First Report of 

Banana bunchy top virus in

Heliconia spp. on Hawaii

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Citation

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Banana bunchy top virus (BBTV) infects Musa spp. and causes banana bunchy top disease (BBTD), one of the most significant constraints to banana (Musa spp.) production worldwide (Xie and Hu 1995). The virus is transmitted by banana aphids (Pentalonia spp.), which can also feed on heliconia (Heliconia spp.) (Watanabe et al. 2013). Heliconias, native to the tropical Americas, are common landscape plants in Hawaii and have naturalized in some disturbed areas and forests. If heliconias are hosts of BBTV, they may potentially pose a significant threat to banana production in Hawaii. In July 2016, heliconia (Heliconia aurantiaca) plants with chlorotic leaves and green flecking of the veins were observed in a community garden in Honolulu, HI (21.2851°N, 157.8280°W). Fifteen symptomatic samples were tested for BBTV by PCR assays using virus-specific primers BBTV-RT1F (5′-ACCAGCCGACATCACTGCTG-3′) and BBTV-RT2R (5′-TCCTCAAACG GGTGTCTTC-3′). The expected 155-bp fragment of the partial capsid protein (CP) gene was amplified from eight of the 15 samples. These samples also tested positive in triple-antibody sandwich (TAS)-ELISA for BBTV (Agdia, Elkhart, IN), confirming the presence of the virus. Thirty-two additional heliconia samples with similar symptoms were collected from the same location and 22 tested positive in seven PCR tests using two different sets of BBTV-specific primer pairs: Rep-gene-specific primers BBTV-RepF1 (5′-CCATCAAAATCCCAACAACA-3′) and BBTV-RepR1 (5′-ACAGTATGACCGCGCTTCTT-3′); and CP-specific primers BBTV-HAF1 (5′-TCCGAAGAATCCATCAAGA-3′) and BBTV-HAR1 (5′-ACACCGTTTGCTCTTCAA-3′). The
positive PCR and ELISA results from symptomatic heliconia samples were weaker than those produced from BBTV-infected banana in both assays. To further verify the results, the 208-bp amplicons of the Rep sequence and the 401-bp amplicons of the CP sequence were cloned into pGEM-T-Easy (Promega, Madison, WI) and sequenced. The 208-bp sequence (accession no. KY322773) and the 401-bp sequence (KY322774) shared 98 to 100% and 98 to 99% nucleotide sequence identities, respectively, to the Hawaiian and other Pacific isolates of BBTV. In addition, 14 heliconia samples (H. aurantiaca) with similar BBTV-like symptoms were collected from another location in Honolulu (21.2711°N, 157.8215°W) and assayed for BBTV by PCR and ELISA. Four of the 14 samples tested positive for BBTV by ELISA and PCR sequencing, with intensities similar to those noted above. To our knowledge, this is the first report of BBTV infecting Heliconia sp. in Hawaii. Further study is needed to determine whether banana aphids can transmit BBTV from infected heliconia to healthy banana plants.

References:

Watanabe, S., et al. 2013. Viruses 5:758. https://doi.org/10.3390/v5020758 [Crossref] [ISI] [Google Scholar]