

Mini datasheet on *Tomato leaf curl New Delhi virus*

Tomato leaf curl New Delhi virus was added to the EPPO A2 List in 2022. A full datasheet will be prepared, in the meantime you can view here the data which was previously available from the EPPO Alert List (added to the EPPO Alert List in 2015 - deleted in 2022).

Tomato leaf curl New Delhi virus (Geminiviridae: Begomovirus)

Why: *Tomato leaf curl New Delhi virus* (ToLCNDV) is a bipartite, whitefly-transmitted, begomovirus which was first described on tomatoes in India in 1995 (initially as ToLCV-India). This virus was initially reported on solanaceous crops, but subsequently many reports of damage to cucurbit crops were also made. Following its discovery in India, other Asian countries reported the occurrence of ToLCNDV on a rather wide range of crops. In September 2012, symptoms caused by ToLCNDV were first observed on courgette (*Cucurbita pepo* var. *giromontiina*) in Murcia, Spain. In May 2013, similar symptoms were noticed in Almería province, and by autumn 2013, the disease was widespread in both Spanish regions. In January 2015, the virus was detected for the first time in Tunisia, causing a severe disease on melon, cucumber and courgette cultivated under plastic tunnels in the Kébili region (Southeastern Tunisia). Subsequently, it was also found in Morocco on courgette near Agadir and Taroudant (2017), Greece (2018), and Portugal (2019). As ToLCNDV is an emerging virus in the Euro-Mediterranean region, the EPPO Secretariat decided to add it to the EPPO Alert List.

Where: information is generally lacking on the geographical distribution, which might be wider than what is listed below.

EPPO region: Algeria (first found in 2018), Greece (first found in October 2018), Italy (Sicilia, first found in autumn 2015; Sardegna and Campania in 2016), Morocco (first found in 2017), Portugal (Algarve and Azores, first found in 2019), Slovakia (transient, under eradication), Spain (first found in autumn 2012 on the mainland, in Canary Islands (Gran Canaria) in 2018), Tunisia (first found in January 2015).

Africa: Algeria, Morocco, Seychelles (Praslin island), Tunisia.

Asia: Bangladesh, India (Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Punjab, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh, West Bengal), Indonesia (Java), Iran, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand.

On which plants: ToLCNDV was initially found on *Solanum lycopersicum* (tomato), and then on other Solanaceae such as *Solanum melongena* (aubergine), chili pepper (*Capsicum* spp.) and *Solanum tuberosum* (potato). ToLCNDV was also found to infect many Cucurbitaceae, such as: *Benincasa hispida* (wax gourd), *Citrullus lanatus* (watermelon), *Cucumis melo* (melon), *Cucumis melo* var. *flexuosus* (snake melon), *Cucumis sativus* (cucumber), *Cucurbita moschata* (musky gourd), *Cucurbita pepo* (pumpkin), *Cucurbita pepo* var. *giromontiina* (courgette), *Glycine max* (soybean), *Lagenaria siceraria* (bottle gourd), *Luffa cylindrica* (sponge gourd), *Momordica charantia* (bitter melon). In Spain, the virus was detected in melon (*Cucurbita melo*, *C. melo* var. *flexuosus*), pumpkin (*C. pepo*) and cucumber (*Cucumis sativus*) crops, but apparently not in tomato. In Tunisia, ToLCNDV was also found only in cucurbit crops. In the literature, there are a few records on weeds (e.g. *Eclipta prostrata* - Asteraceae, *Physalis minima* - Solanaceae), other crops such as *Hibiscus cannabinus* (kenaf - Malvaceae) and *Carica papaya* (papaya - Caricaceae) and ornamentals (e.g. *Chrysanthemum indicum* - Asteraceae, *Crossandra infundibuliformis* - Acanthaceae).

Damage: diseases caused by ToLCNDV on its different host plants generally include yellow mosaic, leaf curling, vein swelling, and plant stunting. On cucurbit fruits, skin roughness and longitudinal cracking have been observed. On fruiting crops, when the virus infection occurs at an early stage, affected plants are severely stunted and fruit production is significantly affected, if not suppressed. In the Indian sub-continent, ToLCNDV is reported to cause severe symptoms and economic losses, in particular in solanaceous crops (e.g. tomato, aubergine, chili pepper). Surveys conducted in India from 2003 to 2010, confirmed its occurrence in several cucurbit crops associated with damage.

Transmission: ToLCNDV is transmitted by *Bemisia tabaci* in a persistent mode. It is not known if the virus can be transmitted by contact or by seeds.

Pathway: plants for planting of susceptible hosts, viruliferous *B. tabaci*.

Possible risks: ToLCNDV has a wide host range which includes economically important crops for the EPPO region, such as tomato, aubergine, capsicum, potato and cucurbits. ToLCNDV shows genetic variability and several strains have been described, which might explain the differences in host plants affected between regions. In addition, molecular studies have shown that the presence or absence of beta-satellites might affect its pathogenicity. Control measures against ToLCNDV are very limited and mainly rely on whitefly control, cultivation under insect-proof greenhouses, elimination of infected plants, and avoidance of the most susceptible cultivars. It should be noted that for the moment, no resistance or tolerance to ToLCNDV has been identified in commercial cultivars. The introduction of this virus into Spain has raised serious concerns among cucurbit growers, and compulsory control measures were issued by the region of Murcia. Although more studies are needed to better understand the biology and epidemiology of this virus, it seems desirable to avoid its further spread.

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