



First report of ageratum yellow vein virus infecting tomato in Vietnam

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Geminiviruses have single-stranded DNA circular genomes and infect various crops such as tomato and pepper worldwide. Geminiviruses cause diverse disease symptoms such as mosaic, chlorosis, necrosis, malformation, and stunting (Andou et al. 2010; Fukuta et al. 2003; Jones et al. 2014). In 2017, we collected tomato leaf tissues showing symptoms such as yellowing, mosaic, and stunting from six different regions in Bao Loc city of Vietnam. We obtained and pooled leaf samples from at least three different farms for each region, isolated total RNAs from pooled tissues using RNeasy Microarray Tissue Mini kit (QIAGEN, CA, USA), and prepared six libraries for the tomato transcriptome analysis using the TruSeq RNA Library Preparation Kit V2 (Illumina, CA, USA). The libraries were analyzed by the paired-end method using the Illumina HiSeq 2000 platform (Macrogen, Korea). The obtained raw data were processed with Trinity software for the *de novo* assembly (Jo et al. 2016). Among the assembled contigs, one single contig (2570 nt) assembled from 312 reads from one library was matched to ageratum yellow vein virus (AYVV, KC172826; a monopartite begomovirus) with 94% sequence similarity. To confirm infection of AYVV in the collected sample, PCR was performed with two AYVV-specific primer sets designed based upon assembled contig sequence, i.e. 5'-CTGA TGTGCCCAAAGGTTGT-3' / 5'- GCCTGCTCCTTAGA CGCATA-3' and 5'-AGTGCCCAAAGGCCTTCTAT-3' / 5'-

TCACAGGTGGACAATATGCG-3', for amplification of full length DNA. The amplified fragment (2740 nt) was cloned into the pGEM T-easy vector (Promega, WI, USA) and sequenced. The sequence results revealed that the AYVV in Vietnam (MH750441) had 93% sequence identity (2550/2747 nt) with ageratum yellow vein virus (AB100305.1). As judged from the NGS data, all tomato samples used in this study were also co-infected with tomato mosaic virus, tomato yellow leaf curl Kanchanaburi virus, and capsicum chlorosis virus. Therefore, we could not confirm that the symptoms observed such as yellowing, mosaic, and stunting on tomato leaves were caused by AYVV infection. Further efforts are needed to determine the extent of its detrimental effects in tomato. To our knowledge, this is the first report of AYVV infecting tomato in Vietnam.

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