing.

An unexpected finding from the study was how well viruses could “hide” or go unnoticed. Independent of the technologies used, virus detection could be unreliable with some viruses not being detectable in three of four samplings. These findings indicate the need to change the testing approach and increase the number of times testing occurs over a certain period of time so that scientists can provide nurseries and producers the cleanest berry plants possible.

For more information visit: https://aaes.uada.edu/news/virus-detection-in-berry-plants/?utm_source=slider&utm_medium=banner&utm_campaign=virus-detection-in-berry-plants