Disease Note

Diseases Caused by Viruses

First Report of Tomato Brown Rugose Fruit Virus in Tomato in Norway

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In May 2021, tomato (*Solanum lycopersicum* L.) plants with necrosis and ringspot symptoms were observed in a farm greenhouse at Sundbyfoss, Norway. This greenhouse production focused on ecological growing of several tomato varieties (e.g., ‘Blush Tiger’, ‘Sailor’s Luck’, and ‘Evil Oliver’) with compost for local customers. The presence of tomato brown rugose fruit virus (ToBRFV) was suspected due to the symptoms in the diseased plants. Sap inoculation was carried out with extracts from 100 mg of symptomatic fresh tomato leaves in 0.03 M PBS (phosphate buffered saline, pH 7.0), and they were inoculated on three *Nicotiana tabacum* cv. ‘Xanthi’ plants at the four- to six-leaf stage grown in an experimental greenhouse. The test plants showed local necrotic lesions after 3 to 5 days. Two symptomatic leaf samples, one from tomato and the other from a test plant, were analyzed with a transmission electron microscope (TEM) with the help of negative staining. The samples were first treated with 0.1 M PBS (pH 7.3), placed on carbon-coated EM grids, and stained with 2% uranyl acetate before TEM observation. Rigid rod-shaped viral particles, typical of *Tobamovirus* particles (around 300 nm), were observed. Total RNA was isolated from two tomato leaves showing symptoms using a Norgen Plant/Fungi RNA kit (Norgen Biotech, Canada). One-step reverse-transcription (RT)-PCR with specific primers

ToBRFV-F/ToBRFV-R for ToBRFV (Alkowni et al. 2019), which amplified a 560-bp fragment, was performed. The sequence obtained by Sanger sequencing from the amplicon (535 nt) showed 99.8% nt identity with ToBRFV isolate PV-1241 (NCBI accession no. MZ202349) from DSMZ (Leibniz Institute, Germany) and was deposited in the GenBank database under the accession number OK358628. The infection was also confirmed with a duplex real-time RT-PCR test for ToBRFV using CaTa28 and CSP1325 primers and probe (ISF 2020; EPPO 2021). In addition, eight tomato samples from the same farm greenhouse were collected based on their cultivar, location in the greenhouse, and symptoms before eradication and disinfection. Four of the tomato samples were confirmed positive for ToBRFV with one-step RT-PCR as described above. A surveillance program for ToBRFV in commercial greenhouse production has been carried out in 2021 in Norway. Around 4,000 tomato plants from 18 commercial tomato growers were tested. No positive ToBRFV samples have been detected. However, unregulated tomato seeds from abroad and self-propagation of tomato by private gardeners and hobby growers is a potential threat to commercial production of tomato in Norway. To our knowledge, this is the first report of ToBRFV associated with tomato in Norway and in the Nordic countries.

References:

- Alkowni, R., et al. 2019. J. Plant Pathol. 101:719.
EPPO. 2021. EPPO Bull 51:178.
ISF. 2020. Detection of infectious tomato brown rugose fruit virus (ToBRFV) in tomato and pepper seed. https://worldseed.org/wp-content/uploads/2020/03/Tomato-ToBRFV_2020.03.pdf

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