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THE LONGIDORIDAE OF THE MALTESE ISLANDS
WITH THE DESCRIPTION OF
LONGIDORUS MAGNUS SP.N. AND *XIPHINEMA MELITENSE* SP.N.

by

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During a survey of plant parasitic nematodes carried out in the Maltese Islands in the period 1974-1976 (Lamberti and Dandria, 1979) a number of samples were found to contain members of the family Longidoridae.

The species found are reported here, with comments on their biometric variability and geographical distribution.

All measurements were taken on specimens killed by hot 5% formalin and mounted in glycerin by the slow method.

Results

A total of six species were found: *Longidorus goodeyi* Hooper, *L. magnus* sp. n., *Xiphinema pachtaicum* (Tulaganov) Kirjanova, *X. index* Thorne et Allen, *X. turcicum* Luc et Dalmasso and *X. melitense* sp. n. (Table I).

Longidorus goodeyi

This species was found in association with *X. pachtaicum* in two samples collected at Bur Marrad (Malta), one in the rhizosphere of

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Table I - *Species of Longidoridae found in the Maltese Islands listed under their hosts and localities.*

Island	Locality	Host	NEMATODE SPECIES						
			<i>L. goodeyi</i>	<i>L. magnus</i>	<i>X. pachycautum</i>	<i>X. index</i>	<i>X. turicum</i>	<i>X. melitense</i>	
COMINO	S. Niklaw Bay	Fig + Grapevine				+			
	S.ta Marija Bay	Almond			+		+		
		Citrus			+	+	+		
		Fig				+			
GOZO	Ghasri	Plum			+				
		Artichoke			+				
		Grapevine			+				
		Kercem	Onion			+			
		Ir-Ramla	Citrus			+			
		Marsalforn	Grapevine				+		
			Nadur	Apple			+	+	
		Qala	Grapevine			+			
			Grapevine			+			
			Peach			+			
	Plum				+				
	Pomegranate				+				
	S. Lawrenz		Grapevine			+	+		
			S.ta Lucija	Apricot			+		
	Ta Bordin		Grapevine			+			
			Peach			+			
			Tal Hniena	Grapevine			+		
			Tà Pinu	Pea			+		
				Potato			+		
				Artichoke			+		
		Victoria	Grapevine			+			
	Grapevine				+				
	Peach				+				
Xaghghara	Grapevine					+			
	Xewkija		Tomato			+			
MALTA	Bingemma	Xlendi				+	+		
		Mais			+				
		Strawberry			+				
		Barley			+				
		Grapevine		+	+				
	Bur Marrad	Grapevine			+				
		Grapevine			+				
		Peach			+				
		<i>Rubus</i> sp.			+				
		Grapevine			+				
Grapevine			+	+					
	Pomegranate		+	+					

Table I - continued

Island	Locality	Host	NEMATODE SPECIES					
			<i>L. goodeyi</i>	<i>L. magnus</i>	<i>X. pachtaicum</i>	<i>X. index</i>	<i>X. turcicum</i>	<i>X. melitense</i>
MALTA	Buskett	Cypress			+			
		Grapevine			+	+		
		Grapevine		+	+			
		Grapevine		+	+			
		Grapevine			+			
		Loquat			+			
		Olive			+			
		Peach		+	+	+		
		Plum		+	+	+		
		<i>Salix</i> sp.				+		
		<i>Ulmus</i> sp.			+			
		Dingli	Carob					+
			Fig			+	+	
	Garlic			+				
	Fgura	Mulberry			+		+	
	Fiddien	Grapevine			+	+		
		Grapevine			+	+	+	
		Potato			+			
	Ghajm Qajjied	Grapevine				+		
	Ghajm Tuffieha	Artichoke		+	+		+	
		Grapevine			+			
		Grapevine			+	+		
		Grapevine			+			
		Wheat			+			
	Gudja	Citrus			+			
	Has Sajd	Peach			+			
	Hrieri	Grapevine			+			
	Kirkop	Almond					+	
	Leonard Fort	Watermelon			+			
	Luqa	Carob			+		+	
		Carob					+	
	Manikata	Grapevine			+			
		Grapevine			+			
	Marsa	Almond			+			
		Cabbage			+			
	Marsaskala	Carob					+	
	Marsaxlokk	Grapevine		+		+	+	
		Sage			+			
	Mggar	Grapevine		+	+			
		Grapevine		+	+			
Grapevine				+	+			

