sp. n. from rhizosphere of cultivars of conifers from the Far East]. *Parazitologyia*, 21 : 595-598.

FORTUNER, R. & LUC, M. (1987). A reappraisal of Tylenchina (Nemata). 6. The family Belonolaimidae Whitehead, 1960. *Revue Nématol.*, 10 : 183-202.

JAIRAJPURI, M. S. (1988). *Mulkorhynchus* nom. nov. for *Dolichorhynchus* Mulk & Jairajpuri, 1974. *Indian J. Nematol.*, 17 (1987) : 327.

MULK, M. M. & SIDDIQI, M. R. (1982). Three new species of hoplolaimid nematodes from South America. *Indian J. Nematol.*, 12 : 124-131.

POWERS, T. O., BALDWIN, J. G. & BELL, A. H. (1983). Taxonomic limits of the genus *Nagelus* (Thorne & Malek, 1968) Siddiqi, 1979 with description of *Nagelus borealis* n. sp. from Alaska. *J. Nematol.*, 15 : 582-593.

STURHAN, D. (1981). Studies on *Geocenamus* species from Germany (Nematoda, Dolichodoridae). *Nematologica*, 27 : 306-314.

TARJAN, A. C. (1973). Synopsis of the genera and species in Tylenchorhynchinae (Tylenchoidea, Nematoda). *Proc. helminth. Soc. Wash.*, 40 : 123-144.

WU, K. Y. (1969). Three new species of the genus *Tylenchorhynchus* Cobb, 1913 (Tylenchidae : Nematoda) from Canada. *Canad. J. Zool.*, 47 : 563-567.

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PLANT-PARASITIC NEMATODES ASSOCIATED WITH OLIVE (*OLEA EUROPEA* L.) IN THE PROVINCE OF JAÉN, SPAIN

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The olive (*Olea europea* L.) is a characteristic culture of the mediterranean region. In Spain, above all in Andalucía, it represents a basic component of agriculture, but is also important in industry. The Province of Jaén, situated in the Southeastern Iberic Peninsula (Fig. 1) has an area of more than 400 000 ha occupied by this crop and is the most important producer of olive oil in Spain.

Studies on nematodes associated with olives were previously conducted by several authors (Diab & El-Eraki, 1968; Scognamiglio, Talamé & Giandomenico, 1968; Lamberti, 1969, 1981; Scognamiglio, Talamé & d'Errico, 1971; Gallo & Jiménez, 1976; Fiume, 1978; Inserra & Vovlas, 1981; Hashim, 1982, 1983).

In Spain no monographic investigation about the subject has ever been carried out. There are, however, records from general surveys (Jacob, Berkum & Guevara, 1959; Jiménez Millán *et al.*, 1965; Gómez Barcina, 1966; Tobar Jiménez & Guevara Pozo, 1967; Romero & Arias, 1969; Arias, 1975).

The fundamental aim of this study is the preparation of a catalogue of the plant-parasitic nematodes associated with olives in the Province of Jaén.

Material and methods

A total of 129 soil samples were collected from 76 different localities (Fig. 1) and in four seasons of the year : spring (Apr.-May, 1985), summer (July-Aug., 1985), autumn (Oct.-Nov., 1985) and winter (Jan.-Febr., 1986).

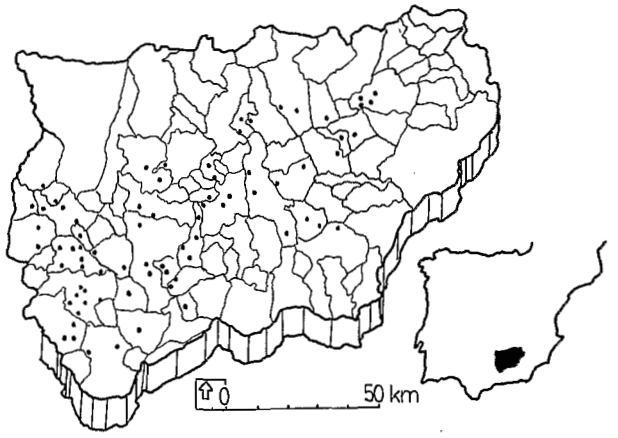

Fig. 1. Geographical distribution of the soil samples collected.

Nematodes were extracted by a modified Baermann funnel technique, fixed in FAA and mounted in anhydrous glycerin according to methods of Seinhorst (1959, 1962).

For each nematode species were calculated the relative abundance (number of specimens of each species expressed like the percentage of total) and the frequency (percentage of samples in which the species has been found).

Results and discussion

Out of total number of nematodes extracted, 39.1 per cent were plant-parasitic. This result is somewhat less than those obtained in Italy by Scognamiglio, Talamé and d'Errico (1971), and Fiume (1978), who used more efficient methods (Fenwick flotation modified by Oostenbrink and centrifugation, respectively) for the extraction of the plant-parasitic species.

