

ROOT LESION AND STEM NEMATODES ASSOCIATED WITH FABA BEAN IN NORTH AFRICA

A. Troccoli and M. Di Vito

Istituto di Nematologia Agraria, C.N.R., 70126 Bari, Italy

Summary. A survey of root lesion nematodes associated with faba bean was undertaken in 1999 in Algeria, Morocco and Tunisia. *Pratylenchus penetrans* and *Zygotylenchus guevarai* occurred in each of the countries. *Pratylenchus thornei* was common in Morocco and Tunisia. *Pratylenchus neglectus* and *P. pinguicaudatus* were found in Algeria and Tunisia, respectively, the last being a new record for that country. Several stem and leaf samples of faba bean were heavily infested by the stem nematode *Ditylenchus dipsaci*, often associated with tissue necrosis and distortions.

Nematodes cause severe damage to faba bean in many countries (Sikora and Greco, 1990; Caubel *et al.*, 1997). *Pratylenchus* species and *Ditylenchus dipsaci* are major pests of this crop in the Mediterranean basin. However, information on their distribution in North Africa is limited. A survey was therefore conducted in Algeria, Morocco and Tunisia to determine the root lesion nematode species associated with faba bean and the occurrence of *D. dipsaci* as a basis for future studies to understand the role that nematodes play in the productivity of the crop in North Africa.

MATERIALS AND METHODS

The survey, in the framework of the EU Project FRYMED, was undertaken in the major faba bean (*Vicia faba* L.) areas of Algeria, Morocco and Tunisia during April 1999, when plants were actively growing and nematode populations were at their peak. A root sample composed of 4-5 plants was collected in each sampled field (Table I). Shoots were also collected.

Sampling was carried out in fields showing plant yellowing and stunting, or at random where no symptoms were evident.

Endomigratory nematodes were extracted from roots by the incubation method (Young, 1954). Specimens were then fixed and preserved in hot aqueous 5% formalin. Nematodes to be identified were selected using a stereomicroscope and then transferred to water agar for temporary mounts (Esser, 1986) and measured under a light microscope with a camera lucida. About 15 specimens per root sample of each population were processed and mounted in anhydrous glycerin (Seinhorst, 1966). Morphometrics of diagnostic value for the genera *Pratylenchus* and *Zygotylenchus* (Loof, 1990) were determined.

RESULTS AND DISCUSSION

i) Algeria

A total of 11 root samples of faba bean were collected in fields of Algeria (Table I). Three root lesion nematode species were identified. The most common species was *Pratylenchus penetrans* (Cobb) Filipijev *et* Schuurmans Stekhoven which occurred in six fields. Two samples were infested by *Zygotylenchus guevarai* (Tobar Jimenez) Brawn *et* Loof and one sample collected at Hamma Bouziane was infested by *P. neglectus* (Rensch) Filipijev *et* Schuurmans Stekhoven.

Eight aerial plant part samples of faba bean were infested by *D. dipsaci* (Khün) Filipijev.

ii) Morocco

Eleven root samples, including nine of faba bean and two of chickpea (*Cicer arietinum* L.) were collected in fields at five locations in Morocco (Table I). Two root samples each of chickpea and faba bean were infested by *P. thornei* Sher *et* Allen. *P. penetrans* was extracted from two root samples of faba bean. One sample each of chickpea and faba bean was infested by *Z. guevarai*. *P. mediterraneus* Corbett occurred in one root sample of faba bean collected at Marchouch.

The stem nematode *D. dipsaci* was found in nine shoot samples of faba bean at Kenitra, Marchouch and Rommani. The crop was severely damaged by this nematode in two fields at Marchouch, where the symptoms of the nematode attack were very evident with stem and leaf necrosis, pod lesions and distortions.

iii) Tunisia

A total of 16 root samples, 15 of faba bean and one of chickpea, were collected in eight locations of Tunisia (Table I). Three of the root samples were infested by *P.*

Table I. Endoparasitic nematodes in samples of faba bean and chickpea collected in Algeria, Morocco and Tunisia during spring, 1999.

Country	Location	Crop	Samples collected	Samples infested with*						
				Dd	Pm	Pn	Pp	Ppi	Pt	Zg
Algeria	Costantine	Faba bean	1	1						1
	Béni Hmidane	"	5	2			3			1
	Hamma Bouziane	"	2	1		1	1			
	Biskra	"	3	1			2			
Morocco	Kenitra	Faba bean	3	2						1
	Rabat	Chickpea	1			1			1	1
	Marchoch	"	1						1	
		Faba bean	3	3			1		1	
	Rommani	"	3	3			1		1	
Tunisia	Tunis	Faba bean	1	1						
	Goubellate	"	1							
	Beja	"	3	2					2	
		Chickpea	1						1	
	Jaundouba	Faba bean	1	1				1		
	Fermana	"	2	2						1
	Tabarka	"	1	1						1
	Menzel Temine	"	5	4		1		2		1
	Kelibia	"	1							
	Total		38	24	2	1	10	1	7	7

* Dd = *Ditylenchus dipsaci*; Pm = *Pratylenchus mediterraneus*; Pp = *P. penetrans*; Ppi = *P. pinguicaudatus*; Pn = *P. neglectus*; Pt = *P. thornei*; Zg = *Zygotylenchus guevarai*.

thornei and *Z. guevarai*. *P. penetrans* occurred in two root samples collected at Menzel Temine. *P. mediterraneus* Corbett and *P. pinguicaudatus* Corbett were extracted from one sample each.

