

## RESPONSE OF LINES OF FABA BEAN TO SIX POPULATIONS OF ROOT LESION NEMATODES (*PRATYLENCHUS* SPP.) FROM THE MEDITERRANEAN REGION

M. Di Vito<sup>1</sup>, F. Catalano<sup>1</sup>, G. Zaccheo<sup>1</sup>, M. Sadiki<sup>2</sup> and M. Kharrat<sup>3</sup>

<sup>1</sup> Istituto di Nematologia Agraria, C.N.R., 70126 Bari, Italy

<sup>2</sup> Institut Agronomique et Vétérinaire Hassan II, Département d'Agronomie et d'Amélioration des Plantes, B.P. 6202 Rabat-Instituts, Rabat, Morocco

<sup>3</sup> INRAT Laboratoire des Grandes Cultures, 2049 Ariana, Tunisia

**Summary.** Investigations were undertaken in 2000-2001 to evaluate the reaction of 99 faba bean lines (40 from Algeria, 6 from Morocco and 53 from Tunisia) to six populations of the root lesion nematodes, three of *Pratylenchus thornei* and one each of *P. neglectus*, *P. penetrans* and *P. pinguicaudatus*. Groups of fifty clay pots were sown with three seeds/pot of each line and maintained in a glasshouse at 22 ± 2°C. Two pots of each line and nematode population were inoculated with 15,000 nematodes/pot. The lines FRYT98-6 and FRYT98-60 were completely free of *P. neglectus* infestation. Numbers of *P. thornei* of Italian, Moroccan and Tunisian populations in the roots of the lines FRYT98-35, FRYT98-47 and FRYT98-56 were low. The infestation of *P. penetrans* and *P. pinguicaudatus* was also low in the lines FRYA98-48 and FRYT98-44, respectively.

Faba bean suffers from attack by root lesion nematodes in several countries of the Mediterranean basin. A growth reduction of faba bean of 60 and 40% was observed in pots infested with initial population densities of 64 *Pratylenchus neglectus* or *P. thornei*/cm<sup>3</sup> soil, respectively (Di Vito *et al.*, 2000).

Because of such extensive yield losses control measures are necessary to successfully grow susceptible crops. The use of resistant cultivars would be economic and a response to concerns about pesticide pollution. Unfortunately, no line of faba bean is known to be resistant to root lesion nematodes. Therefore an investigation, in the frame of the EU Project FRYMED, was undertaken to evaluate the reaction of lines of faba bean to *P. thornei*, *P. penetrans*, *P. neglectus* and *P. pinguicaudatus* from Algeria, Italy, Morocco and Tunisia.

### MATERIALS AND METHODS

Fifty groups of clay pots, containing three litres of steam sterilized sandy soil, were prepared and three pregerminated seeds/pot of each faba bean (*Vicia faba* L.) line were planted. Three populations of *P. thornei* Sher *et* Allen collected from durum wheat at Cerignola (Italy), faba bean at Rommani (Morocco) and faba bean at Beja (Tunisia), one each of *P. neglectus* (Rensch) Filipijev *et* Schuurmans Stekhoven from faba bean at San Ferdinando (Italy), *P. pinguicaudatus* Corbett from faba bean at Beja (Tunisia) and *P. penetrans* (Cobb) Filipijev *et* Schuurmans Stekhoven from faba bean at Béni Hmidane (Algeria) (Troccoli and Di Vito, 2002) were reared, separately, for three months on carrot disks in a growth chamber at 22 ± 2°C. The nematodes were extracted from the carrot disks by incubation for 24 hours (Young, 1954). Two pots of each line and nematode population were inoculated with 15,000 nematodes/pot.

Faba bean cv. Aguadulce was used as a susceptible control. All the clay pots were randomly arranged on benches in a glasshouse maintained at 22 ± 2 °C.

Fifty days after inoculation the plants were uprooted, the roots were gently washed free of adhering soil and the nematodes in the roots extracted by the centrifugation method (Coolen, 1979) and counted.

### RESULTS AND DISCUSSION

Two lines of faba bean of the Tunisia collection (FRYT98-6 and FRYT98-60) were completely free of *P. neglectus* infestation (Fig. 1). The infestation of *P. penetrans* and *P. pinguicaudatus* was also low in the Algerian faba bean line (FRYA98-48) and the Tunisian faba bean line (FRYT98-44), respectively. The infestation of *P. neglectus*, *P. penetrans* and *P. pinguicaudatus* in seventy-four, two and six lines, respectively, was in the range of 201-1000 nematodes per root system (Fig. 1). The number of nematodes of Italian, Moroccan and Tunisian populations of *P. thornei* was low in three lines of faba bean FRYT98-35, FRYT98-47 and FRYT98-56 (Fig. 2).

