

Intensity, Occurrence and redescription of *Aglenchus parvus* Siddiqi, 1963 and *Helicotylenchus siddiqii* Handoo, 1977 on *Brassica oleracea* (Cauliflower) and *Allium cepa* (Onion) respectively in Kashmir, india

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Abstract

The plant parasitic nematodes are common pests of vegetable crops and its yield loss is often due to their high densities, making it essentially important for nematologists to make a thorough data base of such pests, their description and population dynamics in order to devise an effective management strategy. During the period 2018 to 2020 a study was taken up with the objective of making a general survey of plant parasitic nematodes and their population analysis occurring on *Brassica oleracea* (Cauliflower) and *Allium cepa* (Onion) in Kashmir valley. On examining the soil and root samples during such survey after adopting Cobb's Sieving and Baerman's funnel method to find out biodiversity, two significant species of nematodes belonging to the order Tylenchida were found to be enormously prevalent and are described herein with alterations from the original probably because of habitat change especially the host and changing climatic conditions. *Aglenchus parvus* Siddiqi, 1963 and *Helicotylenchus siddiqii* Handoo,⁴ were met with the varied intensity on these hosts. *Helicotylenchus siddiqii* Handoo,⁴ was met with 90% of absolute frequency and 37% of Absolute density while as *Aglenchus parvus* Siddiqi,¹³ was met with 83.3% and 35% of the values respectively. The species as is collected from *Allium cepa* (Onion) is a first time report of its occurrence on this host in this region of India as it was found on *Eruca sativa*⁴.

The Tylenchida are the largest and economically the most important group of plant parasitic nematodes. The plant parasitic Tylenchida are also known as eelworms, phytonematodes, phytohelminthes or simply plant nematodes. These small worms are equipped with a protrusible hollow stylet which

is thrust into plant tissues for obtaining nutrition after the dissolution of the cell contents. They have exploited all plant organs including flowers and seeds, but mostly they attack roots. They utilize chemical activity of bacteria, which hydrolyze carbohydrates, split proteins, cellulose and other organic substances of plant

origin. These phytophagous nematodes are common pests of vegetable crops and its yield loss is often due to their high densities. Important surveys known so far on plant parasitic nematodes in India include the one carried out in I.A.R.I. farm on vegetable and fruit crops¹¹; on nematodes of citrus plants in 13 districts of Uttar Pradesh¹⁴; on the nematodes of onion¹²; on *Scutellonema mangiferae* from the soil around the roots of *Mangifera indica* from U.P.⁸.

Composite root and soil samples were drawn from plants individually at 0-15 cm depths. A composite root sample of 1g from many plants were taken and observed for nematode population. Similarly, a composite soil sample of 200g was processed with Cobb's sieving and Baermann's funnel method and assessed for nematode populations. The samples were taken from all the regions of the valley. 300 mesh sieve of pore size 53µm was used. Nematode suspension was killed and fixed in one operation by using equal amount of double strength hot F.A.A. solution. The fixed material was left as such for 24 hrs. Nematodes were thus collected and dehydrated in glycerine-alcohol solution containing 95 parts of 70% alcohol and 5 parts of glycerine. Slides were prepared from the specimens. Nematodes were identified and counted under stereomicroscope.

Abbreviations used

L = total body length in mm
 a = body length divided by greatest body width
 b = body length divided by distance from

anterior end to junction of oesophagus and intestine
 b' = body length divided by distance from anterior end to posterior end of oesophageal glands
 c = body length divided by tail length
 c' = tail length divided by body width at anus or cloaca
 DGO = dorsal gland orifice
 V = distance of vulva from anterior end X100 ÷ body length
 G1 = overall length of anterior gonad X 100 ÷ body length
 G2 = overall length of posterior gonad X 100 ÷ body length
 ABD = total anal body diameter

During this study the following four species were met on the said hosts with the morphological variations.

Aglenchus parvus Siddiqi, 1963

Female: L= 0.37 - 0.45 mm, a= 29 -36.1, b= 5.3- 6.1, c= 4.4- 6.6, c'= 10- 17.6, V= 53-59, Spear= 9- 9.3, G1= 22.8- 26.1, Tail= 68.6- 70.8, ABD= 6.4- 8.8.

Body straight upon fixation, 0.37 - 0.45 mm long. Cuticle coarsely annulated 1 to 2 µm apart at mid - body. Lateral fields with 3 - 4 incisures. Cephalic striation broadly rounded 4.8 µm wide and 2.4 - 3.2 (2.8 ± 0.4) µm high. Stylet 9 - 9.3 µm long, slender with rounded knobs. Orifice of dorsal oesophageal gland duct 2 - 3 µm from base of spear knob. Oesophagus 79.2 - 88 µm long. Median bulb muscular and oval in shape, basal oesophageal bulb pyriform. Cardia is rounded, 3 - 4 (3.5 ±

0.5) μm wide. Nerve ring behind isthmus at 52.8 - 59.6 μm from the cephalic framework. Excretory pore below the level of nerve ring, 67.2 - 73.6 μm from the anterior body. Deirids prominent. Female reproductive system mono - prodelphic, vulva with larger outer and smaller inner lips. Vagina directed forward, its walls often swollen. Tail is filiform, 68.6 - 70.8 μm long (**Figure 1 & 2**).

