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## PLANT-PARASITIC NEMATODES ASSOCIATED WITH OLIVE IN JORDAN

by

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Several nematode genera and species occur in association with olive (*Olea europaea* L.) in Jordan (Anon., 1970; Qasem, 1970; Abu-Gharbieh *et al.*, 1978; Bridge, 1978; Hashim, 1979). In 1980-1982, the geographical distribution of plant-parasitic nematodes in the olive groves of Jordan was investigated, thus extending our knowledge of the composition of the nematode fauna on this crop and enabling some speculations to be made about the possible economic significance of nematodes to olive production in this country.

### *Materials and Methods*

Eighty soil and root samples were collected from olive groves in several regions of Jordan (Table I). Each sample was collected from the rhizosphere of two trees, at a distance of about 1½ metres from the tree base and at a depth of 15-20 cm. Within 48 hours of collecting the samples of soil and feeder roots, vermiform nematodes were extracted from 200 ml of soil by a tray modification of the Baermann funnel technique (Whitehead and Hemming, 1965). Thereafter, the specimens were killed by heat, fixed in TAF (formalin-triethanolamine mixture), stained in hot (60-65°C) lactophenol containing cotton blue stain and processed to anhydrous glycerol containing traces of picric acid by a rapid method (Baker, 1953). Sedentary endoparasitic and semiendoparasitic nematodes were

dissected out of roots that had been immersed in boiling lactophenol containing cotton blue (3-4 mins) and then allowed to differentiate in clear lactophenol for several hours. These nematodes were subsequently either mounted in lactophenol or processed to, and mounted in, anhydrous glycerol with traces of picric acid according to Baker's (1953) method.

### *Results and Discussion*

During the investigation, 30 nematode species belonging to 18 genera were recovered. The most frequently encountered genera were *Helicotylenchus* Steiner, *Xiphinema* Cobb, *Merlinius* Siddiqi, *Filenchus* (Andrássy) Meyl and *Pratylenchus* Filipjev. A complete list of these nematode genera and species, together with the areas where they were encountered, is given in Table I.

Five *Helicotylenchus* species were found in the olive groves of Jordan. *H. digonicus* Perry in Perry, Darling *et* Thorne was the predominant species, occurring in at least 45% of the groves sampled. Although widely distributed in this country, it does not seem to occur in the important olive-growing region of Irbid (northern Jordan) nor, apparently, in the low-lying irrigated olive groves of the Jordan Valley. *H. digonicus* was found in high densities in some of the soil samples (> 1000 nematodes/100 ml of soil) and was frequently observed in semiendoparasitic feeding position on feeder roots. It has yet to be established whether or not it is pathogenic to olive. *H. tunisiensis* Siddiqi was encountered in more than 16% of the groves sampled and may be of some limited local importance as it was isolated in moderate densities (about 150 nematodes/100 ml of soil). Other *Helicotylenchus* species were rarely found and are probably of little or no economic significance to olive growers in Jordan.

*Xiphinema* species were frequently isolated from the rhizosphere of olive. Of these, *X. pachtaicum* (Tulaganov) Kirjanova was the most common (in 37% of the samples), but it usually occurred in low to moderate densities. Hashim (1982) suggested that this species may be pathogenic to olive but there is no experimental evidence to support this contention. Low population densities of *X. index* Thorne *et* Allen (< 20 nematodes/100 ml of soil) were found in two olive groves in the Salt area; this constitutes the first record of this species in association with olive. *X. ingens* Luc *et* Dalmasso was occasionally encountered in non-irrigated olive groves.

*Merlinius* spp., mostly *M. brevidens* (Allen) Siddiqi and *M. microdorus* (Geraert) Siddiqi, were found in low numbers (< 50 nematodes/100 ml of soil) in many olive groves, particularly in the drier areas. Their pathogenicity to olive is not known.