Table I - continued

Island	Locality	Host	NEMATODE SPECIES					
			<i>L. goodeyi</i>	<i>L. magnus</i>	<i>X. pachytaticum</i>	<i>X. index</i>	<i>X. turcicum</i>	<i>X. melitense</i>
MALTA	Pwales	Eggplant		+				
		Lettuce		+				
	Qormi	Gladiolus			+			
		Qrendi	Carob			+	+	
	Onion				+			+
	Rabat	Grapevine		+	+			+
		Grapevine			+			
		Pea			+			
		Tomato			+			
		Tomato			+			
	Salina	Tomato		+				
	Salib Tàgholja	Pea			+			
	S. Anard	Grapevine			+			
	S. Paul	Grapevine				+		
	Siggiewi	Apple			+			
		Citrus			+			
		Grapevine			+	+		+
		Grapevine			+			
		Grapevine			+			
		Grapevine			+			
		Peach			+			
		Grapevine			+			+
		Tal-Handaq	Grapevine			+	+	
		Tas Salib	Olive			+		
	Xifer il-Kif	Carob			+			
		Zabbar	Citrus		+	+		
	Fig				+			
	Grapevine				+			
	Grapevine				+			
	Olive				+			+
	Zebbieh	Zucchini			+			
		Grapevine				+		+
Grapevine				+				
Zebbug	Peach			+				
	Garlic		+					
	Potato		+					
Zejtun	Potato		+					
	Grapevine			+			+	
		Mulberry			+		+	
TOTALS		120	2	18	99	24	1	23

pomegranate (*Punica granatum* L.) and the other, only a few juvenile stages, from around the roots of grapevine (*Vitis vinifera* L.). The morphometrical characters of the pomegranate population of *L. goodeyi* are (n = 4 ♀ ♀): L = 5.8 (5.6-6.1) mm; a = 94 (86-95); b = 13.6 (12.2-15.1); c = 177 (169-188); c' = 0.7 (0.7-0.8); V = 52 (50-54.5); odontostyle = 106 (105-109) μm ; odontophore = 62 (51-70) μm ; oral aperture to guiding ring = 34 (33-36) μm ; tail = 33 (31.5-34) μm ; J = 8.5 (7-10) μm ; body diam at lip region = 13 (13-14) μm ; body diam at guiding ring = 25.5 (24-27.5) μm ; body diam at base of oesophagus = 50 (45-56) μm ; body diam at vulva = 62 (59-67) μm ; body diam at anus = 44 (42.5-46) μm ; body diam at beginning of J = 26 (23.5-29.5) μm .

The Maltese population of *L. goodeyi* differs from the type population (Hooper, 1961) only by the smaller body size and higher value of the c ratio.

Longidorus magnus sp. n. (Fig. 1 - Table II)

Holotype female: L = 9 mm; a = 78; b = 14.9; c = 169; c' = 0.7; V = 49; odontostyle = 100 μm ; odontophore = 82 μm ; oral aperture to guiding ring = 44 μm ; tail = 53 μm ; J = 16 μm ; body diam at lip region = 20 μm ; body diam at guiding ring = 44 μm ; body diam at base of oesophagus = 90 μm ; body diam at vulva = 115 μm ; body diam at anus = 79 μm ; body diam at beginning of J = 50 μm .

Description

Females: body coiled in a single spiral when heat killed, tapering very gradually towards the anterior extremity. Cuticle very finely striated generally 4-5 μm thick along most of the body but more thickened at the posterior extremity where it is 10-12 μm ventrally and 14-16 μm dorsally, immediately posterior to anus. Labial region continuous with the rest of the body, subacute, rounded laterally and slightly flattened frontally. Amphidial pouches deeply bilobed with the ventral lobe much longer than the dorsal one and with no evident aperture. Odontostyle robust 3 μm diameter at the junction with the odontophore; odontophore faint; guiding sheath typical of the genus with a strong guiding ring. Oesophagus dorylaimoid with posterior enlarged part occupying between 1/3 to 1/4 of the oesophagus total

