

## Mini data sheet on *Meloidogyne ethiopica* and *Meloidogyne luci*

*Meloidogyne ethiopica* was added to the EPPO A1 List in 2023 and *Meloidogyne luci* was added to the EPPO A2 List in 2023. Full datasheets 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 2011 for *M. ethiopica* and 2017 for *M. luci* - both deleted in 2023).

### Why

In 2003, a tropical root-knot nematode species, initially identified as '*Meloidogyne ethiopica*' was found for the first time in a tomato greenhouse in Slovenia. As *M. ethiopica* is a polyphagous species which can multiply on many different types of plants (dicotyledons and monocotyledons), it was added in 2011 to the EPPO Alert List. In 2014, a morphologically similar species, *M. luci*, was described. In 2015 and 2017, molecular studies on populations of *Meloidogyne* species collected from a wide range of geographical origins and host plants showed that the populations found in the EPPO region and originally identified as *M. ethiopica*, corresponded in fact to *M. luci*. As both *M. ethiopica* and *M. luci* can damage a large number of economically important crops, the EPPO Secretariat decided that both *M. ethiopica* and *M. luci* should be included in the EPPO Alert List.

### Where

***M. ethiopica*** is a tropical root-knot species which was first described in 1968 in Southern Africa (Tanzania). Considering the recent confusion between *M. ethiopica* and *M. luci*, the geographical distribution is now rather uncertain.

**EPPO region:** absent (all populations of '*M. ethiopica*' reported from Italy, Greece, Slovenia, and Türkiye correspond to *M. luci*).

**Africa:** Ethiopia, Kenya, Mozambique, South Africa, Tanzania, Zimbabwe.

**South America:** Brazil (Distrito Federal, Minas Gerais, Parana, Rio Grande do Sul, Santa Catarina, Sao Paulo), Chile (detected in the Central Valley from Copiapo (north of Santiago) to Talca), Peru.

***M. luci*** was first described in 2014 from different plant species in Brazil, Chile and Iran. In the EPPO region, *M. luci* (initially identified as '*M. ethiopica*') was first found in 2003 on glasshouse tomatoes in 1 location (Dornberk) in Slovenia. All infested plants were destroyed and the nematode was no longer found. However in 2015, *M. luci* was found again on tomato roots in a glasshouse near Ljubljana (village of Šmartno) where eradication measures are ongoing. In 2009, *M. luci* (as '*M. ethiopica*') was detected in 2 soil samples which had been collected from maize (*Zea mays*) and kiwifruit (*Actinidia deliciosa*) near Kavalla, Northern Greece. The situation of this nematode in Greece needs to be further investigated. In 2009, *M. luci* (as '*M. ethiopica*') was also detected in Türkiye in 2 tomato greenhouses of the University of Ondokuz Mayıs and in several commercial cucumber greenhouses in Çarşamba district (Samsun province). In 2013, *M. luci* was found in a single plot on potato (*Solanum tuberosum*) in Portugal. In the literature, there is a record of this nematode in Italy but data is lacking on its current situation.

**EPPO region:** Italy, Greece, Portugal (mainland, and Azores at low prevalence), Serbia, Slovenia (under eradication), Türkiye.

**South America:** Brazil (Distrito Federal, Rio Grande do Sul, Parana), Chile, Guatemala.

**Asia:** Iran.

### On which plants

***M. ethiopica*** is a polyphagous pest that is able to parasitize at least 80 different host plants, including many economically important crops. Considering the recent confusion between *M. ethiopica* and *M. luci*, the following host plant list is now rather uncertain. In Africa and South America, *M. ethiopica* has been observed on many different cultivated species such as: *Actinidia deliciosa* (kiwi), *Agave sisalana* (sisal), *Asparagus officinalis*, *Beta vulgaris* (beetroot), *Brassica oleracea* (cabbages), *Capsicum frutescens* (chilli pepper), *Citrullus lanatus* (watermelon), *Cucurbita* spp., *Ensete ventricosum* (ensete), *Glycine max* (soybean), *Lactuca sativa* (lettuce), *Nicotiana tabacum* (tobacco), *Phaseolus vulgaris* (common bean), *Polymnia sonchifolia* (yacon), *Solanum lycopersicum* (tomato), *Solanum tuberosum* (potato), *Vicia faba* (faba bean), *Vigna unguiculata* (cowpea), *Vitis vinifera* (grapevine), as well as on trees (*Acacia mearnsii*) and weeds (*Ageratum conyzoides*, *Datura stramonium*, *Solanum nigrum*).