*Filenchus* spp. were found in several of the soil samples examined. These nematodes, as well as other members of the Tylenchidae, probably feed on root hairs and epidermal cells but it seems unlikely that they are pathogenic.

*Pratylenchus* spp., particularly *P. thornei* Sher *et* Allen, were often found associated with olive in Jordan. Although they were consistently encountered in low numbers in the soil samples (< 30 nematodes/100 ml of soil), it is possible that these migratory endoparasites attain much higher population levels in roots, where their feeding and locomotory activities may result in root atrophy.

*Meloidogyne* spp. were rarely found, occurring in less than 4% of the samples. Their economic importance to oliviculture in this country is undoubtedly restricted to nurseries, where olive seedlings, grown intensively under irrigation, may be debilitated by these parasites before transplanting. It has been shown that *M. javanica* (Treub) Chitw. and *M. incognita* (Kofoid *et* White) Chitw. are pathogens of olive (Diab and El-Eraki, 1968; Lamberti and Lownsbery, 1968; Lamberti and Baines, 1969). The latter species, though not detected in the groves examined during this investigation, was previously reported to parasitize olive seedlings in the Southern Ghors (valleys south of the Dead Sea) (Abu-Gharbieh *et al.*, 1978; Hashim, 1979).

Mature females and juveniles of *Trophotylenchulus* n. sp. were observed partially embedded in roots of olive but their effect on olive growth is not known.

Immature females, males and juveniles of *Rotylenchulus macro-somus* Dasgupta, Raski *et* Sher were found in moderate numbers (20-100 nematodes/100 ml of soil) in a few olive groves. Examination of a root sample from an infested grove at Jerash failed to reveal any stages of this nematode attached to the roots.

*Ditylenchus dipsaci* (Kühn) Filipjev was found around the roots of olive trees, but it is unlikely to infect this crop. Possibly, it was parasitizing annual plants growing in the vicinity of the trees.

Other nematode species listed in Table I were detected in exceedingly low numbers. It is unlikely that they cause any appreciable reduction of yield of olive in Jordan.

Although not found during this investigation, the following

Table I - *Plant-parasitic nematodes associated with olive (Olea europaea L.) in Jordan.*

Nematodes	Regions
<b>APHELENCHIDA</b>	
<i>Aphelenchoides</i> spp.	Anjarah, Salt, Wadi Seer
<i>Aphelenchus (Aphelenchus) avenae</i> Bastian	Anjarah, Jerash, Jubeiha, Salt, Wadi Seer
<b>TYLENCHIDA</b>	
<i>Basiria</i> sp.	Sweileh
<i>Boleodorus thylactus</i> Thorne	Jerash, Kerak, Wadi Seer
<i>Criconemella xenoplax</i> (Raski) Luc et Raski	Kerak
<i>Discotylenchus discretus</i> Siddiqi	Jerash
<i>Ditylenchus dipsaci</i> (Kühn) Filipjev	Anjarah
<i>Ditylenchus</i> spp.	Jubeiha, Salt
<i>Filenchus</i> spp.	Anjarah, Irbid, Jerash, Jubeiha, Sakeb, Salt, Wadi Seer
<i>Helicotylenchus digonicus</i> Perry (in Perry, Darling et Thorne)	Ajlun, Anjarah, Jerash, Jubeiha, Kerak, Salt, Wadi Seer
<i>H. minzi</i> Sher	Salt
<i>H. pseudorobustus</i> (Steiner) Golden	central Jordan Valley, near Madaba
<i>H. tunisiensis</i> Siddiqi	Ajlun, Irbid, Jerash, Salt, Wadi Seer
<i>H. vulgaris</i> Yuen	Ajlun, Sakeb
<i>Helicotylenchus</i> spp.	Ajlun, Al-Majdal, Anjarah, Sakeb, Salt, Sweileh
<i>Meloidogyne javanica</i> (Treub) Chit- wood	central Jordan Valley, Wadi Seer
<i>Meloidogyne</i> sp.	near Madaba
<i>Merlinius brevidens</i> (Allen) Siddiqi	Ajlun, Anjarah, Irbid, Jubeiha, Kerak, Na'our, Salt, Sweileh, Wadi Seer
<i>M. microdorus</i> (Geraert) Siddiqi	Anjarah, Irbid, Jerash, Salt, Wadi Seer
<i>M. (?) nothus</i> (Allen) Siddiqi	Irbid
<i>Neolobocriconema</i> n. sp.	Salt
<i>Nothocriconema loofi</i> De Grisse	Wadi Seer
<i>Pratylenchus coffeae</i> (Zimmermann) Filipjev et Sch. Stek.	Anjarah
<i>P. neglectus</i> (Rensch) Filipjev et Sch. Stek.	Jerash, Salt
<i>P. penetrans</i> (Cobb) Filipjev et Sch. Stek.	Al-Majdal, Irbid, Kerak
<i>P. thornei</i> Sher et Allen	Al-Majdal, Anjarah, Irbid, Jubeiha, Salt, Wadi Seer