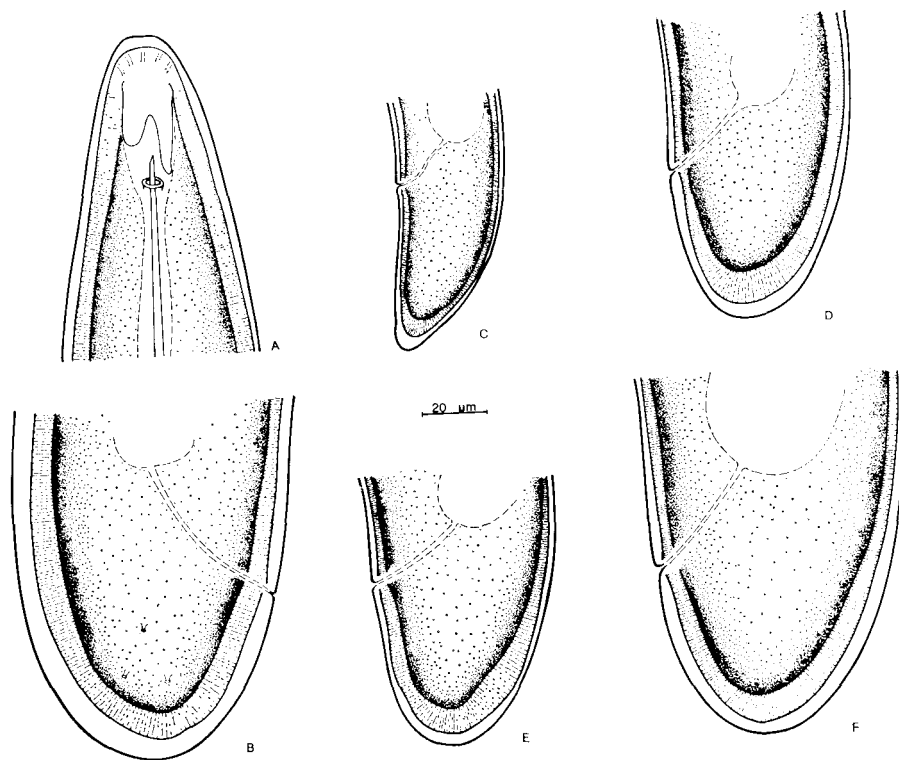


Fig. 1 - *Longidorus magnus* sp. n.: anterior (A) and posterior (B) regions of female; tails of I (C), II (D), III (E) and IV (F) juvenile stages.

length. The muscular bulb, measuring 180-200 μm long and 40-45 μm wide, contains only a single clearly visible nucleus, situated dorsally in the mid-region. Oesophagus-intestinal valve large, amorphous. Vulva located approximately equatorially, comprising two slits at right angles; vagina occupying 1/2 of corresponding body diameter; gonads paired, amphidelphic reflexed, with very long uteri separated from the oviduct by a well muscularized sphincter. Prerectum about 0.5 mm long; rectum 1-1.5 times the body width at anus. Tail short, bluntly rounded bearing three caudal pores.

Male: not found.

Juveniles: similar to adult females but differing in size of the body. The tail of the first juvenile stage is much more elongated than

Table II - *Morphometrical characters of Longidorus magnus sp. n. (paratypes).*

St a g e s	L ₁	L ₂	L ₃	L ₄	♀
n	13	6	5	7	10
L mm	2.2 (2-2.2)	3.5 (3.2-3.8)	5.3 (4.9-5.6)	6.8 (6.2-7.5)	9.5 (9-11.5)
a	59 (49-65)	62 (53-69)	74 (67-79)	77 (66-92)	86 (75-95)
b	6.6 (5.8-8)	8.6 (8-9.6)	11 (10.5-11.6)	13 (11.9-15)	15.7 (14.4-18.3)
c	46 (44-50)	72 (63-82)	101 (93-111)	129 (119-136)	189 (161-209)
c'	1.8 (1.6-1.9)	1.1 (1-1.2)	0.9 (0.9-0.9)	0.8 (0.7-0.8)	0.7 (0.6-0.7)
V	—	—	—	—	49 (48-51)
Odontostyle μm	66 (60-69)	82 (77-86)	94 (91-96)	105 (100-111)	114 (100-118)
Odontophore μm	53 (42-59)	63 (58-72)	70 (67-75)	78 (71-82)	80 (67-100)
Replacement odontostyle μm	80 (75-84)	93 (87-98)	105 (101-110)	117 (113-120)	—
Oral aperture to guiding ring μm	25 (23-28)	31 (29-32)	34 (33-35)	39 (38-41)	46 (42-48)
Tail μm	47 (44-51)	50 (45-52)	52 (49-56)	53 (47-59)	51 (43-57)
J μm	10 (7.5-12)	11 (9.5-13)	13 (12-14)	13 (11-14)	15 (11.5-18)
Body diam at lip region μm	10.5 (10-11)	13.5 (13-15)	15.5 (14-17)	17 (15-19)	19 (18-22)
Body diam at guiding ring μm	20.5 (20-21)	29 (26-31)	35 (33-38)	39 (36-43)	44 (41-49)
Body diam at base of oesoph. μm	35 (31-43)	54 (48-61)	65 (63-67)	79 (71-89)	89 (77-101)
Body diam at vulva μm	36 (31-46)	57 (50-62)	71 (69-76)	89 (79-101)	112 (100-130)
Body diam at anus μm	26 (24.5-33)	45 (41-49)	58 (56-62)	67 (63-72)	77 (67-85)
Body diam at beginning of J μm	15 (13-17)	26 (22-29)	36 (34-39)	41 (38-43)	50 (44-59)

that of the other stages, conoid, dorsally convex, with the terminus separated by a slight constriction.

Type material: holotype and 8 paratype females in the collection of the Istituto di Nematologia Agraria del Consiglio Nazionale delle Ricerche, Bari, Italy; 3 paratype females, Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England; and 3 paratype females, Plant Nematology Laboratory Collection, United States Department of Agriculture, Beltsville, Maryland, U.S.A.

