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Studies on Phytoparasitic Nematode *Xiphinema* Sp. (Cobb, 1913) Inglis, 1983 from Sangli Region (M.S.) India

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Abstract
The present study is the redescribtion of plant parasitic nematode *Xiphinema* Spp. It was established after examination of 6 female and morphological variation was evaluated from various localities of Sangali region. The morphological and morphometric characteristics of these species are presented. Head not offset, long stylet (odontostyle). Nucleus of the dorsal oesophageal gland located from the anterior end of the bulb. Vulva a transverse slit situated near the middle of the body.

Keywords: phytoparasites, nematodes, *Xiphinema* sp.

Introduction

Plant-parasitic nematodes cause worldwide losses of US$78 billion in a year (Smiley, 2005). Traditional control methods are based in the use of expensive and soil polluting chemicals. Until now, the biggest infestations on soils are treated with pre plantation fumigants, like methil bromide or 1,3- D (Aballay and Montedónico, 2009) [1]. Some integrated managements includes the use of amendments and plant parasitic resistant rootstocks (Bell *et al*., 2000) [3]. Despite their parasitic behavior, plant-parasitic nematodes spend a considerable part of their life-cycle in the soil. In addition to the host plant, soil type is also known to be a major factor that affects nematode distribution.

Nematodes of the genus *Xiphinema*, commonly called dagger nematodes, parasitize plants. Many of these nematodes, the majority of them belonging to the *Xiphinema americanum*-group, can transfer viruses to plants during feeding (Taylor and Brown 1997, Gozel *et al*. 2006) [14, 7]. Dagger nematodes can cause economic damage and death of host crops through feeding on the roots and also by spreading viral mosaic and wilting diseases (Jones *et al*. 2013) [8]. However, *Xiphinema* spp. are the eighth most economically important plant parasitic nematode group to agricultural crops worldwide (Jones *et al*. 2013) [8]. Damage to roots causes up to 65% root weight loss and this can result in severe yield reduction (Anonymous 2014). Viruses transmitted to food crops such as tomato, grapevine, pepper, cassava, and potato can cause more than 50% crop losses because the virus limits plant development (Evans *et al*. 2007) [5]. As a result, virus vectoring dagger nematodes are on quarantine lists for many countries (Nicol *et al*. 2011) [11]. Species of *Xiphinema* are sensitive to changes in soil temperature and moisture (Malek 1969) [9] and will migrate vertically away from desiccating conditions in topsoil; most dagger nematodes can live and survive deep in soil (Feil *et al*. 1997) [6].

The present study deals with the morphology of plant parasitic nematode *Xiphinema spp.* (Cobb, 1913) [4] collected from the soil around root of garden plants and citrus plants

Material and Methods

Soil Sampling: Soil samples are collected from various locations of Sangli district; around roots of host plants with the help of shovel from the depth of 5-15 cm. in moist soil fields. If the field is arid or semiarid, the depth is increased. For making a bulk soil sample, 4-5 sub-samples are collected from the fields. The soil is collected in a polythene bag and brought to laboratory. A label bearing information regarding host, locality, district, date, etc. is tied at the neck of polythene bag with the help of rubber band. In order to avoid evaporation of moisture from soil sample they are stored in a refrigerator and processed as soon as possible.

Processing: Extraction of plant and soil nematodes from soil samples was made by modified Bearmann funnel technique.

Killing and Fixation: The suspension containing the nematodes is placed in a test tube for 20-30 minutes so that nematodes may settle down at the bottom. Most of water is discarded carefully from the test tube with the help of dropper. The nematodes are fixed in hot 4% formalin.

Permanent Slides: The nematodes are transferred from fixative to a solution of 5 parts of glycerin and 95 parts of alcohol in a cavity block. The cavity block having the nematodes is placed in a desiccator for dehydration of nematodes at room temperature for 2-3 weeks. The nematodes are finally mounted in a glass/metal slide in pure anhydrous glycerine. Ordinary nail polish is used as a sealing material (Baqri and Bohra, 2005) [2]. All measurements were made on specimens mounted in anhydrous glycerine with the help of ocular micrometer. De Man's (1884) formula for denoting body dimensions of nematodes was used

Nematode identification: Individual nematodes were picked, killed by heating (70ºC), and then fixed in FG solution (1 ml

glycerol, 10 ml formalin, and 89 ml distilled water). Specimens were processed slowly into glycerol and mounted on microscope slides (Southey 1970) [13].

Result and Discussion

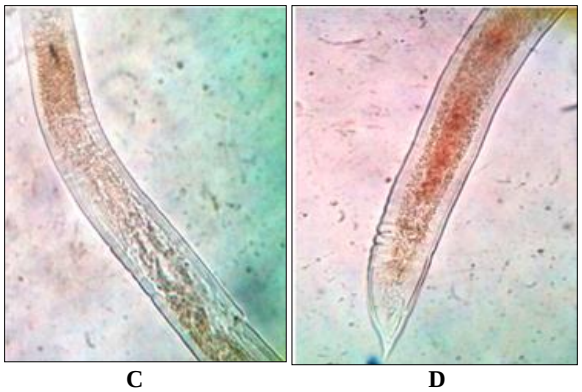
The structure of the female tract is an important character for the specific definition and determination in the genus *Xiphinema* Cobb, 1913 [4] (Michel, 1981) [10].