Table I (contd.)

Nematodes	Regions
<i>Pratylenchus</i> spp.	Al-Majdal, Jerash, Kerak, Madaba, Salt
<i>Psilenchus iranicus</i> Kheiri	Jubeiha, near Madaba, Na'our
<i>Rotylenchulus macrosomus</i> Dasgupta, Raski et Sher	Al-Majdal, Jerash, Wadi Seer
<i>Rotylenchus cypriensis</i> Antoniou	Irbid, Jubeiha, Wadi Seer
<i>Seriespinula</i> (?) <i>seymouri</i> (Wu) Khan, Chawla et Saha	Salt
<i>Trophotylenchulus</i> n. sp.	Salt
<i>Tylenchorhynchus clarus</i> Allen	northern Jordan Valley, Wadi Seer
<i>Tylenchorhynchus</i> n. sp.	Jerash
<i>Tylenchus</i> sp.	Kerak
<b>DORYLAIMIDA</b>	
<i>Paratrichodorus</i> s.l. sp.	Salt
<i>Xiphinema index</i> Thorne et Allen	Salt
<i>X. ingens</i> Luc et Dalmasso	Irbid, Jerash, Jubeiha, Wadi Seer
<i>X. pachtaicum</i> (Tulaganov) Kirjanova	Ajlun, Irbid, Jerash, Jubeiha, Madaba, Na'our, Salt, Sweileh, Wadi Seer

nematode species, in addition to *M. incognita* (*loc. cit.*), were reported from the rhizosphere of olive in Jordan by Hashim (1979): *Amplimerlinius macrurus* (Goodey) Siddiqi, *Criconemella* (= *Criconemoides*) *informis* (Micol.) Luc et Raski, *Tylenchorhynchus goffarti* Sturhan (erroneously referred to as *T. dubius* (Bütschli) Filipjev) and *Brevinema* (formerly *Longidorus*) *siddiqii* (Aboul-Eid) Stegaresku.

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## S U M M A R Y

The distribution of plant-parasitic nematodes in the olive groves of Jordan was investigated. From 80 soil and root samples, 30 nematode species were isolated and identified. The most frequently encountered genera were *Helicotylenchus* Steiner, *Xiphinema* Cobb, *Merlinius* Siddiqi, *Filenchus* (Andrássy) Meyl and *Pratylenchus* Filipjev. *H. digonicus* Perry (in Perry, Darling *et* Thorne) and *X. pachtanicum* (Tulaganov) Kirjanova were detected in 45% and 37.5% of the groves sampled, respectively; large numbers of the former species were sometimes found. *M. brevidens* (Allen) Siddiqi, *P. thornei* Sher *et* Allen and *Filenchus* spp. were also common, but always in low numbers. *Meloidogyne* spp. were rare, occurring only in irrigated groves and nurseries (< 4% of the samples examined). Other nematode species were only sporadically encountered.

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