Type habitat and locality: rhizosphere of plum (*Prunus domestica* L.) and grapevine (*Vitis* sp.) at Buskett, Malta.

Differential diagnosis

Longidorus magnus sp. n. is similar to *L. macrosoma* Hooper, 1961; *L. caespiticola* Hooper, 1961 and *L. profundorum* Hooper, 1965. It differs from *L. macrosoma* in having a smaller body (9.5 v. 10.5 mm) a bilobed amphidial pouch (not lobed in *L. macrosoma*), a more rounded lip region, a shorter odontostyle (114 v. 134 μm) and a more anterior vulva (49 v. 52). It differs from *L. caespiticola* because of its larger body (9.5 v. 6.7 mm), bilobed amphidial pouch, higher c value (189 v. 103), anteriorly situated vulva (49 v. 53) and posteriorly located guiding ring (46 v. 37 μm). Finally it differs from *L. profundorum* in its larger body (9.5 v. 7 mm), more rounded lip region, higher value of c (189 v. 154), lower value of c' (0.7 v. 0.9), longer odontostyle (114 v. 97 μm) and anterior vulva (49 v. 53).

Longidorus magnus was found in ten other localities of Malta associated with various herbaceous and woody plants (Table I). Populations, consisted mainly of juvenile stages, were detected seven times with no other longidorid species, four times with *X. pachtaicum*, four times with *X. pachtaicum* and *X. melitense*, once with *X. index* and *X. melitense* and twice with *X. pachtaicum*, *X. index* and *X. melitense*.

Xiphinema pachtaicum

Xiphinema pachtaicum is the most common species of Longidoridae in the Maltese Islands. It was found in 99 samples associated with various plant species collected from 42 localities in Malta, Gozo

and Comino (Table I). In 68 samples *X. pachtaicum* was detected as the only longidorid nematode while eight times it was found with *X. index*, six times with *X. melitense*, four times with *L. magnus*, twice with *L. goodeyi*, once with *X. turcicum*, four times with *X. index* and *X. melitense*, four times with *L. magnus* and *X. melitense* and, finally, twice with *L. magnus*, *X. index* and *X. melitense*.

The morphometrical characters of a population collected from the rhizosphere of peach [*Prunus persica* (L.) Batsch.] at Zebbieh (Malta) are (n = 20 ♀ ♀): L = 1.9 (1.7-2) mm; a = 60 (51-67); b = 6.7 (5.7-7.7); c = 66 (58-76); c' = 1.6 (1.5-1.8); V = 56 (52-60); odontostyle = 86 (80-93) µm; odontophore = 48 (44-51) µm; oral aperture to guiding ring = 73 (61-78) µm; tail = 29 (25-33) µm; J = 9 (7-11) µm; body diam at lip region = 8.5 (8-9) µm; body diam at guiding ring = 20.5 (19.5-22) µm; body diam at base of oesophagus = 26 (23.5-31) µm; body diam at vulva = 31 (28-35.5) µm; body diam at anus = 17.5 (16.5-18.5) µm; body diam at beginning of J = 8 (6.5-9) µm.

The maltese populations of this species do not differ morphologically from those found in other Mediterranean localities (Lamberti and Bleve-Zacheo, 1979).

Xiphinema index

Xiphinema index was found in 24 samples collected from 19 localities in the three Maltese Islands (Table I). In seven samples it was the only longidorid species detected while in eight it was found with *X. pachtaicum*, twice with *X. melitense*, four times with both *X. pachtaicum* and *X. melitense*, once with *L. magnus* and *X. melitense* and twice with *L. magnus*, *X. pachtaicum* and *X. melitense*. Measurements of specimens of *X. index* collected from the rhizosphere of grapevine in various localities of Malta are given in table III. They are very similar to the Italian and Californian populations (Martelli and Lamberti, 1967). However, a population collected at Dingli (Malta) from around the roots of a fig tree consisted of slightly smaller individuals and contained some females without the tail mucron, as reported by Prota *et al.* (1971) for Sardinian populations.

Two males with the testes full of large sperms were found in a population collected from the rhizosphere of grapevine at Busket (Malta). Their morphometrical characters are similar to those of males found in Sardinia, Italy (Prota *et al.*, 1971).

Xiphinema turcicum

Only two females and a juvenile of *X. turcicum* were found in the rhizosphere of a mulberry tree (*Morus rubra* L.) in a single locality (Fgura, Malta) mixed with a population of *X. pachtaicum*. Their biometrical characters are (2 ♀ ♀): L = 3.5-4.1 mm; a = 61-71; b = 8.3-9.6; c = 106-109; c' = 0.9; V = 50-51; odontostyle = 135-149 μm ; odontophore = 77-78 μm ; oral aperture to guiding ring = 119-123 μm ; tail = 34-37 μm ; J = 10-11 μm ; body diam at lip region = 10-13 μm ; body diam at guiding ring = 39-41 μm ; body diam at base of oesophagus = 48-49 μm ; body diam at vulva = 57-58 μm ; body diam at anus = 36-38 μm ; body diam at beginning of J = 23 μm .

