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## A PRELIMINARY REPORT OF SURVEY OF PLANT PARASITIC NEMATODES OF LEGUMINOUS CROPS IN SYRIA

by

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Leguminous crops, such as chickpea (*Cicer arietinum* L.), lentil (*Lens culinaris* Medic.) and faba bean (*Vicia faba* L.) are of major economic importance in Syria. Plant parasitic nematodes are among the pathogens that limit their productivity. However, there is little information on the species involved or their geographical distribution. A preliminary survey of these parasites, was undertaken in May 1983.

### *Materials and Methods*

Soil and plant samples were collected mostly from chickpea fields (44) and also from lentil (2), faba bean (4), alfalfa (*Medicago sativa* L.) (2) and a non leguminous crop, onion (*Allium cepa* L.) (1). Five hundred cm<sup>3</sup> of soil per sample were processed by Cobb's sieving and decanting method. Five grams of root samples were also incubated (Young, 1954) or comminuted (Fallis, 1943) to extract endoparasitic migratory and sedentary nematodes, respectively. The nematodes were fixed in 5% hot formalin and mounted for species identification.

### *Results*

#### *Nematodes found associated with leguminous crops*

Tables 1 and 2 show that 12 nematode genera occurred in soil

and root samples of the five leguminous crops sampled. Among them *Heterodera*, *Meloidogyne*, *Pratylenchus*, *Ditylenchus* and *Aphelenchoides* are usually considered to be of most economic importance. Also present were the genera *Pratylenchoides*, *Helicotylenchus*, *Tylenchorhynchus* and *Xiphinema* that are reported in the literature to damage several crops. Genera of less economic importance were *Paratylenchus*, *Trophurus* and *Tylenchus*.

*Heterodera* sp. 24% of the chickpea root samples were infested with a species of *Heterodera*. Infested fields showed poor growth of the plants and yellowish foliage, indicating that the nematode causes considerable damage to chickpea; peas appeared to be less susceptible and faba bean resistant or a non host. Infestations were mostly found south of Aleppo where the area between Idleb and Saraqeb appeared to be extensively infested. In this area chickpea is the prevalent crop and in almost all fields there were patches of stunted plants and in some the crop was badly damaged.

All the nematode populations detected in the infested fields showed morphological features of the *Heterodera trifolii* group and were close to *H. rosii* Duggan *et* Brennan. However, males which are very important in distinguishing species of this group were not found in all the populations, probably because the crops were senescent at the time of sampling.

*Meloidogyne artiellia*. A species identified as *M. artiellia* Franklin was present in 12% of the chickpea samples. Infested fields showed patches in which plants were yellow, stunted and produced few pods.

*Ditylenchus dipsaci*. *D. dipsaci* (Kuehn) Filipjev was extracted from 13% of the soil samples. It is suspected of reducing the yield of faba beans, and is also a problem because at harvest fourth stage juveniles of the nematode may survive within the seeds and thus present serious quarantine implications for their export as many countries require nematode-free seed stock.

*Pratylenchus thornei*. It appears that *P. thornei* Sher *et* Allen is very common in Syria. It was detected in 60% of the samples including chickpea, faba bean, lentil and alfalfa. Chickpea seemed to be severely damaged by attacks of *P. thornei* and 74% of the samples were found

Table I - *Nematodes per 500 cm<sup>3</sup> soil of each soil sample of legumes collected in Syria.*

