

Studies on *Xiphinema* and *Longidorus* spp. (Longidoridae : Nematoda) from Tamil Nadu

by

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The dagger nematodes (*Xiphinema* spp.) and the needle nematodes (*Longidorus* spp.) are two important groups of phytoparasitic nematodes in Dorylaimida. They not only cause root injuries but also act as vectors of some important virus diseases. Although these genera are known to be widespread, nothing was known about them in India, till Siddiqi reported their occurrence in 1959. In a survey conducted to know the occurrence and distribution of various species *Xiphinema* and *Longidorus* in Tamil Nadu four species of *Xiphinema*, viz. *X. americanum*, *X. basiri*, *X. elongatum* and *X. insigne* and two of *Longidorus*, *L. elongatus* and *L. sylphus* were found to be very common in the soils in and around Coimbatore. A short morphological description, range of measurements and the associated host plants, many of them are new hosts, hitherto not recorded for these genera are presented in this paper. The various species have been collected mainly from Coimbatore region except otherwise stated.

i) *Xiphinema americanum* Cobb, 1913

20 00 L = 1.3 - 1.9 mm; a = 47 - 57; b = 6.2 - 7.4;

++ c = 54 - 58; V = 51 - 54%; Spear = 81 - 92 μ ;

Spear extension = 45 - 52 μ .

Male = Not found.

Body cylindrical gradually tapers at both ends. When killed the body assumes a characteristic spiral form. Cuticle two layered and thicker at the tail region and radially striated. Lateral hypodermal chord, continuous, broad and about one fourth of body width. Dorsal and lateral pores not observed. Ventral pores regularly placed in the anterior region along a single line. Lip region smooth, rounded and continuous with body contour. Amphid sacs extend up to the muscular oesophagus. Spear 81 - 92 μ long and spear extension with well developed flanges is 45 - 52 μ long. Prominent guiding ring is 65 - 75 μ from anterior end. Guide tube 6 - 7 μ long. The tube length varies considerably according to the projection of the stylet. Nerve ring is located at 175 μ from the anterior end. Hemizonid and mucro not observed.

Vulva is placed slightly posterior to the middle of the body. Ovaries two, reflexed. 'Z' organ absent. Prerectum indistinct. Tail conoid with a blunt terminus 29 - 32 μ long and with two pairs of caudal papillae.

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Host plants: This species was collected from the rhizosphere of Sapota (*Achras Sapota*, L.), Citrus (*Citrus limon*, B.), mango *Mangifera indica* L.), grape vine (*Vitis vinifera* L. Var. Bangalore Blue), Cotton (*Gossypium hirsutum* L.), neem (*Azadirachta indica* A.), Coconut (*Cocos nucifera* L.), mulberry (*Morus alba* L.) and sunn hemp (*Crotalaria juncea* L. from Krishna-giri of Dharmapuri district.)

(i) *Xiphinema basiri* Siddiqui, 1959 (Fig. 1)

10 ♀♀ : L=2.6-3.0 mm; a=53-65; b=7.3-8.2; c=54-71;
++ V=48-50%; Spear=101-105 μ ; Spear extension=51-54 μ .

1 ♂ : L=3.46 mm; a=75.1; b=8.1; c=64.4; T=52%;
Spicula=69 μ ; Spear=134 μ ; Extension=55 μ .