These females are biometrically more similar to a Sardinian population (Prota *et al.*, 1971) than to the type population (Luc and Dalmasso, 1963) of *X. turcicum* which has a longer odontostyle and a slightly posterior vulva. Moreover, it is remarkably smaller and has a much shorter odontostyle compared with a population reported from Algeria (Dalmasso, 1969). The two Maltese females of *X. turcicum* have spines in the uteri as reported for *X. ingens* (Grimaldi De Zio *et al.*, 1979).

Xiphinema melitense sp. n. (Fig. 2 - Table IV)

Holotype female: L = 4.3 mm; a = 55; b = 7; c = 96; c' = 0.8; V = 53; odontostyle = 151 μm ; odontophore = 94 μm ; oral aperture to guiding ring = 140 μm ; tail = 45 μm ; J = 13 μm ; body diam at lip region = 14.5 μm ; body diam at guiding ring = 49 μm ; body diam at base of oesophagus = 65 μm ; body diam at vulva = 78 μm ; body diam at anus = 54 μm ; body diam at beginning of J = 27 μm .

Description

Females: body forming an open spiral when heat killed, tapering very gradually toward the anterior extremity. Cuticle very finely striated, 2-3 μm thick along most of the body but 3-4 μm thick in the vulvar region and 7-8 μm thick at the posterior extremity, both ventrally and dorsally immediately posterior to anus. The cuticle is marked by longitudinal striae in the subdorsoventral regions. Labial region semielliptical 8-10 μm high, set off from rest of body by a

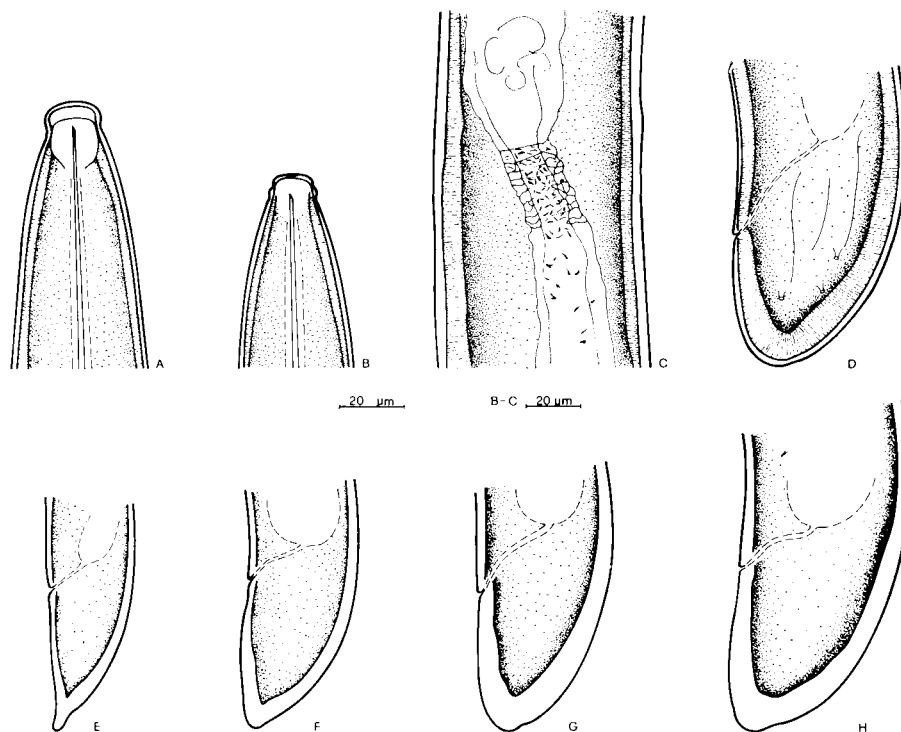


Fig. 2 - *Xiphinema melitense* sp. n.: anterior region of female in lateral (A) and dorso-ventral (B) position; pseudo Z-organ (C); tails of female (D), I (E), II (F), III (G) and IV (H) juvenile stages.

depression. Amphidial pouches large, stirrup-shaped with slit-like aperture. Odontostyle robust 2 μm diameter at the junction with the odontophore, typical of the genus. Guide sheath also typical of the genus with the two guiding rings about 20 μm apart. Oesophagus dorylaimoid with the posterior part enlarged, occupying 1/3 to 1/4 of the oesophagus total length. Muscular oesophageal bulb 160-170 μm long and 30-35 μm wide containing two nuclei, one situated dorsally and anteriorly and the other ventrally in the mid-region. Oesophagus-intestinal valve amorphous. Vulva a transverse slit located approximately equatorially; vagina occupying 1/2 of corresponding body diameter. Gonads paired, opposed and reflexed with long uteri with spines and large spermathecae preceded by a pseudo Z-organ (Grimaldi-De Zio *et al.*, 1979) little differentiated and with small and