Locality	Crop	<i>Heterodera</i> sp. 1)	<i>Meloidogyne</i> <i>artificialis</i> 1)	<i>Pratylenchus</i> <i>thiornet</i>	<i>Helicotylenchus</i> sp.	<i>Tylenchorhynchus</i> sp.	<i>Tylenchus</i> sp.	Other nematodes
Alep	chickpea	—	—	—	—	9	2	—
»	chickpea	—	—	—	—	—	—	—
»	lentil	—	—	—	—	14	—	50 <i>Ditylenchus dipsaci</i>
»	chickpea	—	—	24	32	40	24	—
»	broad bean	—	—	9	—	45	27	—
Zetan Almasna	chickpea	9	525	9	—	971	138	—
»	chickpea	7	881	7	620	155	74	—
»	lentil	—	—	—	—	—	—	70 <i>D. dipsaci</i>
Dear Ajmeel	chickpea	—	—	16	312	80	24	16 <i>Pratylenchoides</i>
Dear Sawan	chickpea	8	—	8	264	176	—	—
»	chickpea	—	—	—	680	—	—	—
Azaz	vetch	8	27	—	90	271	—	8 <i>D. dipsaci</i>
Salame	chickpea	—	—	207	—	198	108	945 <i>Paratylenchus</i> sp.
»	chickpea	—	—	109	—	195	133	100 <i>Paratylenchus</i> sp.
Tel Hadya	chickpea	—	64	24	—	40	—	—
»	broad bean	—	—	—	—	—	—	—
»	chickpea	—	—	—	—	153	—	—
»	annual medic	—	—	—	—	—	—	—
»	chickpea	—	—	—	—	—	—	—
»	alfalfa	—	—	—	—	—	—	—
»	alfalfa	—	—	21	56	56	—	—
»	broad bean	—	—	—	—	—	—	—
»	chickpea	—	—	—	—	—	—	—
Algemeel	chickpea	—	—	13	46	73	20	145 <i>Pratylenchoides</i> sp., 20 <i>Aphelenchoides</i> sp.
»	chickpea	—	—	—	218	134	129	—
Kafranton	broad bean	—	—	—	21	564	49	—
»	chickpea	—	—	—	—	—	—	—
Azaze	chickpea	—	—	149	—	67	53	—
Jinderis	chickpea	—	—	—	14	27	170	54 <i>D. dipsaci</i>
Atareb	chickpea	—	—	—	324	54	66	—
Hama	chickpea	—	—	—	—	20	41	—
Soran	chickpea	—	—	—	—	213	38	—
Khan Shaikoun	chickpea	—	—	—	84	126	48	—
Maret Noman	chickpea	—	—	—	584	—	—	—
Kan Al Subul	chickpea	—	—	—	310	94	38	—
»	chickpea	—	—	59	503	37	22	1 <i>Aphelenchoides</i> sp.
»	onion	—	—	—	—	—	—	—
Jubus	chickpea	76	—	—	11	302	232	—
Saraqeb	chickpea	—	—	14	252	302	29	—
»	chickpea	56	—	—	84	274	62	34 <i>Trophurus</i> sp.
»	chickpea	—	—	—	—	—	—	—
»	chickpea	—	—	6	—	397	45	—
Mhambel	chickpea	—	—	223	630	—	462	34 <i>D. dipsaci</i>
»	chickpea	—	—	—	—	—	—	—
Ain-Al Hamra	chickpea	—	—	—	1048	22	545	11 <i>Trophurus</i> sp.
»	chickpea	32	—	—	528	104	128	—
Abou Zubeir	chickpea	—	—	19	64	19	122	26 <i>D. dipsaci</i> , 243 <i>Trophurus</i> sp.
Fermit	chickpea	30	—	—	502	205	334	—
»	chickpea	—	—	—	64	176	120	1 <i>Xiphinema</i> sp., 1 <i>D. dipsaci</i>
Maazula	chickpea	—	—	96	—	235	293	—
Khafar	chickpea	—	—	6	—	161	180	—
Sheikh-Usef	chickpea	—	—	—	168	119	—	301 <i>Trophurus</i> sp., 7 <i>D. dipsaci</i>
El-Ghab	chickpea	—	—	84	203	133	189	—
Idleb	chickpea	66	—	106	—	323	79	—
»	chickpea	40	—	498	—	18	—	—

1) Juveniles + males.

infested with this parasite. Infested chickpea showed reduced growth and many lesions on the roots.

*Other nematodes.* Among other nematodes, *Tylenchorhynchus* spp. occurred in 73% of the samples, *Tylenchus* spp. 60%, *Helicotylenchus* spp. 50%, *Pratylenchoides* spp. 6%, *Aphelenchoides* spp. 4%, *Paratylenchus* spp. 4%, *Trophurus* spp. 6%, and *Xiphinema* spp. 2%. Most of these nematodes are ectoparasitic in habit and were found on the roots and in the rhizosphere of several plants, but there were no symptoms of damage associated with their presence.

### Discussion

These preliminary results indicate that *Heterodera* sp., *M. artiellia*, *P. thornei* and *D. dipsaci* should be considered as serious pests of many leguminous crops of Syria. Large numbers of these species were extracted from the rhizosphere or from the roots of chickpea plants that were heavily injured. Cyst forming and root-knot nematodes appeared to be the most pathogenic, but the former were more widespread and should be regarded as one of the main chickpea pathogens in the Idleb area.

Different nematode populations of *Heterodera* sp. are being reared at the Istituto di Nematologia Agraria, Italy, for characterizing all the developmental stages and for species confirmation. *H. rosii* has been reported only on *Rumex* sp. and no other hosts are known for this species. A *Heterodera* sp. similar to *H. rosii* has also been reported from Syria by Mamluk *et al.* (1983) on chickpea, pea, vetch and alfalfa. Further investigations, including the host range of the cyst nematode population, will provide useful information on the identity of the species.

*Meloidogyne artiellia* was first reported in England and thereafter in the Mediterranean area on cereals and legumes, including chickpea (Alcala *et al.* 1970; Kyrou, 1969; Taylor and Sasser, 1978; Tobar Jimenez, 1973). It is a severe pathogen of chickpea in Syria and according to Mamluk *et al.* (1983) it may also infest vetch, pea and alfalfa.