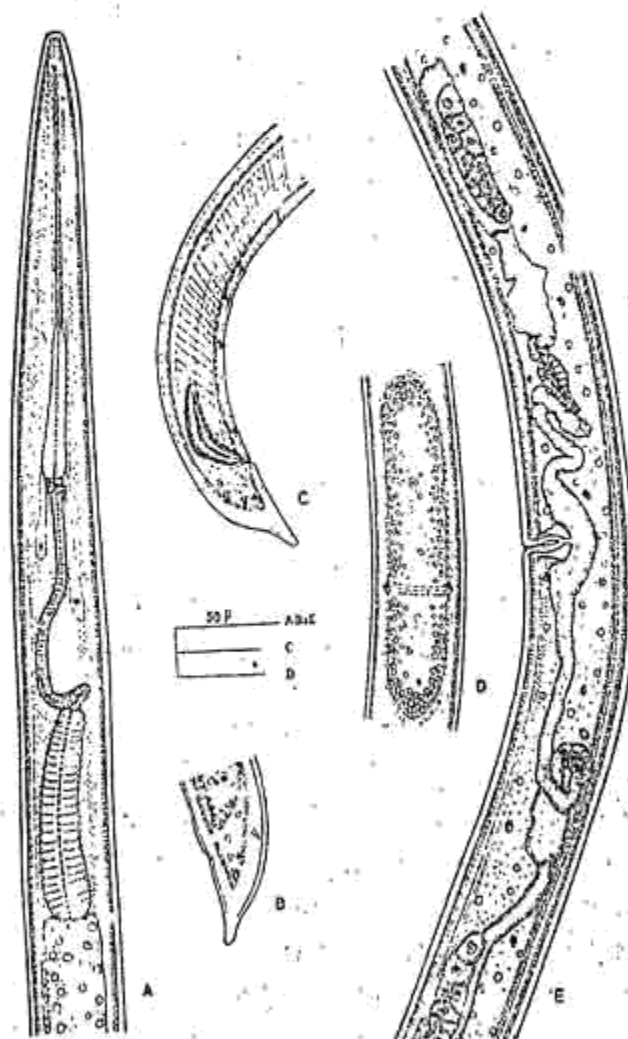


FIG. 1. *Xiphinema basiri* Siddiqui, 1959

A. Anterior part of female; B. Female tail; C. Posterior part of male;
D. Egg in organ 'Z'; E. Genital region of female

Body attenuated, long with a tapering anterior end and a posterior rounded end with a short peg like process. Cuticle uniformly thick with long striations and is radially striated at tail end. Lateral chord continuous

throughout the body and about 21% of body width. Dorsal and ventral pores not clearly visible. Lip region smoothly rounded and clearly set off by a constriction. Amphid sacs broad and pouch like extend upto the muscular oesophagus. Spear very long (101-105 μ) with a 51-54 μ long extension. Guiding tube is 18 μ long and the fixed guiding ring is 80-90 μ from the anterior end. Nerve ring is just behind the base of the spear extension and is 162 μ from the anterior end. Hemizonid and hemizonion absent. Mucro not observed. The muscular part of oesophagus is 75 μ long and 18 μ broad. Cardia small and flat.

Vulva is a transverse slit and vagina and uterus are thick walled. Two ovaries almost symmetrical, opposed and reflexed. A distinct 'Z' organ is present. Prerectum is about 410 μ long. Tail short slightly convex-conoid ending with a peg like process (sub digitate) and is 36-40 μ long. Four pairs of caudal papillae are present.

Body shape and other details of male similar to female. Testis paired and are 148 μ long. Spicule with prominent and powerful copulatory muscles. Supplements consists of four pairs of ventro median papillae and one pair of adanal papillae.

Host plants: Collected from the root zones of mango (*Mangifera indica* L.), Kapak (*Ceiba pentandra* G.), mulberry (*Morus alba* L.), cotton (*Gossypium herbaceum* L.), sapota (*Achras sapota* L.), country almond (*Terminalia catappa* L.), West Indian cherries (*Malpighia puniceifolia* L.) and brinjal (*Solanum melongena* L. from Reddiarchatram of Madurai District).

iii) *Xiphinema elongatum* Schurumans Stekhoven and Teunissen, 1938 (Syn: *X. pratense* Loos, 1949)

26 00 L = 2.1-2.3 mm; a = 47-54; b = 5.6-6.7;

++ c = 35-42; V = 42-45%; Spear = 99-116 μ ;

Spear extension = 56-63 μ

Males: Not found.

