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[Home](#) > [Plant Disease](#) > [Table of Contents](#) > [Abstract](#)

[Previous Article](#) | [Next Article](#)

July 2014, Volume 98, Number 7

Page 1015

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Disease Notes

First Report of *Tomato chlorotic spot virus* in Lettuce in Puerto Rico

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e-Xtra

Viral diseases have not previously been described in lettuce (*Lactuca sativa*) in Puerto Rico. In April 2013, lettuce samples from a hydroponic greenhouse in Guayanilla were submitted to the Plant Disease Clinic at the University of Puerto Rico's Juana Díaz Experimental Station. Lettuce plants were symptomatic for virus and had thrips. Eight samples reacted with *Tomato spotted wilt virus* (TSWV) DAS-ELISA (Envirologix, Portland, ME) and lateral flow immunoassay (Envirologix). Further sampling at the hydroponic greenhouse, which had 45,000 lettuce plants in different growth stages, revealed leaf symptoms of necrotic ringspots and browning with an incidence of 38%. Losses were high because plants had to be destroyed, resulting in \$160,000 of lost earnings to date. Symptoms appeared in the younger core leaves 5 days after transplanting and consisted of small chlorotic spots that developed into necrotic ringspots. The leaves became pale, then brown and wilted. In 15-day-old plants, lesions coalesced and within 1 to 2 days, leaf tissue appeared burned. Soft rot in the crown was observed in 5% of the affected plants. Stunting was also observed when young plants were affected. Due to recent identification of *Tomato chlorotic spot virus* (TCSV) in Puerto Rico (4) and known cross reaction of TSWV serological reagents with closely related tospoviruses, plants were tested for TCSV, TSWV, and *Groundnut ringspot virus* (GRSV) by reverse transcription (RT)-PCR as previously described (4). Total RNA was extracted from representative symptomatic leaves of two lettuce plants using RNeasy Plant Mini Kit (Qiagen, Valencia, CA) and tested by RT-PCR with TCSV-specific nucleocapsid (N) or RNA-dependent RNA polymerase (L) gene primers (4) or movement protein (NSm) gene primers (2). Amplicons of the expected sizes were produced with all three TCSV primer sets from both samples, whereas primers specific for the N gene of TSWV (1) or GRSV (3) did not amplify products from either sample. Three TCSV amplicons (N, L, and NSm) from one sample were gel-purified and

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cloned (pGEM-T, Promega, Madison, WI). Six clones of each amplicon were sequenced in both directions and consensus sequences were deposited in GenBank (KF819827 to 29). All three genes showed greater than 96% nucleotide identity with all TCSV isolates in GenBank, including 99 to 100% nucleotide identity with previously characterized TCSV isolates from tomato, pepper, and jimsonweed in Puerto Rico (4). Consistent with the identification of TCSV, the known TCSV vector *Frankliniella schultzei* was identified in the lettuce with an adult population of 10 to 21 thrips per plant. Symptomatic lettuce leaves were used to mechanically inoculate 10-day-old lettuce and 56-day-old tobacco (*Nicotiana tabacum*) plants. Symptoms reminiscent of the original lettuce developed, and the presence of TCSV was confirmed by RT-PCR as described above. This is the first report of TCSV infection of lettuce in Puerto Rico and demonstrates that TCSV can be a limiting factor to lettuce production here and elsewhere in the Caribbean.

References: (1) S. Adkins and E. N. Roskopf. *Plant Dis.* 86:1310, 2002. (2) M. S. Silva et al. *Arch. Virol.* 146:1267, 2001. (3) C. G. Webster et al. *Virology* 413:216, 2011. (4) C. G. Webster et al. *Plant Health Progress* doi:10.1094/PHP-2013-0812-01-BR, 2013.



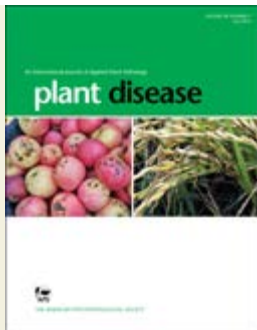


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[Home](#) > [Plant Disease](#) > [Table of Contents](#) > [Supplemental Material](#)

[Previous Article](#) | [Next Article](#)

July 2014, Volume 98, Number 7
Page 1015
<http://dx.doi.org/10.1094/PDIS-12-13-1200-PDN>

Supplemental Material



Tomato chlorotic spot virus-induced necrosis and wilt of hydroponic lettuce in Puerto Rico.

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