Finally, seven shoot samples of faba bean from Tunis (1), Fermana (2), Beja (1) and Menzel Temine (3) were infested by the stem nematode *D. dipsaci* and in two fields of the last location the damage caused by the nematode was very severe with evident symptoms on stems, leaves and pods.

This survey confirms that several root lesion nematodes and the stem nematode are important parasites of faba bean in Algeria, Morocco and Tunisia. Root lesion nematodes are also widely distributed in other food legumes such as chickpea (Di Vito *et al.*, 1994; Greco and Di Vito, 1994). Among them, *P. thornei* is one of the most common in fields of chickpea and faba bean in the Mediterranean Basin (Sikora and Greco, 1990; Di Vito and Greco, 1999). It causes severe damage to faba bean when the soil population density is more than 2.2

specimens/cm³ soil and yield losses of 40% can be expected in fields infested with more than 32 specimens/cm³ soil (Di Vito *et al.*, 2000).

Pratylenchus pinguicaudatus, in particular, was found on faba bean at Jaundouba and it is a new geographic record for this area. Since its first description from wheat plants in England (Corbett, 1969), it has only been recorded in Poland (Brzeski and Szczygiel, 1977), Bulgaria (Ryss *et al.*, 1991) and south-eastern Spain (Talavera and Tobar-Jiménez, 1997), mainly from cereals, and often with *P. thornei*. Morphometrics of our population fit well with previous descriptions, and the present record extends to warmer zones the known range of distribution for the species.

The stem and bulb nematode *D. dipsaci* is also common and causes severe damage to faba bean and numerous other plant species in the Mediterranean Basin. It is a quarantine nematode and in several countries the importation of seed stocks is subjected to severe quarantine regulations.

ACKNOWLEDGEMENT

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

LITERATURE CITED

- Brzeski M.W. and Szczygiel A., 1977 - Materiały do poznania krayowich nicieni (Nematoda). 1. Genus *Pratylenchus* Fil. (Tylenchida: Pratylenchidae). *Fragmenta Faunistica, Warsaw*, 23: 1-11.
- Caubel G., Abbad Andaloussi F., Bekal S., Di Vito M. and Esquibet M., 1997 - Les nématodes des légumineuses alimentaires à grosses graines dans le bassin méditerranéen, Pp. 129-154. In: *Les légumineuses alimentaires méditerranéennes* (Tivoli B. and Caubel G. eds), Les Colloques INRA éditions, France n. 88.
- Corbett D.C.M., 1969 - *Pratylenchus pinguicaudatus* n. sp. (Pratylenchinae: Nematoda) with a key to the genus *Pratylenchus*. *Nematologica*, 15: 550-556.
- Di Vito M. and Greco N., 1998 - Nematodes of cool season food legumes in the Mediterranean Basin. *Grain Legumes*, 20: 10-11.
- Di Vito M., Greco N., Halila H.M., Mabsoute L., Labdi M., Beniwal S.P.S., Saxena M.C., Singh K.B. and Solh M.B., 1994 - Nematodes of cool-season food legumes in North Africa. *Nematologia Mediterranea*, 22: 3-10.
- 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.
- Esser R.P., 1986 - A water agar *en face* technique. *Proceedings of the Helminthological Society of Washington*, 53: 254-255.
- Greco N. and Di Vito M., 1994 - Nematodes of food legumes in the Mediterranean Basin. *EOPP Bulletin*, 24: 393-398.
- Greco N., Di Vito M. and Saxena M.C., 1992 - Plant parasitic nematodes of cool season food legumes in Syria. *Nematologia Mediterranea*, 20: 37-46.
- Loof P.A., 1991 - The family Pratylenchidae Thorne, 1949, Pp. 363-421. In: *Manual of Agricultural Nematology* (W. Nickle ed.). Marcell Dekker, Inc., New York, U.S.A.
- Ryss A., Baicheva O and Stoyanov D., 1991 - A new phytonematode for Bulgaria *Pratylenchus pinguicaudatus* Corbett, 1969 and morphological description of *Pratylenchus thornei* Sher et Allen, 1953 and *Zygotylenchus guevarai*, Tobar Jiménez, 1963. *Kelmintologiya*, 30: 3-8.
- Seinhorst J.W., 1966 - Killing nematodes for taxonomic study with hot f.a. 4:1. *Nematologica*, 12: 178.
- Sikora R.A. and Greco N., 1990 - Nematode parasites of food legumes, Pp. 181-235. In: *Plant Parasitic Nematodes in Subtropical and Tropical Agriculture* (Luc M., Sikora R.A. and Bridge J. eds). CAB International Wallingford, UK.
- Talavera M. and Tobar Jiménez A., 1997 - Plant parasitic nematodes from unirrigated fields in Alhama, southeastern Spain. *Nematologia Mediterranea*, 25: 73-81.
- Young T.W., 1954 - An incubating method for collecting migratory endoparasites nematodes. *Plant Disease Reporter*, 38: 794-795.