plant disease

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Disease Notes

First Report of Tomato yellow leaf curl virus in Hawaii

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Tomato yellow leaf curl disease, caused by the begomovirus Tomato yellow leaf curl virus (TYLCV; family Geminiviridae), is an economically important disease of tomato (Solanum lycopersicum L.) that can be very destructive in tropical and subtropical regions (1). In October 2009, tomato plants showing stunted new growth, interveinal chlorosis, and upward curling of leaf margins were reported by a residential gardener in Wailuku, on the island of Maui. Similar symptoms were observed in approximately 200 tomato plants at a University of Hawaii research farm in Poamoho, on the island of Oahu in November 2009. The similarity between these symptoms and those of tomato yellow leaf curl disease and the presence of whiteflies (Bemisia spp.), the vector of TYLCV, suggested the causal agent was a geminivirus such as TYLCV. Total nucleic acids were extracted from a tomato plant sample from Wailuku and Poamoho and used in a PCR assay with degenerate primers PAR1c715 and PAL1v1978 for geminivirus detection (4). The ~1.5-kbp amplicon expected to be produced from a geminivirus template was generated from the symptomatic tomato plant samples but not from a greenhouse-grown control tomato plant. The amplicons were cloned by the pGEM-T Easy vector (Promega, Madison, WI). Three clones from each sample were sequenced, revealing 97 to 99% nucleotide identity to TYLCV sequences in GenBank and a 98.9% nucleotide identity between the Wailuku (Accession No. GU322424) and Poamoho (Accession No. GU322423) isolates. A multiplex PCR assay for the detection and discrimination between the IL and Mld clades of TYLCV was also performed on these isolates (2). A ~0.8-kbp amplicon was generated from both isolates confirming the presence of TYLCV and their...
inclusion into the TYLCV-IL clade (2). Seven symptomatic and three asymptomatic tomato plant samples from Poamoho were tested for TYLCV using a squash-blot hybridization assay (3) utilizing a digoxigenin-labeled probe derived from the ~1.5-kbp PCR amplicon. All symptomatic tomato plants and one asymptomatic tomato plant were found to be infected with TYLCV. How the virus entered Hawaii and how long it has been present is unknown. The most plausible route is through infected plant material such as an asymptomatic alternative host rather than viruliferous whiteflies. It appears TYLCV is not a recent introduction into Hawaii since the Wailuku gardener observed similar disease symptoms for a few years before submitting samples for testing. In January 2010, TYLCV was also detected in two commercial tomato farms on Oahu, posing a serious threat to the state’s $10 million annual tomato crop.