No important differencies in the spatial distribution of the nematode species were found between different localities of the Province. There are, on the other hand, interesting contrasts in seasonal distribution, certainly according to climatology of the region : high population level in autumn, low in summer and intermediate, but relatively high, in winter and spring.

3 976 specimens belonging to at least 43 plant-parasitic species of 30 different genera were mounted and classified. A list of these species together with the values of their relative abundance and frequency is presented in Table 1. Out of the 43 species, 22 are new records in association with olives in the world and another ten species are new records in Spain.

The predominant species is *Helicotylenchus digonicus*. Moreover, the difference from others is great. This agrees with the finding of Hashim (1983) that *H. digonicus* is also the most important species associated with olive in Jordan. But it constrasts with the information contributed by some Italian authors (Scognamiglio, Talamé & d'Errico, 1971; Fiume, 1978; Inserra & Vovlas, 1981) who noted that the most important species in Italy are *Rotylenchus* sp. and *Rotylenchulus macrodoratus*. These genera have not been found in the present study. On the other hand, according to literature, *H. digonicus* is not associated with olives in Italy.

In relation to other abundant species, such as species of the genera *Merlinius, Xiphinema, Pratylenchus, Filenchus* and others, there is a general accordance between the results of this study and those of Hashim (1983) and Fiume (1978).

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REFERENCES

ARIAS, M. (1975). Nuevas aportaciones al conocimiento del género *Xiphinema* (Nematoda) y su distribución en los suelos españoles. *An. Edafol. Agrobiol.*, 34 : 183-198.

DIAB, K. A. & EL-ERAKI, S. (1968). Plant parasitic nematodes associated with olive decline in the United Arab Republic. *Pl. Dis. Reptr*, 52 : 150-154.

FIUME, F. (1978). I generi dei nematodi viventi nella rizosfera dell'olivo in Calabria. *Informat. fitopat.*, 7 : 11-14.

Table 1

List of plant-parasitic nematodes associated with olives in the Province of Jaén, Spain, with data about relative abundance (RA) and frequency (F).

Species	RA	F
**Helicotylenchus digonicus*	26.38	93.8
Aphelenchus avenae	11.19	92.0
**Merlinius brevidens*	10.36	73.6
***Filenchus thornei*	7.17	68.2
***Filenchus sandneri*	5.31	58.9
***Aprutides guidettii*	4.93	45.0
Xiphinema sp.	4.00	42.6
**Tylenchorhynchus dubius*	3.92	24.8
Ditylenchus spp.	3.19	23.2
***Zygotylenchus guevarai*	2.72	16.3
**Pratylenchus neglectus*	2.52	16.3
Aphelenchoides spp.	2.46	37.3
Filenchus spp.	2.21	34.1
**Boleodorus* sp.	2.01	16.3
***Paratylenchus baldacii*	1.61	10.1
***Paratylenchus microdorus*	1.31	13.2
***Coslenchus lateralis*	0.91	11.6
**Coslenchus* sp.	0.80	10.9
***Basiria duplexa*	0.79	9.3
**Criconemella informis*	0.58	10.1
***Neopsilenchus magnidens*	0.58	5.4
Pratylenchus spp.	0.58	4.7
**Psilenchus iranicus*	0.58	11.6
***Amplimerlinius* sp.	0.55	4.7
Hoplolaiminae ind.	0.53	5.4
***Coslenchus cancellatus*	0.50	7.0
**Filenchus discretus*	0.40	9.3
***Aglenchus agricola*	0.35	5.4
***Longidorus macrosoma*	0.35	6.2
Ogma rhombosquamata	0.30	2.3
***Trichodorus aequalis*	0.20	4.7
**Pratylenchus penetrans*	0.15	0.8
Criconemella sphaerocephala	0.10	3.1
***Tylenchus arcuatus*	0.10	3.1
***Xiphinema turcicum*	0.10	3.1
Heteroderinae ind.	0.05	1.6
***Paraphelenchus pseudoparietinus*	0.05	0.8
***Gracilacus* sp.	0.05	0.8
***Criconema annuliferum*	0.03	0.8
Criconemella sp.	0.03	0.8
***Paratrophurus loofi*	0.03	0.8
***Ditylenchus anchiliposomus*	0.03	0.8
***Seinura oxura*	0.03	0.8

M.B. : Species marked ** are new records in association with olives in the world; those marked * are new records for olive in Spain.

REFERENCES

GALLO, D. P. & JIMÉNEZ, R. M. (1976). Nematofauna fitoparásita asociada al olivo (*Olea europea* L.) en el Valle de Azapa. *Idesia, Chile*, 4 : 105-109.