Body attenuated, cylindrical and assumes an arcuate position ventrally and posteriorly when killed by gentle heat. Body tapering is more towards posterior end. Cuticle smooth and uniformly thick except in caudal region where it is thicker and radially striated. Lateral hypodermal chord broad and is about 21% of body width. Lateral pores irregularly placed. Dorsal and ventral pores also observed from the anterior end upto the middle of the body.

Lip region set off from the body by a slight constriction and is rounded. Amphidial openings slit like and amphid sacs extend upto the middle of slender oesophagus. Spear 99-116 μ long with an extension which measures 56-63 μ in length. Guiding tube, with two rings, is prominent. The location

of the fixed or prominent guiding ring varies from 93 to 110 μ from the anterior end. Nerve ring is situated just behind the base of the spear extension and is about 190 μ from anterior end. Hemizonid clearly distinguishable in many specimens at about the same level of nerve ring and is about 190 μ from the anterior end. Hemizonion observed in two specimens. A small triangular chitinized piece (mucro) is present in the slender portion of the oesophagus, just below the spear extension. Cardia small and conoid. The muscular oesophagus, measures $74 \times 15 \mu$.

Vulva, a transverse slit is always placed a little anterior to the middle of the body. Vagina and uterus thick walled. Ovaries almost symmetrical and reflexed. 'Z' organ absent. Prerectum indistinct. Tail long tapering, and conoid measures 49-54 μ long, with three pairs of caudal pores.

Host plants: This species was collected from the soil around the roots of *Dolichos lab lab* (from Trichy and Coimbatore), Sapota (*Achras sapota* L.), rose (*Rosa indica* L.), fig (*Ficus carica* L.), Sorghum (*Sorghum vulgare* P.) and mulberry (*Morus alba* L.).

iv) *Xiphinema insigne* Loos, 1949

(Syn: *X. indicum* Siddiqi, 1959)

18 00: L=2.1-2.6 mm; a=53-69; b=6.8-9.0; c=24.3-26.7;
 ++ V=30-33%; Spear=85-103 μ ; Spear extension=54-61 μ .

Males: Not found.

Body cylindrical and assumes an arcuate position when killed. Body tapering is more towards posterior end. Cuticle smooth and lateral chord broad and almost 29% of body width. Lateral pores as well as sub dorsal pores observed. Head rounded and clearly set off by an incisure. Lips amalgamated. Odontostylet 85-103 μ long with a well developed spear extension which varies in length between 54-61 μ . Prominent guiding ring is 90-95 μ from the anterior end and guide tube is about 5 μ long. Nerve ring is located just behind the base of the spear extension. Hemizonid and Hemizonion were observed in many specimens and were placed about 110 μ and 150 μ respectively from the anterior end. Mucro not observed. Cardia not well developed, and obscure. Muscular part of oesophagus measures $92 \times 18 \mu$ on an average.

Vulva is placed at about one third of total length from the anterior end. Ovaries, two well developed, reflexed and the anterior ovary (103-106 μ) is always a little shorter than the posterior one (124-201 μ). Organ 'Z' absent. Prerectum indistinct. Tail 88-95 μ long, conoid, uniformly tapering towards a rounded end. Three pairs of caudal papillae are present.

Host plants: This species was collected from the root zones of sugarcane (*Saccharum officinarum* L.), mango (*Mangifera indica* L.), ground nut *Arachis hypogaea* L. from Chingleput), banana (*Musa paradisiaca* L.), sapota (*Achras sapota* L.), and country almond (*Terminalia catappa* L.).

v) *Longidorus elongatus* (de Man, 1876), Thorne and Swanger, 1936

20 00 L=5.2-6.7 mm; a=108-114; b=13.5-15.7;

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c=183-207; V=44-47%; Spear=126-134 μ ;

Spear extension=63-76 μ .

Males: Not obtained.

