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FEEDING AND REPRODUCTION OF *XIPHINEMA INDEX* (NEMATODA: DORYLAIMIDA) ON TWO HOSTS AT THREE TEMPERATURES

by

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Summary. In a laboratory study about one third of individual female *Xiphinema index* from a southern Italy population fed but did not reproduce on *Lycopersicon esculentum* or *Ficus carica* at 10°C. Most nematodes fed on these hosts at 13°C and two of 14 females reproduced on *F. carica*. All nematodes fed on both host plant species at 23°C and *X. index* completed its life cycle in less than 12 weeks on *F. carica*. At 23°C only two females reproduced on *L. esculentum* and they produced relatively few J1 and J2. In southern Italy *X. index* may feed on host plants at 10°C but the minimum daily threshold temperature for reproduction is 13°C.

Brown and Coiro (1985) examined the total reproductive capacity and longevity of female *Xiphinema index* from three populations. They suggested that females produced an egg every 24-26 day° above a minimum daily threshold of 10°C. From data obtained from field and screenhouse experiments, Coiro *et. al.* (1987) subsequently suggested that the minimum daily threshold for egg production by female *X. index* was 15°C. The minimum daily threshold temperature needs to be determined accurately when planning cropping systems or determining the timing of chemical measures. Thus experiments were done to determine the minimum daily threshold temperature at which female *X. index* from field populations in southern Italy are likely to begin to feed and reproduce.

Materials and methods

The methods used were similar to those of Brown and Coiro (1983; 1985) and Coiro and Brown (1984). *X. index* were collected from a coastal fig grove at Brindisi, southern Italy, and extracted from the sandy loam soil by a decanting and sieving method (Brown and Boag, 1988). Individual young females, identified by the presence of clearly defined oocytes in the uterus, were hand-picked into a series of 25 ml clay pots without drainage holes. A seedling of fig (*Ficus carica* L.) or tomato (*Lycopersicon esculentum* Mill.) cv. 'Moneymaker' was added to each of 60 pots used for each species. Twenty pots with each plant species were maintained in temperature controlled cabinets, similar to those of Taylor and Brown (1974), at 10°, 13° and 23°C, ± 1°C, with supplementary lighting to provide a minimum daylength of 16 h. After twelve weeks the

nematodes were extracted from the pots and the different developmental stages identified and counted. Root-tip necrosis and root-tip galls caused by nematode feeding, were also identified and counted.

Results

Of the individual females added to the pots, at least half were recovered after 12 weeks (Table I). At 10°C one third of the fig and tomato plants from which the original female *X. index* had been recovered showed evidence of nematode feeding, (root-tip galls and or root-tip necrosis). At 13°C most and at 23°C all plants had been fed upon by the recovered females and their progeny. Juveniles were not recovered at 10°C on either host plant or at 13°C on

TABLE I - Numbers (from 20 replicates) of female *Xiphinema index* surviving, feeding and reproducing on *Ficus carica* and *Lycopersicon esculentum* cv. 'Moneymaker' at three temperatures.

Host plant	Temperatures								
	10 ± 1 °C			13 ± 1 °C			23 ± 1 °C		
	S	F	R	S	F	R	S	F	R
<i>Ficus carica</i>	10	4	0	14	12	2	14	14	14
<i>Lycopersicon esculentum</i>	12	4	0	16	13	0	16	16	16

S, surviving; F, feeding; R, reproducing.

tomato, but 2 of 14 females had produced juveniles on fig at 13°C. All females recovered from both host plant species reproduced at 23°C.

The two females which reproduced on fig at 13°C and all the females which reproduced on tomato at 23°C produced only small numbers of first and second stage juveniles (Table II). At 23°C *X. index* had completed its life cycle on fig and all developmental stages, including new females, were recovered. Also, many of the new females were gravid and probably had produced some juveniles.

TABLE II - Mean number of adult and juvenile *X. index* recovered after twelve weeks access to *F. carica* and *L. esculentum* cv. *MoneyMaker* at three temperatures.

Temperature	Nematode stage	<i>F. carica</i>	<i>L. esculentum</i>
10°	J1	0	0
	J2	0	0
	J3	0	0
	J4	0	0
	♀	0	0
13°	J1	0.4(0-6) *	0
	J2	0.8(0-10)	0
	J3	0	0
	J4	0	0
	♀	0	0
23°	J1	3.6(0-22)	1.3(0-3)
	J2	8.1(0-18)	0.6(0-5)
	J3	12.6(0-25)	0
	J4	12.1(0-31)	0
	♀	11.6(0-51) **	0

* Mean (minimum and maximum);

** Females which developed from eggs produced by the original individual females.

Discussion

Results from the present study support the suggestion of Coiro *et al.* (1987) that in southern Italy field populations of *X. index* require a minimum daily threshold temperature of c 15°C for full reproduction rather than 10°C as suggested by Brown and Coiro (1985). Also, at a constant temperature of 23°C, reported to be the optimum temperature for reproduction by *X. index* in southern Italy (Coiro *et al.* 1980), *X. index* was able to complete its life-cycle on fig in less than 12 weeks. These data support the observation of Coiro *et al.*, 1987, that in fields in southern Italy egg laying and rapid multiplication of *X. index* population occurs between April and September when soil temperatures are c. 15°C or more.

On tomato at 23°C, *X. index* females produced only a few J1 and J2 specimens which is in accordance with previous results obtained by Coiro and Brown (1984) and Brown and Coiro (1985). The fewer specimens produced on tomato compared with fig, appear to be the result of a slower reproductive development of the nematodes on that host. Also, the absence of reproduction at 13°C on tomato, although most of the nematodes had fed on the roots, suggests that reproduction can occur on this host only at higher temperature. Brown and Coiro (1985) demonstrated that female *X. index* produce in total substantially less progeny on a less than optimum host such as tomato, than on an optimum host such as fig. A less than optimum host for these nematodes may retard reproductive development and possibly also a higher temperature is required before reproduction can occur.

Taylor and Brown (1981) suggested that physiological differences may occur between populations of *X. index* and subsequently Coiro and Brown (1984) substantiated that suggestion. Only two of 12 females *X. index* which had fed upon fig at 13°C produced juveniles. Also, at 13°C, 2 of 14 and 3 of 16 females *X. index* recovered from fig and tomato respectively after 12 weeks apparently had not fed upon them.

These results suggest that physio-biological differences can occur also within populations of *X. index*.

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