GÓMEZ BARCINA, A. (1966). *Especificidad y distribución geográfica de nematodos fitoparásitos de la zona costera de Málaga y Granada.* Tesis Doctoral, Universidad Complutense de Madrid, 291 p.

HASHIM, Z. (1982). Distribution, pathogenicity and control of nematodes associated with olive. *Revue Nématol.*, 5 : 169-181.

HASHIM, Z. (1983). Plant-parasitic nematodes associated with olive in Jordan. *Nematol. medit.*, 11 : 27-32.

INSERRA, R. N. & VOVLAS, N. (1981). Indagine sulla distribuzione geografica dei nematodi parassiti dell'olivo in Italia. *Informat. fitopat.*, 31 : 117-119.

JIMÉNEZ MILLÀN, F., ARIAS, M., BELLO, A. & LÓPEZ PEDREGAL, J. (1965). Catálogo de los nematodos fitoparásitos y perirradiculares encontrados en España. *Boln R. Soc. esp. Hist. nat. (Biol.)*, 63 : 47-104.

LAMBERTI, F. (1969). Nematodi parassiti dell'olivo. *Informat. fitopat.*, 31 : 93-96.

LAMBERTI, F. (1981). I nematodi dell'olivo e la relativa lotta. *Informat. fitopat.*, 31 : 93-96.

ROMERO, M. D. & ARIAS, M. (1969). Nematodos de las solanáceas cultivadas en la zona mediterránea del Sur de España. 1. Tylenchida. *Boln R. Soc. esp. Hist. nat. (Biol.)*, 67 : 121-142.

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SCOGNAMIGLIO, A., TALAMÈ, M. & d'ERRICO, P. (1971). Indagine sui nematodi viventi nella rizosfera dell'olivo (2° contributo). *Boll. Lab. Ent. agr. "Filippo Silvestri"*, 29 : 43-59.

SCOGNAMIGLIO, A., TALAMÈ, M. & GIANDOMENICO, N. (1968). Indagine sui nematodi viventi nella rizosfera dell'olivo (1° contributo). *Boll. Lab. Ent. agr. "Filippo Silvestri"*, 26 : 205-226.

SEINHORST, J. W. (1959). A rapid method for the transfer of nematodes from fixative to anhydrous glycerin. *Nematologica*, 4 : 67-79.

SEINHORST, J. W. (1962). On the killing, fixation and transferring to glycerin of nematodes. *Nematologica*, 8 : 29-32.

S'JACOB, J., BERKUM, J. & GUEVARA, D. (1959). *Tylenchorhynchus parvus* (Nematoda) hallada por vez primera en Europa en muestras de suelo de Granada. *Revta ibér. Parasit.*, 19 : 427-428.

TOBAR JIMÉNEZ, A. & GUEVARA POZO, D. (1967). Estudio parasitológico de la provincia de Granada. Nematodos del suelo parásitos de vegetales. 1. Poblaciones parásitas granadinas, su distribución geográfica cuantitativa y posible o conocida importancia económica. *Revta ibér. Parasit.*, 27 : 135-172.

EFFECTS OF THE NEMATODE *PRATYLENCHUS FALLAX* ON ROOTS OF OILSEED RAPE *(BRASSICA NAPUS* VAR. *OLEIFERA)*

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Pratylenchus fallax Seinhorst, 1968 is widespread in sandy arable soils throughout Europe. It was found associated with barley (Corbett, 1970) and was present in large numbers in stunted maize from Berkshire, England, it also damaged the roots of wheat, barley and sugar beet in *in vitro* tests (Corbett, 1972). Oilseed rape is often used as a break crop between cereal crops and these experiments were performed to determine whether *P. fallax* from a cereal crop could damage a following crop of oilseed rape. Therefore this study investigates the effect of infestation of *P. fallax* at two different inoculation densities on oilseed rape cv. Bienvenu in *in vitro* monoxenic culture.

Materials and methods

Seeds of oilseed rape, *Brassica napus* var. *oleifera* cv. Bienvenu, were surface sterilised using 0.1 % mercuric chloride solution and then placed on White's medium (Mountain, 1955) in sterile Petri dishes and incubated at 22 °C. When tap root growth measured 4 cm the seed was excised and discarded. Cultures of *P. fallax*, derived from a single female nematode, were grown on excised maize roots and pieces of this infested root were used as inoculum (Olowe & Corbett, 1976). Three treatments with fifteen replicates of each were started : control plants without nematodes, plants inoculated with 670 nematodes (light inoculum), or 1 340 nematodes (heavy inoculum). All plates were incubated at 22 °C in dark conditions. Each plate was examined each day for 30 days and individual lesions were marked and developments noted. A record of root growth was obtained by marking the position of the tip of each infested root on the Petri dishes each day. After 30 days each plate was photocopied against a white ground and an image obtained of the root system. The length and number of tap and lateral roots were measured from these photo-