The roots of the resistant lines, with very few or no nematodes, were white with only small necroses caused by nematode attack, while those of the remaining lines and the faba bean cultivar used as control were much more severe and associated with extensive and numerous root necrosis, a clear symptom of nematode attack.

These results indicate that sources of resistance to some species of root lesion nematodes (*Pratylenchus* spp.) may occur in faba bean. Faba bean is among the most widely cultivated cool season legumes in the Mediterranean area, where root-lesion and stem nematodes are quite common. Nevertheless, little attention has been paid so far to explore the presence of resistance to these nematodes in the existing faba bean

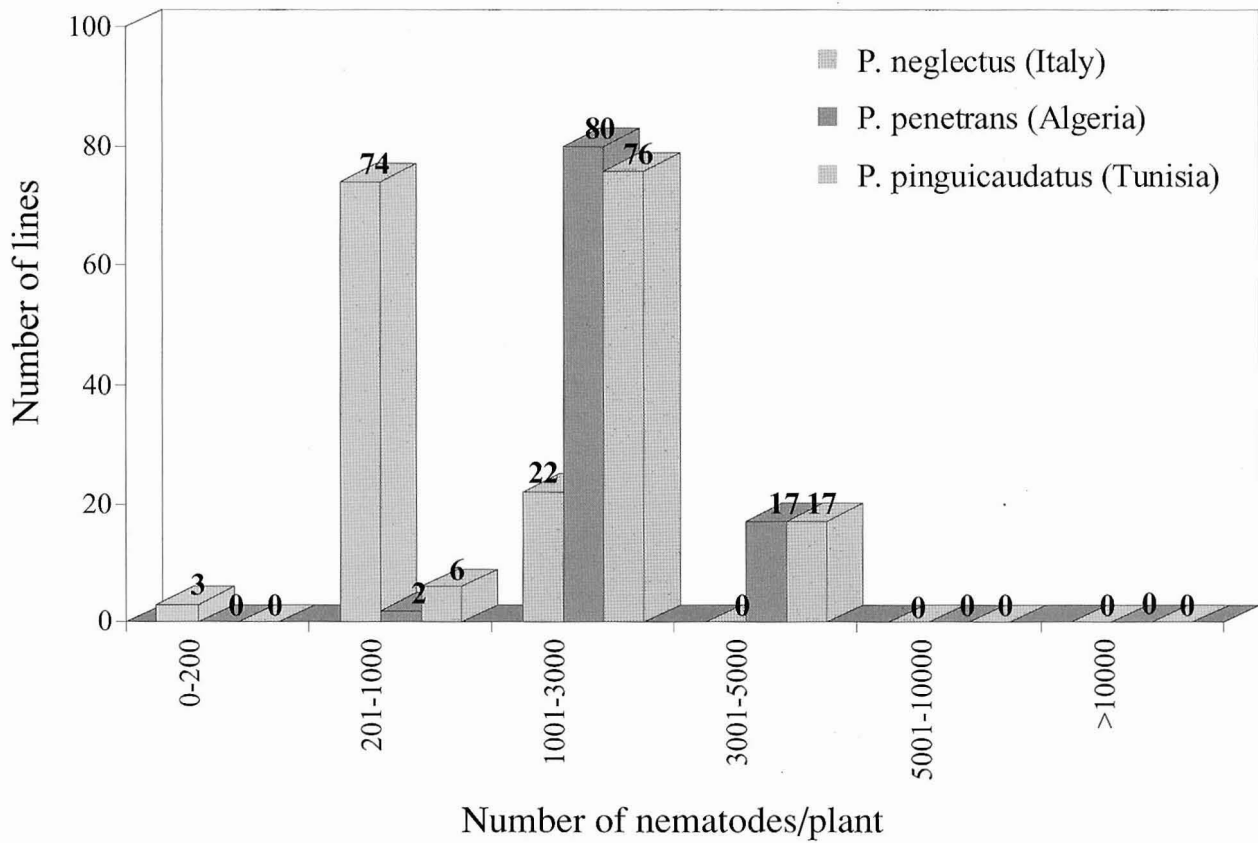


Fig. 1. Frequency of infestation on lines of faba bean infested with one each of the populations of *Pratylenchus neglectus* from Italy, *P. penetrans* from Algeria and *P. pinguicaudatus* from Tunisia.