Table III - *Morphometrical characters of various populations of Xiphinema index from Malta.*

	Populations from grapevine	Population from fig (Dingli)		Population from grapevine (Basket)
		♀ ♀ with mucronate tail	♀ ♀ with amucronate tail	
n	20 ♀ ♀	4 ♀ ♀	3 ♀ ♀	2 ♂ ♂
L mm	3 (2.6-3.4)	2.8 (2.7-2.8)	2.9 (2.8-3)	2.8-3.4
a	61 (58-64)	57 (52-65)	62 (58-67)	60-70
b	6.8 (6-7.8)	6.9 (6.7-7)	6.6 (6-7)	6.4-7.5
c	84 (68-90)	76 (73-79)	104 (91-115)	69-80
c'	1.1 (0.9-1.2)	1 (1-1.1)	0.8 (0.8)	1-1.1
V	41 (38-42.5)	40.5 (38-42)	40 (40-41)	—
Odontostyle µm	129 (120-137)	121 (117-126)	126 (125-127)	121-129
Odontophore µm	65 (60-70)	65 (63-67)	65 (61-67)	67-68
Oral aperture to guiding ring µm	112 (104-121)	104 (98-110)	105 (101-109)	110-111
Tail µm	36 (30-40)	37 (36-38)	28 (26-31)	41-42
J µm	15 (12.5-17.5)	16.5 (14-17)	8 (7.5-8.5)	17-18
Body diam at lip region µm	12.5 (11.5-13)	12 (12-12.5)	13 (12.5-13)	12.5-13
Body diam at guiding ring µm	35.5 (33.5-39)	35 (34-37)	35 (35-36)	35-38
Body diam at base of oesophagus µm	44 (38-53)	44 (39-48)	42 (41-44)	43-50
Body diam at vulva µm	49 (42-58)	49 (42-53)	47 (45-51)	47-48
Body diam at anus µm	34 (31.5-38)	35 (34-37)	36 (33-38)	38-41
Body diam at beginning of J µm	17 (12-20)	18 (16.5-20)	20.5 (18.5-22)	17.5-18
Spicules µm				67-71
Number of ventromedian supplements in addition to the adanal pair				4-5

Table IV - *Morphometrical characters of Xiphinema melitense sp. n. (paratypes).*

S t a g e s	L ₁	L ₂	L ₃	L ₄	♀
n	8	6	4	11	18
L mm	1.8 (1.8-1.9)	2.1 (1.9-2.2)	2.7 (2.6-2.8)	3.4 (3.1-3.7)	4.3 (4.4-9)
a	50 (44-54)	50 (47-53)	52 (46-58)	58 (51-64)	59 (55-65)
b	5.3 (4.7-6.3)	6 (5.5-6.8)	6.3 (5.6-7)	6.8 (6.3-7.4)	7.5 (7-8.7)
c	38 (36-43)	43 (36-55)	59 (54-63)	81 (74-100)	106 (92-117)
c'	1.7 (1.6-1.9)	1.6 (1.3-1.8)	1.2 (1.1-1.3)	1 (0.8-1.1)	0.8 (0.7-0.9)
V	—	—	—	—	51.5 (50-53)
Odontostyle μm	79 (77-81)	86 (80-98)	102 (93-108)	125 (121-130)	150 (132-168)
Odontophore μm	55 (50-60)	60 (56-66)	66 (64-67)	78 (73-82)	92 (81-100)
Replacement odontostyle μm	95 (84-101)	106 (97-118)	123 (118-128)	152 (145-159)	—
Oral aperture to guiding ring μm	69 (64-79)	76 (67-88)	88 (82-91)	112 (102-117)	137 (122-149)
Tail μm	47 (43-50)	49 (41-58)	45 (42-50)	42 (34-46)	41 (38-45)
J μm	9.5 (7-11.5)	9.5 (6.5-11)	9 (8.5-10)	10.5 (9-11.5)	12.5 (11-15)
Body diam at lip region μm	10 (8.5-10.5)	10 (9.5-11)	11.5 (11-12)	13.5 (12.5-14.5)	15 (14-16)
Body diam at guiding ring μm	25 (24-25)	27 (24-31)	32.5 (32-34)	39 (37-43)	49 (43-52)
Body diam at base of oesoph. μm	32 (31-35)	37 (34-39)	45 (40-50)	52 (44-61)	63 (53-72)
Body diam at vulva μm	36 (33.5-41.5)	41 (38-44)	52 (43-60)	60 (48-68)	74 (66-80)
Body diam at anus μm	26.5 (24.5-28.5)	31 (29-32)	37 (34-39)	42 (37-45)	49 (47-55)
Body diam at beginning of J μm	8.5 (7-11)	10 (8-12)	18 (16.5-20)	24 (22.5-26)	30 (26-35)