Order	:	Dorylaimida (Pearse, 1942)
Sub order	:	Dorylaimida (Pearse, 1936)
Super Family	:	Dorylaimoidea, (De Man, 1876)
Sub Family	:	Xiphinematidae (Dalmasso, 1960)
Genus	:	*Xiphinema*, (Cobb, 1913) [4]

Females: Body assumes 'C' shape on death. Head not offset, long stylet called an odontostyle. The stylet has no stylet knobs but rather flanges, which support (anchor) the basal part of the odontophore (the rear part of the long stylet) (Fig. B). The guiding ring in the middle holds the long stylet in position. Anterior guiding ring 92 µm (91-110 µm) from anterior end. Odontostyle odontophore junction with prongs. Nerve ring 190 µm (180-210 µm) from anterior end. Constriction present at the junction of the two parts of oesophagus. Oesophageal bulb measuring 85 X 10 µm (80-110 X 9-15 µm). Nucleus of the dorsal oesophageal gland located at 13 µm (11-15 µm) from the anterior end of the bulb. Vulva a transverse slit situated near the middle of the body. Vagina thick walled, gonads opposed reflexed. Pre-rectum about 8% of the total body length. Tail dorsally convex conoid, 1.8 (1.5-1.9) anal-body-width in length with a peg.

A **B**

Fig 1. A: Entire Body of Xiphinema sp. (Female), **B:** Anterior region



C **D**

Fig 2. C: Middle Region Vulva, **D:** Posterior region

Male: Not Found.

The present morphological characters come closer to Plant Parasitic Nematode genus *Xiphinema*, (Cobb, 1913) [4].

References

1. Aballay E, Persson P, Mårtensson A. Plant-parasitic nematodes in Chilean vineyards. Nematropica, 2009; 39:85-98.
2. Baqri H, Bohra P. Studies on Plant and Soil Nematodes Associated with Crops of Economic Importance in Gujarat of the Zoological Survey of India, Rec. zool. Surv. India, Occasional Paper No. Published by the Director, Zoo I. Surv. India, 2005; 240:1-48.
3. Bell NI, Watson RN, Sarathchandra SU. Suppression of plant parasitic nematodes in pastoral soils amended with chitin. New Zealand Plant Protection, 2000; 53:44-47.
4. Cobb NA. New nematode genera found inhabiting fresh water and non-brackish soils. Journal of the Washington Academy of Science, 1913; 3:438.
5. Evans TA, Miller LC, Vasilas BL, Taylor RW, Mulrooney RP. Management of *Xiphinema Americanism* and soybean severe stunt in soybean using crop rotation. Plant Disease, 2007; 91:216-219.
6. Feil H, Westerdahl BB, Smith RJ, Verdegaal P. Effects of seasonal and site factors on *Xiphinema index*populations in two California vineyards. Journal of Nematology, 1997; 29:491-500.
7. Gozel U, Lamberti F, Duncan L, Agostinelli A, Rosso L, Nguyen K, *et al*. Molecular and morphological consilience in the characterization and delimitation of five nematode species from Florida belonging to the *Xiphinema americanum*-group. Nematology, 2006; 8:521-532.
8. Jones JT, Haegeman A, Etienne GJD, Hari SG, Helder J, Michael GKJ *et al*. Top 10 plant-parasitic nematodes in molecular plant pathology. Molecular Plant Pathology, 2013; 4:946-961.
9. Malek RB. Population fluctuations and observations of the life cycle of *Xiphinema americanum* associated with cottonwood *Populus deltoides* in South Dakota. 2011 Proceedings of the Helminthological Society, 1969; 36:270-274.
10. Michel Luc. Revue Némafol. 1981; 4(1):157-167.
11. Nicol JM, Turner SJ, Coyne DL, den Nijs L, Hockl S, Maafi ZT. Current nematode threats to the world agriculture. *In* Genomics and molecular genetics of plant-nematode interactions. Jones J, Gheysen G, Fenoll C. eds. DOI 10.1007/978-94-007-0434-3_2. Springer, Ankara, Turkey, 2011.
12. Smiley R. Plant-parasitic nematodes affecting wheat yield in the Pacific North west. Oregon State University extension publication. EM 8887, 2005, 4.
13. Southey JF. Laboratory methods for work with plant and soil nematodes. London, UK: Her Majesty's Stationery Office, 1970, 148.
14. Taylor CE, Brown DJF. Nematode vectors of plant viruses. CABI Publishing, Wallingford, UK. van Zyl S, Vivier MA, Walker MA. 2012. *Xiphinema index* and its relationship to grapevines: A review. South African Journal of Enology and Viticulture, 1997; 33:21-32.