Very long attenuated cylindrical nematodes which acquire an open 'C' shape when relaxed. Body tapers anteriorly and posterior end is smooth and rounded with thick cuticle having radial striations. Lip region smooth, rounded 17 μ wide, and clearly set off by a constriction. Lateral chord broad from the oesophageal region and is about 35% of body breadth. Lateral pores arranged in a single row. No dorsal and ventral pores. Amphidial sacs very prominent and extend upto the beginning of the muscular oesophagus. Nerve ring is just behind the base of the spear extension and is about 228 μ from the anterior end. Stylet, very long and measures 126-134 μ and the extension is 63-76 μ long without flanges. Anteriorly there is a prominent guiding ring which is about 35 μ from the head end. The muscular oesophagus measures 112 \times 22 μ . Mucro not observed. There is no hemizonid or hemizonion. Cardia small and round.

Vulva a transverse slit situated a little anterior to the middle of the body. Vagina thick walled with powerful muscles. Ovaries two, almost equal and reflexed. No "Z" organ. Prerectum distinct, about 305 μ long. Tail short, broadly convex with a rounded end and is 32-38 μ long with two pairs of caudal papillae.

Host plants: Collected from soil around roots of sorghum (*Sorghum vulgare* P.), maize (*Zea mays* L.), cotton (*Gossypium herbaceum* L.), brinjal (*Solanum melongena* from Virudhunagar of Ramnad District), guava (*Psidium guajava* L.), *Zinnia heagenna* R., *Dolichos lab lab* L., *Petunia* sp., *Hibiscus rosa-sinensis* L., sunnhemp (*Crotalaria juncea* L.), bajra (*Pennisetum typhoides* R.) and Cowpea (*Vigna catjang* W.).

vi) *Longidorus sylphus* Thorne, 1939

25 00 L = 3.8 to 4.9 mm; a = 80-102; b = 9-12.5; c = 69-88;

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V=46-50%; Spear=84-92 μ ; Spear extension=48-62 μ .

Males: Not found.

Body elongate, attenuated and ventrally coiled when relaxed by gentle heat. Body tapering is more and uniform towards anterior end. Body cuticle smooth without any transverse striations. Lip region rounded and continues

with body contour. Hypodermal lateral chord broad and is almost one third of body breadth which becomes narrower near the head end. Lateral, dorsal and ventral pores not observed. Odontostylet is 84-92 μ long with an unsclerotised stylet extension measuring 48-62 μ . Guiding ring is located at about 30 μ from the anterior end. Stoma less conspicuous, a cylindrical tube without sclerotisation. Nerve ring is located just below the terminus of stylet extension. Oesophagus typical dorylaimoid type and the muscular portion measures 102 μ long and 20 μ broad. 'Mucro' absent. Cardia well developed, conoid and rounded. Hemizonid observed in a few specimens.

Vulva is situated at about 46-50% of body length from anterior end. Vagina and uterus thick walled. Organ 'Z' absent. Ovaries, paired almost symmetrical and reflexed. Oocytes arranged in a single pile. Prerectum distinct and is about 8% of the total body length. Tail conoid, rounded and is about 49 μ long.

Host plants: Collected from around the root zones of Sorghum (*Sorghum vulgare* P.), maize (*Zea mays* L.), mulberry (*Morus alba* L.), cotton (*Gossypium herbaceum* L.), neem *Azadiracta indica* L.) *Zinnia linearis* and brinjal (*Solanum melongena* L.).

Summary: In a survey conducted, to find out the occurrence and distribution of *Xiphinema* and *Longidorus* spp. in Tamil Nadu State, the following species were found to be prevalent in the region. *Xiphinema americanum* Cobb, 1913, *X. basiri* Siddiqi, 1959 *X. elongatum* Schuurmans Stekhovan and Teunissen, 1938, *X. insigne* Loos, 1949, *Longidorus elongatus* Thorne and Swanger 1936 and *L. Sylphus* Thorne, 1939. The measurements, a short morphological description and the host plants, with which these species were associated, are given.

Acknowledgement: The senior author is greatly indebted to Sri T. S. Muthukrishnan, Nematologist, Agricultural College and Research Institute, Coimbatore for the facilities provided for this taxonomic work.

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