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HETERODERA LATIPONS AND PRATYLENCHUS THORNEI ATTACKING BARLEY IN CYPRUS

by

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Summary. The mediterranean cereal cyst nematode, *Heterodera latipons* and the lesion nematode, *Pratylenchus thornei* are widespread in Cyprus and cause stunting and chlorosis in autumn sown barley. Crop damage is enhanced in dry seasons due to the inability of the infested root system to utilize the available moisture from deeper soil layers. Nematode invasion by *P. thornei* was observed in late December, 1996 and by *H. latipons* in early January, 1997. *H. latipons* caused abnormal branching and slight swelling of the young infested roots while *P. thornei* caused destruction of the root cortex. Very often the nematodes were found to coexist.

Cereals have been grown in Cyprus from ancient times. During the last few decades, however, drought conditions and monoculture of cereals, mainly of barley, have made cereal growing on the island unprofitable. The total area under cereals is about 63,500 hectares which is supplemented by annual imports of 0.5 million tones of feed grain to satisfy local demands (Anonymous, 1994). Ninety five per cent of the area under cereals is sown with barley, *Hordeum vulgare* L., and the remainder with wheat, *Triticum aestivum* L. It is assumed that, to date, the most damaging nematode species on barley in Cyprus are the Mediterranean cereal cyst nematode, *Heterodera latipons* Franklin, and the lesion nematode, *Pratylenchus thornei* Sher et Allen (Philis 1988; Philis 1995). *H. latipons* has been reported attacking oats in Israel (Cohn and Ausher, 1973), barley in Turkey (Rumpfenhorst *et al.*, 1996) and Libya (Franklin, 1969) thus justifying the naming of the species by Franklin (1969) as the Mediterranean cereal cyst nematode. According to Sikora (1988) *H. latipons* could be an important con-

straint to barley production in the temperate semi-arid region of North Africa and West Asia while in Cyprus substantial yield losses of barley by this nematode have also been reported (Philis, 1988).

Pratylenchus thornei is very common and widespread in the mediterranean region (Lamberti, 1981) and reports from Australia (Baxter and Blake, 1968) and the U.S.A. (Van Gundy *et al.* 1974) identify it as a serious threat to wheat; there is no information on the pathogenicity of *P. thornei* to barley.

The work reported here had the aim of identifying the geographical distribution of *H. latipons* and *P. thornei* in the cereal growing areas of Cyprus and the extent and effect of their parasitism on barley cv. Athenais.

Materials and methods

Root and soil samples were collected in December, 1996, and throughout January-February 1997, when plants were 5-15 cm high, from se-

veral areas on the island where barley cv. Athenais was grown and transported to the laboratory for nematode extraction. Juveniles of *H. latipons* and *P. thornei* were extracted from soil samples using a modification of the sieving-decanting method. *P. thornei* were extracted from roots, at a later stage of plant growth, by comminuting samples in a Waring blender followed by filtering. Final nematode collection for both species from soil samples was made using 350 and 410 mesh sieves, corresponding to 45 and 38 μm apertures, respectively. For observation of nematodes in the roots, 2-3 cm pieces were stained for about two minutes in hot 0.05 per cent acid fuchsin, in equal parts of glycerol, lactic acid and distilled water, left to cool and then cleared in a mixture of equal parts of glycerol and distilled water for 2-3 days (Bridge *et al.*, 1982). Specimens were mounted in glycerol

on glass slides and photographs taken through an Axiophot microscope.

Results and discussion

Heterodera latipons was found in most of the traditional barley-growing areas of the island where intensive growing of this crop had occurred for many years. It was first observed at Lymbia (Phillis, 1988) situated 20 km south east of Nicosia while further sampling in several areas indicate that the nematode is widespread on the island (Fig. 1). *H. latipons* and *P. thornei* were found to invade barley cv. Athenais causing serious stunting and chlorosis (Fig. 2). The extent of nematode attack observed in the field ranged from isolated patches of damaged plants to uniform infection covering the entire