*Pratylenchus thornei* was widespread in the sampled area, but appears to be less pathogenic than *Heterodera* sp. and *M. artiellia* on chickpea. *P. thornei* had been reported from many countries infesting cereals and legumes. It may reduce the drought resistance of infested

Table II - *Nematodes per 5 g roots of each root sample of legumes collected in Syria.*

Locality	Crop	<i>Heterodera</i> sp. 1)	<i>Meloidogyne</i> <i>artifolia</i> 1)	<i>Pratylenchus</i> <i>thornei</i>	Other nematodes
Alep	chickpea	—	—	—	—
»	cnickpea	—	—	—	—
»	lentil	—	—	—	—
»	cnickpea	—	—	—	—
»	broad bean	—	—	—	—
Zetan Almasna	chickpea	5	2710	—	—
»	chickpea	—	6135	—	—
»	lentil	—	—	—	—
Dear Ajmeel	chickpea	—	—	9	—
Dear Sawan	chickpea	—	—	98	176 <i>Helicotylenchus</i> sp.
»	chickpea	—	—	50	46 <i>Helicotylenchus</i> sp.
Azaz	vetch	—	—	—	—
Salame	chickpea	—	—	636	—
»	chickpea	—	—	103	—
Tel Hadya	chickpea	—	2320	—	—
»	broad bean	—	—	—	—
»	chickpea	—	—	103	—
»	annual medic	—	—	—	—
»	chickpea	750	—	—	—
»	alfalfa	—	—	—	—
»	alfalfa	—	—	9	31 <i>Helicotylenchus</i> sp., 31 <i>Tylenchorhynchus</i> sp.
»	broad bean	—	—	37	—
»	chickpea	—	—	201	—
Algemeel	chickpea	—	—	—	—
»	chickpea	—	—	208	—
Kafranton	broad bean	—	—	—	—
»	chickpea	—	—	20	91 <i>Helicotylenchus</i> sp., 84 <i>Tylenchus</i> sp.
Azaze	chickpea	—	—	707	—
Jinderis	chickpea	—	—	225	—
Atareb	chickpea	—	—	6	6 <i>Aphelenchoides</i> sp.
Hama	chickpea	—	—	6	—
Soran	chickpea	—	—	—	—
Khan Shaikoun	chickpea	—	—	—	—
Maret Noman	chickpea	—	—	—	—
Khan Al Subul	chickpea	100	699	28	—
»	chickpea	—	—	—	—
»	onion	—	—	—	—
Jubus	chickpea	182	—	—	—
Saraqeb	chickpea	—	80	12	—
»	chickpea	665	—	31	1 <i>Tylenchorhynchus</i> sp.
»	cnickpea	650	—	30	—
»	chickpea	65	—	130	—
Mhambel	chickpea	—	—	6	40 <i>Tylenchorhynchus</i> sp., 22 <i>Pratylenchoides</i> sp.
»	chickpea	50	—	—	—
Ain-Al Hamra	chickpea	—	—	52	—
»	chickpea	56	—	20	—
Abou Zubeir	chickpea	—	—	309	—
Fermit	chickpea	—	—	33	—
»	chickpea	—	—	167	—
Maazula	chickpea	—	—	385	—
Khafar	chickpea	—	—	40	—
Sheikh-Usef	chickpea	—	—	387	—
El-Ghab	chickpea	—	70	31	—
Idleb	chickpea	775	—	15	—
»	chickpea	1342	—	4152	—

1) All stages.

plants because of damage caused to the feeder roots (Orion *et al.* 1982).

The stem and bulb nematode *D. dipsaci* is very harmful to faba bean, oat, alfalfa, strawberry, onion and bulbous flowers. It is very common in Mediterranean countries (Lamberti, 1981).

Among the leguminous crops, the yield of faba beans and peas may be greatly reduced by *D. dipsaci* in conditions of mild weather and rain. Some races of the stem nematode may also infest oat, alfalfa and clover. Though other nematodes are very common in Syria, they are not suspected of causing severe yield losses unless they interact with other pathogens.

The survey was limited to the northern part of Syria and it should be extended to other major food legume areas to obtain more knowledge on the geographical distribution of the species reported above. Moreover, more investigations should be undertaken to provide information on the biology, population dynamics, host-parasite relationship and pathogenicity of these nematodes under different farming systems. The host range of these nematodes, tolerance limits of the susceptible crops, and the reaction of the available cultivars and lines to these parasites should also be studied to predict yield losses and determine resistant or tolerant sources. The expected information will enable agriculturalists to suggest management practices to avoid or reduce the damage caused by the most noxious nematodes.

#### S U M M A R Y

A survey of plant parasitic nematodes of leguminous crops was undertaken in northern Syria in 1983. 12 nematode genera *Aphelenchoides*, *Ditylenchus*, *Helicotylenchus*, *Heterodera*, *Meloidogyne*, *Paratylenchus*, *Pratylenchus*, *Pratylenchoides*, *Trophurus*, *Tylenchorhynchus*, *Tylenchus*, and *Xiphinema*, were found in the sampled area. *Heterodera* sp., *M. artiellia* and *Pratylenchus thornei* were extracted from 24%, 12% and 60% of the samples, respectively, and appeared to be the most damaging nematodes of many leguminous crops in this country.

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