***M. luci*** has been found on the following plant species: *Abelmoschus esculentus* (okra), *Actinidia deliciosa* (kiwifruit), *Antirrhinum majus* (snapdragon), *Brassica oleracea* var. *italica* (broccoli), *Cucumis sativus* (cucumber), *Daucus carota* (carrot), *Glycine max* (soybean), *Hylotelephium spectabile* (sedum), *Lactuca sativa* (lettuce), *Lavandula angustifolia* (lavender), *Phaseolus vulgaris* (common bean), *Polymnia sonchifolia* (yacon), *Rosa* sp. (rose), *Solanum lycopersicum* (tomato), *Solanum tuberosum* (potato), *Vitis vinifera* (grapevine). At least

on bean, tomato, and soybean crops, symptoms of decline and stunting, as well as root galling have been reported.

Host range experiments have also showed that *M. luci* (as '*M. ethiopica*') can also multiply on a large number of cultivated plants of economic importance, for example: *Allium cepa* (onion), *Apium graveolens* (celery), *Fagopyrum esculentum* (buckwheat), *Helianthus annuus* (sunflower), *Hordeum vulgare* (barley), *Medicago sativa* (lucerne), *Oryza sativa* (rice), *Pisum sativum* (pea), *Prunus persica* (peach), *Solanum melongena* (aubergine), *Spinacia oleracea* (spinach), *Zea mays* (maize).

### Damage

As is the case with other root-knot nematodes, both *M. ethiopica* and *M. luci* damage plants by affecting the development of their root systems which are distorted by multiple small and large galls and devoid of fine roots. Affected plants can also show above ground symptoms such as stunting and wilting. In Brazil and Chile, *M. ethiopica* is considered to be a damaging species on kiwi and grapevine, as infestations lead to a reduction of plant growth, fruit size and quality. In Brazil, it has also been reported to cause multiple galls on potato root systems, as well as protuberances on tubers. Data is generally lacking on the extent of damage and the economic impact these nematodes may cause on their different host plants. Data is also lacking on their biology.

### Transmission

As a root-knot nematode species, both *M. ethiopica* and *M. luci* can easily be transmitted with soil and plant root material. In Chile, it is suspected that movements of contaminated grapevine nursery stock have probably resulted in serious infestations in various vineyards. In Brazil, it is also suggested that *M. ethiopica* was introduced in 1989 to Rio Grande do Sul on kiwi seedlings imported from Curicó (Chile), and that the pest was then moved to Distrito Federal on infested bulbs of *Polymnia sonchifolia* (yacón or Peruvian ground apple) from Rio Grande do Sul.

### Pathway

Infested soil and growing media, plants for planting, bulbs and tubers from countries where *M. ethiopica* or *M. luci* occur are the most probable pathways to introduce and spread these pests into the EPPO region. Soil attached to machinery, tools, footwear, or plant products is also another possible pathway.

### Possible risks

Both *M. ethiopica* and *M. luci* are polyphagous species and many of their host plants are of economic importance to the EPPO region as they are cultivated as arable, vegetable, ornamental or fruit crops. The detection of *M. luci* in the EPPO region clearly demonstrated that it has the potential to enter the region, although its pathway of introduction remains unknown. Studies had shown that, despite its probable tropical origin, *M. luci* (as '*M. ethiopica*') has the potential to survive outdoors under a continental climate (hot summers and cold winters) even in areas where soil temperatures fall below zero during winter, as well as under a sub-Mediterranean climate (hot summers and mild winters). More studies on the potential of establishment of *M. ethiopica* in the EPPO region would be needed but its similarities with *M. luci* suggest that it may also survive under temperate conditions. Once root-knot nematodes have been introduced, it is in general difficult to control or eradicate them. The detection of virulent populations of *M. luci* in Türkiye that can reproduce on tomato plants bearing *Mi-1* resistance gene adds to the concern about the damage potential of this pest. The *Mi-1* resistance gene has been introgressed into many commercial tomato cultivars to control root-knot nematode species, and the fact that it can be overcome by some populations of *M. luci* limits the availability of efficient management options. The confusion between *M. ethiopica* and *M. luci* underlines the difficulties faced in establishing a reliable identification between morphologically similar species. Considering the wide host range of both species and their probable (or verified) ability to establish under temperate conditions, it seems desirable to avoid the introduction of *M. ethiopica* and the spread of *M. luci* in the EPPO region.

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