Netherlands Food and Consumer
Product Safety Authority
Ministry of Agriculture, Fisheries, Food Security and Nature

Quick scan for tomato necrotic spot virus

National Plant Protection Organization, the Netherlands

Quick scan number: 2024VIR002

Quick scan date: 15-08-2025

No.	Question	Quick scan answer for tomato necrotic spot virus
1.	What is the scientific name (if possible up to species level + author, also include (sub)family and order) and English/common name of the organism? *Add picture of organism/damage if available and publication allowed*.	Tomato necrotic spot virus (ToNSV), unclassified virus related to the genus *Ilarvirus* in the family *Bromoviridae*.  The imported beans in which ToNSV was detected showed necrotic rings, flecks and spots. It needs further confirmation whether these necrotic symptoms are caused by ToNSV or have another cause (see 6).
2.	What prompted this quick scan?	ToNSV was detected in common beans (*Phaseolus vulgaris* L.) for consumption imported from Morocco in 2017 and 2024.

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	Organism detected in product for import, export, in cultivation, nature, mentioned in publications, e.g. EPPO alert list, etc.	Currently, ToNSV is not regulated and has not been reported in the EU. However, ToNSV can cause damage in tomato (*Solanum lycopersicum* L.*,* see 6)..
3.	Wat is the risk assessment area?	The risk assessment area is the territory of the European Union.
4.	What is the current area of distribution?	ToNSV has been reported in California (Batuman et al., 2009), Indiana and Ohio (Bratsch et al., 2019) in the United States.
5.	What are the host plants?	Tomato is a natural host (Batuman et al., 2009). Additionally, ToNSV has been detected in pepper (*Capsicum* sp.) and onion (*Allium cepa*) (Batuman et al., 2011). However, the findings in pepper and onion are only mentioned in a meeting abstract and, therefore, need further confirmation. No reports have been found about ToNSV infections in *P. vulgaris.*
6.	Does the organism cause any kind of plant damage in the current area of distribution and/or does the consignment demonstrate damage suspected to have been caused by this organism? *Yes/no + plant species on which damage has been reported + short description of symptoms.* *Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).*	Yes. Symptoms have been observed in several tomato fields in the US where the disease incidence in most fields was not more than 5%, but in some fields over 20% (Batuman et al., 2009). In other publications, incidences of 5% (Bratsch et al., 2018) and 1 to 13% have been reported for tomato (Bratsch et al., 2019). Necrosis was observed on the fruit, leaves and stems of tomato (Batuman et al., 2009; Bratsch *et al*., 2018). Fruit was unmarketable due to the severe necrosis (patterns, lines, spots and scabbing) (Bratsch *et al*., 2018). The imported beans, both in 2017 and 2024, in which ToNSV was detected showed necrotic rings, flecks and spots. It needs further confirmation if these necrotic symptoms are caused by ToNSV or have another cause.
7.	Assess the probability of establishment in the Netherlands (NL) (i.e. the suitability of the environment for establishment). a. In greenhouses b. Outdoors c. Otherwise (e.g. storage facilities, human environment)	The establishment of ToNSV depends on the presence of host plants and the possibility to be transmitted. In the Netherlands, common beans are mostly grown in the field and tomatoes in greenhouses. In the EU, both crops are grown in the field as well as in greenhouses. There is limited information about the transmission of ToNSV. In an abstract of the APS-IPPC meeting and in a review paper, it is mentioned that ToNSV transmission is mediated by the thrips *Frankliniella occidentalis* (Batuman et al., 2011; Gilbertson et al., 2015). However, supporting scientific data are not shown and, therefore, this information needs further confirmation. Furthermore, some ilarviruses are reported to be transmitted by pollen and seed (Mink, 1993). Virus transmission via pollen can be facilitated by thrips, due to the wounds made while feeding (Sdoodee and Teakle, 1993). Transmission of ToNSV via pollen and seed has not been studied so far. Therefore; a) ToNSV may be able to establish in greenhouses where host plants are grown (tomato). b) ToNSV may be able to establish outdoors where host plants are grown (common bean).