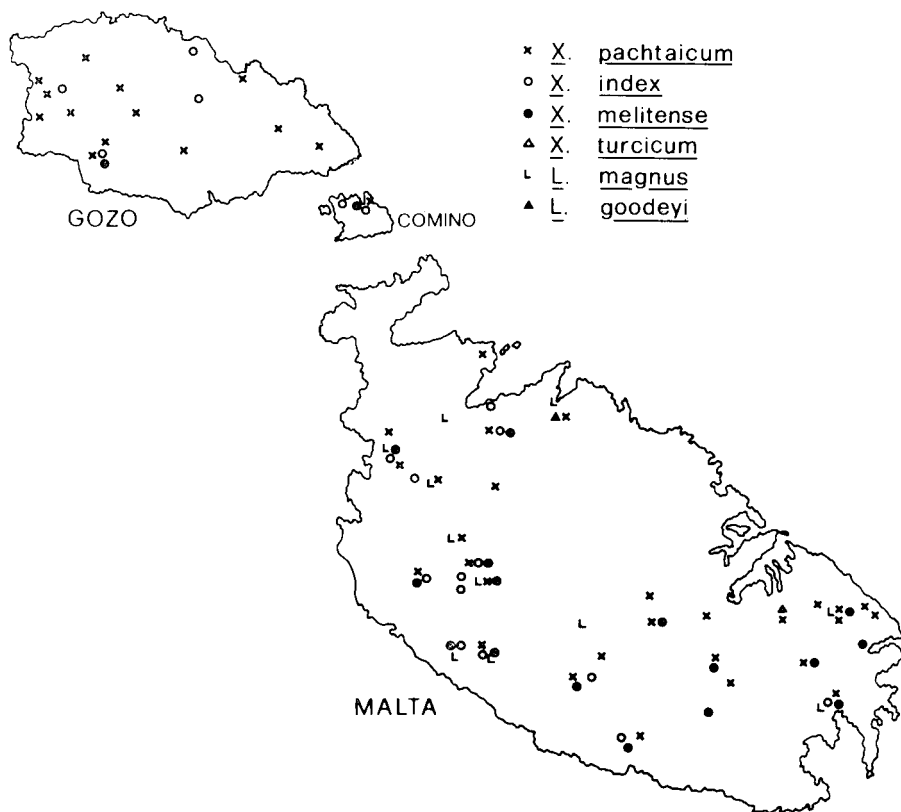


Fig. 3 - Distribution of Longidoridae in the Maltese Islands.

irregularly shaped, weakly sclerotized chips. The spermatheca is connected to the oviduct by means of a large and robust sphincter. Prerectum over 0.5 mm long, rectum a little shorter than the body width at anus. Tail broadly conoid, with rounded terminus, bearing three pairs of caudal pores.

Male: not found.

Juveniles: similar to adult females, but differing in size of the body and shape of the tail. The tail of the first juvenile stage is conoid with subdigitate terminus; the second stage juvenile has a conoid elongated tail with no evident digitation; third stage and preadult juveniles have a tail similar to that of the adult females but more elongated.

Table V - *Soil samples collected in the Maltese Islands and found infested by Longidoridae.*

Island	Crop	N° samples collected		Totals	N° samples containing Longidoridae		Totals
		woody plants	herbaceous plants		woody plants	herbaceous plants	
COMINO	Fruit trees	10			5		
	Potato		3			0	
	Leguminosae		2			0	
	Liliaceae		2			0	
	Barley		3			0	
	Totals		10	10	20	5	0
GOZO	Fruit trees	15			8		
	Grapevine	10			10		
	Other trees	3			0		
	Potato		11			1	
	Leguminosae		15			1	
	Liliaceae		22			1	
	Gramineae		13			1	
	Strawberry		4			1	
	Artichoke		2			2	
	Tomato		3			1	
	Others		1			1	
Totals		28	81	109	18	9	27
MALTA	Fruit trees	46			27		
	Grapevine	44			37		
	Other trees	6			4		
	Potato		82			3	
	Leguminosae		42			2	
	Liliaceae		36			3	
	Gramineae		42			2	
	Umbelliferae		4			0	
	Carnation		4			0	
	Artichoke		5			1	
	Tomato		19			2	
	Others		26			7	
	Totals		96	260	356	68	20
Great Totals		134	351	485	91	29	120

N.B.: Leguminosae includes beans, broad beans, pea, vetch and sweet vetch; Liliaceae includes garlic and onion; Gramineae includes barley, maize and wheat; Umbelliferae includes carrot and celery.