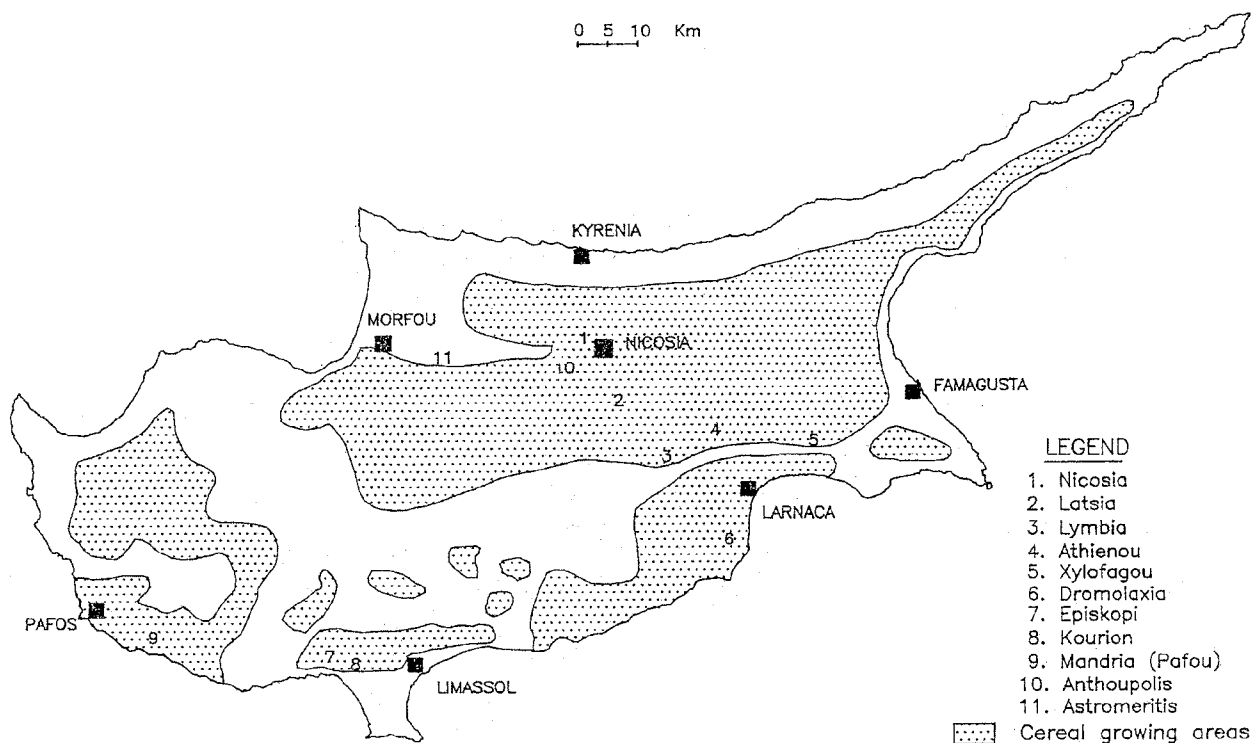


Fig. 1 - Sampling sites where *Heterodera latipons* was found in Cyprus.



Fig. 2 - Patch of stunted and chlorotic barley cv. Athenais in the field infested with *H. latipons* and *Pratylenchus thornei*.

field. Where both nematodes were relatively numerous, stunting and chlorosis occurred from the early stages of plant development while where drought conditions prevailed the leaves were also yellowish green, especially in calcareous soils. Numerous second stage juveniles of *H. latipons* were recovered from the soil from mid-January and throughout February. Root examination under the microscope revealed that the nematode caused slight swelling and abnormal branching of the young roots at the site of nematode invasion leading, at a later stage of plant development, to a bushy and shallow root system. This inhibited normal root development in the soil and prevented infected plants from utilizing the available moisture in the deeper soil layers. After prolonged feeding,

females became white cysts attached to the roots (Fig. 3), later turning to a brown colour. Eggs were observed within the cysts from early March.