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		c) Not relevant. Key uncertainty: mode of transmission and likelihood of transmission of ToNSV
8.	Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).	ToNSV may be able to establish in the EU, both in greenhouses and in the field but there is a key uncertainty concerning the mode of transmission (see question 7).
9.	What are the possible pathways that can contribute to spread of the organism after introduction? How rapid is the organism expected to spread (by natural dispersal and human activity)?	Natural spread might occur via vectors, pollen and seed (uncertainty, see question 7). Human assisted spread may occur via movement of infected seeds and plants for planting.
10.	Provide an assessment of the type and amount of direct and indirect damage (e.g. lower quality, lower production, export restrictions, threat to biodiversity, etc.) likely to occur if the organism would become established in NL and the EU, respectively?	Economic damage is expected if ToNSV were to become established in the EU (including the Netherlands). In tomato, similar damage levels may occur as reported from the current area of distribution (see question 6). The magnitude of the expected impact is, however, uncertain because of uncertainties about the mode(s) of transmission of ToNSV (see question 7). Economic damage in common bean is uncertain because of a lack of reports of ToNSV infections in this crop. If ToNSV causes the observed symptoms on the imported beans, ToNSV is also expected to have an economic impact on the production of common beans.
11.	Has the organism been detected on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables)? *If "no", go to question 12*	Yes (vegetable for consumption).
12.	If the organism has been found on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables), what is the probability of introduction (entry + establishment)? *Only to be answered in case of an interception or a find.*	The probability of introduction through import of infected beans (vegetable) is expected to be very low. Mechanical transmission does not contribute to the spread of ilarviruses in the field. Therefore, transmission via produce (fruits/vegetables) seems very unlikely. There may only be a chance of introduction if people would extract seeds from the fruit/vegetables for propagation purposes. However, transmission via seed for ilarviruses in general has only been reported at low incidence. The probability that a consumer will use the seeds from infected tomato fruits or fresh beans to grow plants, and subsequently ToNSV is transmitted from the seed to the plant seems very low. In addition, an infected plant at a consumer's place will only lead to an established population when the virus is transmitted to other plants.
13.	Additional remarks	-
14.	Summary and conclusions	• This quickscan of tomato necrotic spot virus (ToNSV) was prompted by the interception of the virus on *Phaseolus* beans for consumption imported from Morocco. • ToNSV is not known to be present in the EU. It has been reported from the United States but may have a wider distribution considering the interception on produce from Morocco.

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		• Tomato (*Solanum lycoperosicum* L.) is known as a host plant. The interception indicates that common bean (*Phaseolus vulgaris*) is also a host. The host plant status of pepper (*Capsicum* sp.) and onion (*Allium cepa*) needs confirmation. • ToNSV may be able to establish in the EU in greenhouses and the open field where host plants are present. • If ToNSV were to become established economic impacts can be expected. • Key uncertainty for both the likelihood of establishment and the magnitude of the potential impact is the mode of transmission and how fast ToNSV can spread in a crop. The thrips species *Frankliniella occidentalis* may be able to transmit the virus but this needs confirmation.
15.	References	Batuman O, Miyao G, Kua YW, Chen LF, Davis RM and Gilbertson RL. An outbreak of a necrosis disease of tomato in California in 2008 was caused by a new ilarvirus species related to *Parietaria mottle virus.* Disease note, 93: no 5, 2009. Batuman O, Chen LF, Gilbertson RL. Characterization of tomato necrotic spot virus (ToNSV), a new ilarvirus species infecting processing tomatoes in the central valley of California. Phytopathology 101:S13, 2011. Bratsch SA, Creswell TC and Ruhl GE. First report of tomato necrotic spot virus infecting tomato in Indiana. Plant health progress, 19: 3, 2018. Bratsch SA, Grinstead S, Creswell TC, Ruhl GE, and Mollov D. Characterization of tomato necrotic spot virus, a subgroup 1 ilarvirus causing necrotic foliar, stem, and fruit symptoms in tomatoes in the United States. Plant disease, 103: 2019. Sdoodee R. and Teakle DS. Mechanism of transmission of pollen-associated TSV by Thrips tabaci. Plant pathology, 42: 88-92, 1993. Mink GI. Pollen- and seed-transmitted viruses and viroids. Annual review of Phytopathology, 31: 375-402, 1993.
16.	Follow-up measures	No official measures (literature will be monitored for any new information about ToNSV)