

## First report of Tomato torrado virus on weed hosts in Spain

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Tomato torrado virus (ToTV) is a recently identified Picorna-like virus that causes 'torrado' disease in tomatoes (Verbeek *et al.*, 2007a). Typical symptoms of 'torrado' disease seen in tomato crops (*Solanum lycopersicum* L. formerly *Lycopersicon esculentum* L.) were initially defined as yellow areas at the base of the leaflet that later developed into necrotic spots that sometimes abscised, leaving holes in the leaflet. Other plants showed extensive necrosis progressing from the base to the tip of the leaflet. Fruits were distorted with necrotic lines on the surface that often cracked. Affected plants had a burnt-like appearance and the production was seriously reduced. These symptoms have been observed in tomato crops in Murcia (Spain) and the Canary Islands (Spain) (Alfaro-Fernández *et al.*, 2007a). To identify possible alternative hosts that may serve as virus reservoirs, samples of 72 different common weed species were collected in greenhouses in Murcia and the Canary Islands

where 'torrado' disease symptoms were observed in tomatoes. Forty-seven showed virus-like symptoms and 25 were asymptomatic. Symptoms included mild mosaic, blistering, vein clearing, interveinal yellowing, yellow spots, necrosis, leaf distortion, and curling. Samples were analyzed by one-step reverse transcription (RT)-PCR using primers specific for ToTV to amplify 580 bp of the polyprotein region of RNA2 (van den Heuvel *et al.*, 2006) and dot-blot hybridization with a digoxigenin-labeled RNA probe complementary to the same portion of the ToTV genome. Twenty-two of the 72 weed samples belonging to *Amaranthus* sp. (*Amaranthaceae*); *Spergularia* sp. (*Caryophyllaceae*); *Atriplex* sp., *Chenopodium ambrosioides* L., *Chenopodium* sp., and *Halogetum sativus* (Loef. ex L.) Moq. (*Chenopodiaceae*); *Senebiera didyma* Pers. (*Cruciferae*); *Malva* sp. (*Malvaceae*); *Polygonum* sp. (*Polygonaceae*); and *Nicotiana glauca* Graham and *Solanum nigrum* L. (*Solanaceae*) were positive for ToTV by molecular hybridization (10 samples) and RT-PCR (22 samples, including the samples positive by molecular hybridization). PCR products obtained from *Atriplex* sp. (Canary Islands) and *S. didyma* (Murcia) were sequenced (GenBank Accessions EU090252 and EU090253). BLAST analysis showed 99% identity to ToTV RNA2 sequence (GenBank Accession DQ388880). Two tomato plants were positive for ToTV by RT-PCR after mechanical back-inoculation, although no symptoms were observed. This study showed ToTV infects common weeds present in Spanish tomato crops. Recently, *Trialeurodes vaporariorum* has been reported to transmit ToTV (Pospieszny *et al.*, 2007), although the efficiency of transmission is unknown. The vector-assisted transmission of ToTV could explain the

infection of weeds in affected greenhouses. To our knowledge, this is the first report of natural infection of weeds by ToTV.

References: (1) A. Alfaro-Fernández et al. *Plant Dis.* 91:1060, 2007. (2) H. Pospieszny et al. *Plant Dis.* 91:1364, 2007. (3) J. Van der Heuvel et al. *Plant Virus Designated Tomato Torrado Virus*. Online publication. World Intellectual Property Organization WO/2006/085749, 2006. (4) M. Verbeek et al. *Arch. Virol.* 152:881, 2007.