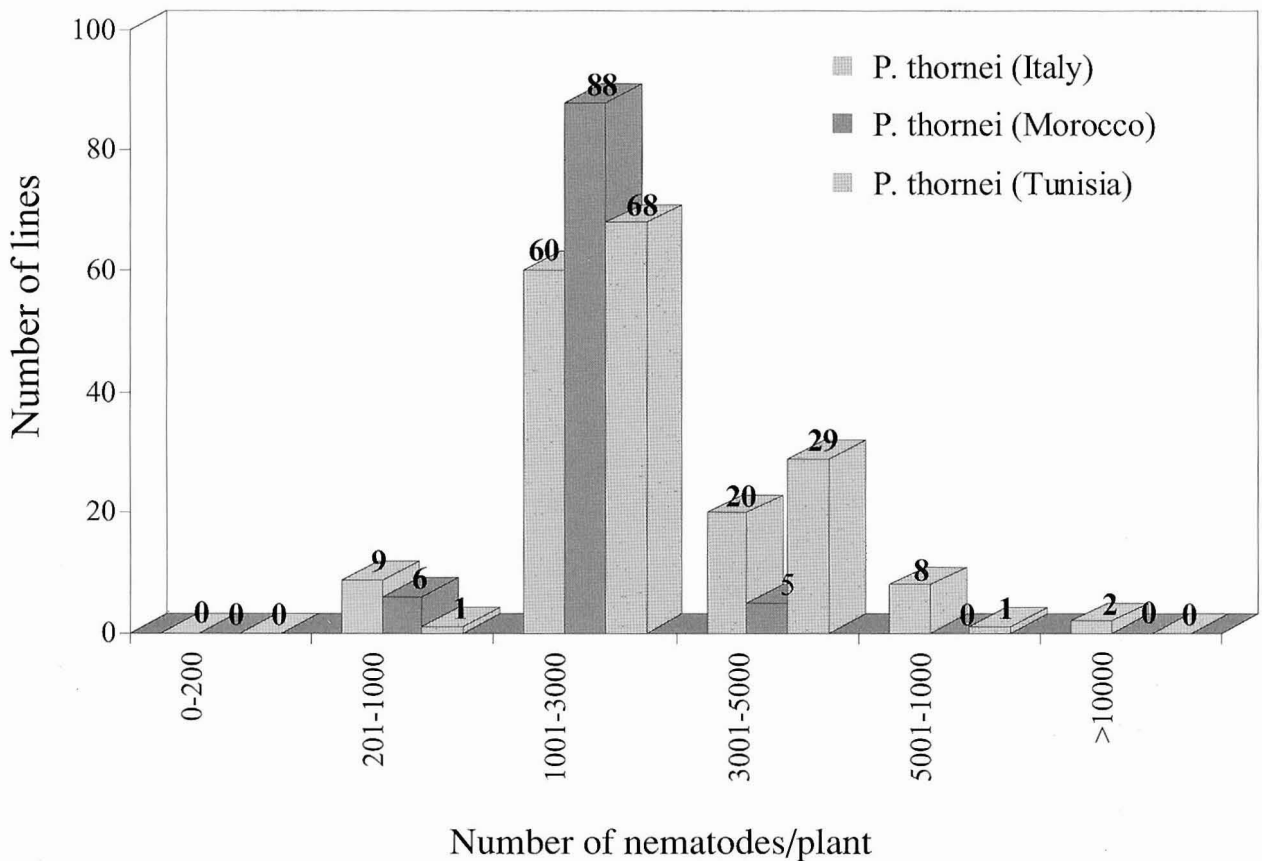


Fig. 2. Frequency of infestation on lines of faba bean infected with three populations of *Pratylenchus thornei* from Italy, Morocco or Tunisia.

germplasm. It would be desirable to undertake breeding programmes to transfer resistance into cultivars of faba bean. It would also be advisable to produce new inbred lines having multiresistance, such as to root-lesion and stem nematodes. Therefore, investigations are still needed to identify more sources of resistance to nematodes and to understand the genetics of such resistance.

#### ACKNOWLEDGEMENT

The research was partially funded by the European Commission, Project FRYMED, Contract INCO/DC n. IC-18-CT98-0300.

Accepted for publication on 6 March 2002

#### LITERATURE CITED

- Coolen W.A., 1979 - Methods for extracting of *Meloidogyne* spp. and other nematodes from roots and soil. Pp. 317-330. In: Root-knot Nematodes (*Meloidogyne* species) Systematics, Biology and Control (F. Lamberti and C.E. Taylor eds.), Academic Press, London, U.K.
- Di Vito M., Zaccheo G. and Catalano F., 2000 - Effect of *Pratylenchus neglectus* and *P. thornei* on the growth of faba bean. *Nematologia Mediterranea*, 28: 261-265.
- Troccoli A. and Di Vito M., 2002 - The root lesion and the stem nematodes associated with faba bean in North Africa. *Nematologia Mediterranea*, 30: (in press).
- Young T.W., 1954 - An incubation method for collecting migratory endoparasitic nematodes. *Plant Disease Reporter*, 38: 794-795.