Juveniles of *P. thornei* were observed in the root cortex of young roots and arranged parallel to the long axis of the root a few weeks after plant emergence. Mature females laid eggs singly or in clusters. The nematode caused little damage at the early stages of plant growth and when soil population densities were low. However, as plants continued to develop and when mass invasion by the nematode occurred, the cortex of the root was destroyed and the epidermis, including part of the cortex, sloughed off exposing the uninvaded, but already necrotic, stele. These symptoms have also been

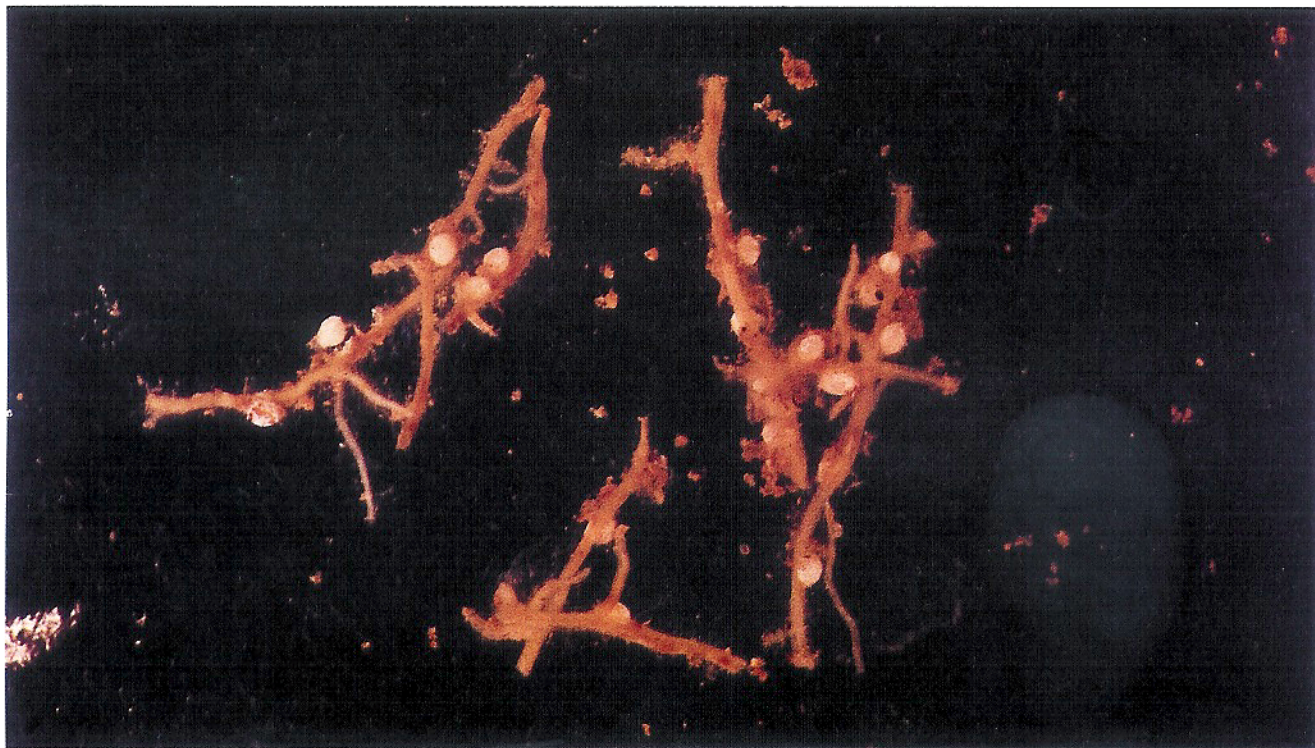


Fig. 3 - *H. latipons* attacking barley cv. Athenais: A, abnormally branched roots with young females.

described by Baxter and Blake (1968) when studying the effect of *P. thornei* on wheat. The consequences of the loss of the cortex in barley are unknown but Jacques and Schwass (1956) suggested that in certain grasses it would result in reduced absorptive capacity of the roots and this may also apply to barley. *P. thornei* is killed at 40 °C (Feldmesser and Rebois, 1965) but high soil temperatures in Cyprus, usually occurring during July-August and after completion of barley harvesting, hardly reach 30 °C at 10 cm soil depth (Phillis, 1980) and thus the nematode can survive and continue its life cycle in the next growing season (December-June).

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