

Mini data sheet on *Heterodera elachista*

Added to the EPPO Alert List in 2014 - Deleted in 2019

Reasons for deletion:

Heterodera elachista has been included in EPPO Alert List for more than 3 years and during this period no particular international action was requested by the EPPO member countries. In 2019, the Working Party on Phytosanitary Regulations agreed that it could be deleted, considering that sufficient alert has been given.

Heterodera elachista - Japanese rice cyst nematode

Why: The cyst nematode, *Heterodera elachista*, was originally described in Japan in 1974. Until recently, it was known to occur in Asia only, affecting upland rice crops. In October 2012, its presence was detected in Italy on a maize crop. Because this is the first time that *H. elachista* is recorded in the EPPO region and on a new and economically important host plant, the EPPO Secretariat decided to add this nematode to the EPPO Alert List.

Where: Until its discovery in 2012 in Italy (1 maize field in Emilia-Romagna region), *H. elachista* was known to occur in Asia only.

EPPO region: Italy (no longer found in Emilia Romagna but other outbreaks were detected in Lombardia (2016) and Piemonte (2017); under eradication).

Asia: China (Guangxi, Hubei, Hunan, Jiangxi, Ningxia), Iran, Japan (from Northern Honshu to Kyushu).

On which plants: rice (*Oryza sativa*), and maize (*Zea mays*). In Asia, *H. elachista* has only been reported in rice crops. As is the case for most rice cyst nematodes (except *H. oryzae*), *H. elachista* cannot withstand an extended flooding period and is mainly found on upland rice or on lowland rice where there is little or no water control. Experiments carried out in Italy on potted plants of rice and maize have shown that both species were suitable host plants for *H. elachista*.

Damage: Rice plants infested by *H. elachista* can be severely stunted and chlorotic and usually produce fewer tillers. Root growth can be reduced, infested roots becoming brown or black. If soils are heavily infested rice seedlings may die. It was estimated that *H. elachista* can decrease rice yield by 7 to 19% and has the most severe impact during the later stages of plant growth.

In their paper, De Lucas *et al.* (2013) mentioned that the affected maize field in Italy presented patches of plants showing severe decline and stunting, with heavily infested plants displaying significant proliferation of short lateral roots. Brown cysts and white lemon-shaped females could be observed on the root surface of affected plants, as well as in the soil.

H. elachista has sedentary endoparasitic habits. Cysts are persistent tanned sacs derived by the female body and contain the eggs. Cysts persist in soil for many years. Second-stage juveniles (J2) emerge from the cysts, penetrate host roots and establish a specialized feeding site (syncytium) in the central cylinder of roots (stele). They develop into swollen females, which retain the eggs and produce large egg masses. Females rupture the root cortex and protrude from the root surface. At the end of the reproductive phase, females die and become rounded dark or black cysts. *H. elachista* is morphologically close to *H. oryzae*, *H. oryzicola* and *H. sacchari*, and its identification requires the use of several techniques (e.g. morphological, biochemical, molecular). The life cycle of *H. elachista* was studied in China both in the laboratory and in a rice field. Results showed that the development of *H. elachista* is slow below 20°C, and is favoured by relatively high temperatures. At 30°C, the complete life cycle took 22 days (however, the English abstract of the paper from Zhong *et al.*, 2012 does not mention whether these values are referring to air or soil temperatures).

Dissemination: Natural spread is very limited, as juveniles can only move over short distances when attracted towards roots in the soil. As in the case of other cyst nematodes, *H. elachista* can spread into new areas as cysts, carried with plants, soil or soil attached to plants, machinery or any other material.

Pathway: Plants for planting, soil, soil attached to agricultural machinery or other material.

Possible risks: Maize, and rice to a lesser extent, are economically important crops in the EPPO region. Although data is lacking about the economic impact of *H. elachista*, it cannot be excluded that this cyst nematode could have negative impacts on maize and rice yields. Data is generally lacking on possible control measures against *H. elachista*. However, it is likely that as for other cyst nematodes, control would probably rely on crop rotation with non-hosts. As cysts persist in soil for a long time and can be easily transported with soil and soil attached to plants or contaminated machinery or any other material, it is desirable to avoid any further spread of this nematode within the EPPO region.

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