Type material: holotype and 12 paratype females in the collection of the Istituto di Nematologia Agraria del Consiglio Nazionale delle Ricerche, Bari, Italy; 3 paratype females, Nematology Department, Rothamsted Experimental Station, Harpenden, Herts, England, and 3 paratype females, Plant Nematology Laboratory collection, United States Department of Agriculture, Beltsville, Maryland, U.S.A.

Type habitat and locality: rhizosphere of carob tree (*Ceratonia siliqua* L.) at Luqa, Malta.

Differential diagnosis

Xiphinema melitense sp. n. is similar to *X. ingens* Luc et Dalmasso, 1963, *X. turcicum* Luc et Dalmasso, 1963, and *X. dentatum* Sturhan, 1978. However, it differs from all of them in having a very little differentiated and rudimentary pseudo Z-organ. Moreover, it differs from *X. ingens* because of its smaller body (4.3 v. 5-5.7 mm), lower value of a and c and not mucronate tail, from *X. turcicum* in having a more robust body (a = 59 v. 68-76) and a differently shaped labial region (semielliptical v. hemispherical), set off from the rest of the body (continuous in *X. turcicum*) and from *X. dentatum* in its larger size (4.3 v. 3.6 mm), posterior vulva (51.5 v. 46-47) and differently shaped labial region (hemispherical and continuous in *X. dentatum*).

Xiphinema melitense was found in sixteen other localities of Malta, Gozo and Comino, almost always in the rhizosphere of woody plants (Table I); only in two cases were a few individuals of *X. melitense* found in samples collected from around the roots of artichoke (*Cynara scolymus* L.) in Malta and of cabbage in Gozo. Four populations were without other longidorids; six were with *X. pachtaicum*, four with *X. pachtaicum* and *X. index*, two with *X. index*, one with *L. magnus* and *X. index*, four with *L. magnus* and *X. pachtaicum*, and two with *L. magnus*, *X. pachtaicum* and *X. index*.

Discussion

The results of this investigation support the contentious that woody plants are better hosts than herbaceous plants for *Xiphinema* species (Cohn, 1975) and indicate that in the Mediterranean region *Longidorus* species are also more frequently associated with woody or herbaceous perennials than with annuals plants. In fact, in a total

of 485 samples, collected in different seasons, only 29 out of 351 collected from the rhizosphere of herbaceous species were positive for longidorid nematodes (Table V). From 27 of these samples only a single longidorid species was recovered: 20 times *X. pachtaicum* and 7 times *L. magnus*, but always at very low population levels.

A sample from around the roots of artichoke plants contained a mixture of *L. magnus*, *X. pachtaicum* and *X. melitense* and a few individuals of *X. index* and *X. melitense* were detected in the soil collected in a cabbage field in Gozo.

Conversely, 91 out of the 134 samples collected from the rhizosphere of trees, vines and shrubs contained one or more species of *Xiphinema* and *Longidorus*.

Longidorid species were found in 120 out of 485 samples; 14 out of 55 of the samples collected from around the roots of grapevines contained high populations of *X. index*.

Xiphinema pachtaicum is the commonest longidorid species in the Maltese Islands, as it is throughout the Mediterranean region (Fig. 3). *X. index* and *X. melitense* are the second commonest species; both were found in all the three islands, Malta, Gozo and Comino, but the second seems to be only occasionally present in Gozo. *X. index* was detected, as expected, also from the rhizosphere of fig trees. No *Longidorus* species were found in samples collected at Comino and Gozo, but *L. magnus* is widespread in Malta. *L. goodeyi* and *X. turcicum* were found only in one locality each.

S U M M A R Y

A survey of longidorid nematodes was carried out, in the period 1974-1976, in the Maltese Islands. Species of Longidoridae were detected in 24.7% (120 out of 485) of the samples examined. Two species of *Longidorus* and four of *Xiphinema* were found prevalently in association with woody plants; in a total of 351 samples 67.9% of those collected from the rhizosphere of trees, vines and shrubs contained one or more species of Longidoridae, while those from around the roots of annual or perennial herbaceous plants contained only 8.3%. The commonest species was *Xiphinema pachtaicum* (Tulaganov) Kirjanova. *Xiphinema index* Thorne et Allen was found in each of the three islands, Malta, Gozo and Comino, and in 25.4% of the samples collected from the rhizosphere of grapevine. *Xiphinema turcicum* Luc et Dalmasso and *Longidorus goodeyi* Hooper were found only in one locality each in Malta, while no specimens of *Longidorus* were found in Gozo and Comino. *Xiphinema melitense*, closely related to *X. dentatum*, *X. ingens* and *X. turcicum*, and *L. magnus* similar to *L. caespiticola*, *L. macrosoma* and *L. profundorum* are described as new species. Both are widely distributed in Malta and the first is also present in Comino and Gozo.

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