Male: Not found.

Habitat and locality: The specimens were collected in the soil around roots of *Brassica oleracea* (Cauliflower) from HMT area of Srinagar.

Remarks: The dimensions and morphological characteristics of the present species conform well to those described already¹³ except in some variations in the tail length and anal body diameter.

***Helicotylenchus siddiqi* Handoo, 1977**

Dimensions:

Females: L = 0.56-0.60, a=24.3-27, b= 5.3-6.2, b'= 4.2- 4.7 c=43-47, c'= 0.9- 1.3, G1= 27- 31, G2= 19- 26.2, v= 61-72%, spear=20-25 μm , Tail= 21- 23, ABD= 11.1- 15.3.

Description:

Assumes spiral shape on heating. Strong curvature behind vulva. Cuticle transversally striated, each striae measuring 1.6 μ at mid body. Deirids absent, lateral field marked by incisures. The head conoid truncate with the distinct striations and is continuous with

the body contour. Vestibulum forming an inverted funnel shaped spear guide extending upto six annules into body. Spear 20-25 μm in length. Basal knobs of spear anteriorly cuped. Dorsal oesophageal gland orifice located at 7 μ behind spear base. Procorpus cylindrical, metacarpus well developed measuring 12 \times 7 μ , filling more than half of the corresponding body with and extends upto 7 body annules. Nerve ring enveloping isthmus, is at 80 μm from anterior. Excretory pore located at 89 μ from anterior end and is in level with the oesophageal intestinal junction (**Figure 3**).

Vulva transverse slit, vagina at right angle to body axis slightly protruded lips. Tail dorsally convex with a bluntly rounded terminus, regularly striated, number of striae in the tail on ventral side are six. Phasmids located at 3 annules anterior to anus. The lateral fields merges with the tail striations.

Males: Not found

Habitat and Locality: The specimens were collected in the soil around roots of *Allium cepa* (Onion) from Largam, Shopian.

Remarks: The species as is collected from *Allium cepa* (Onion) is a first time report of its occurrence on this host in this region of India as it was found on *Eruca sativa*⁴. The original dimensions vary to the present in values of V and b value.

On examining the soil samples as well as root samples of *Brassica oleracea*, *Aglenchus parvus* Siddiqi, 1963 was encountered with its absolute density of 35% (Table 1, Figure 4). The absolute frequency of 83.3% was found

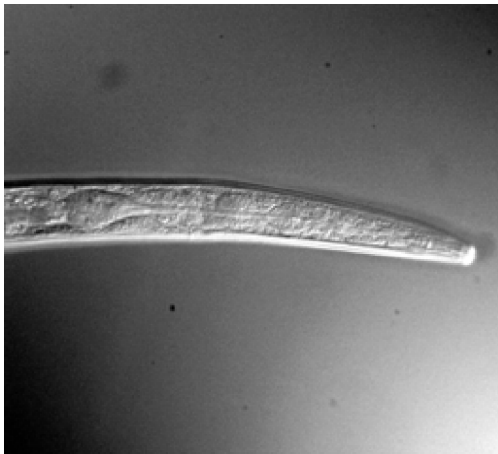


Figure 1: *Aglenchus parvus* Siddiqi, 1963

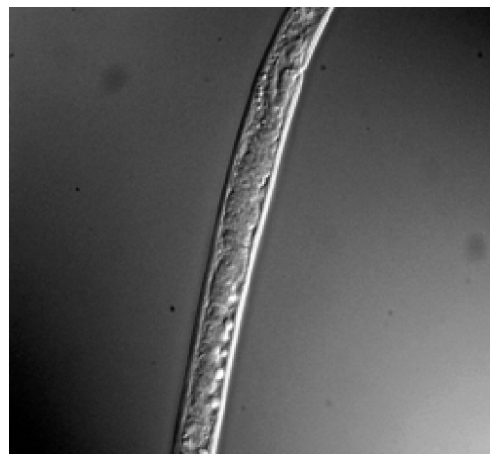


Figure 2: *Aglenchus parvus* Siddiqi, 1963

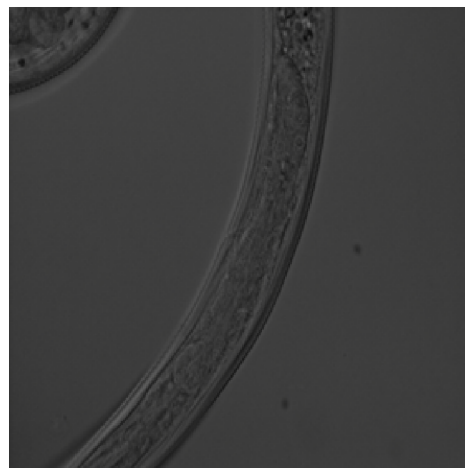


Figure 3: *Helicotylenchus siddiqii* Handoo, 1977

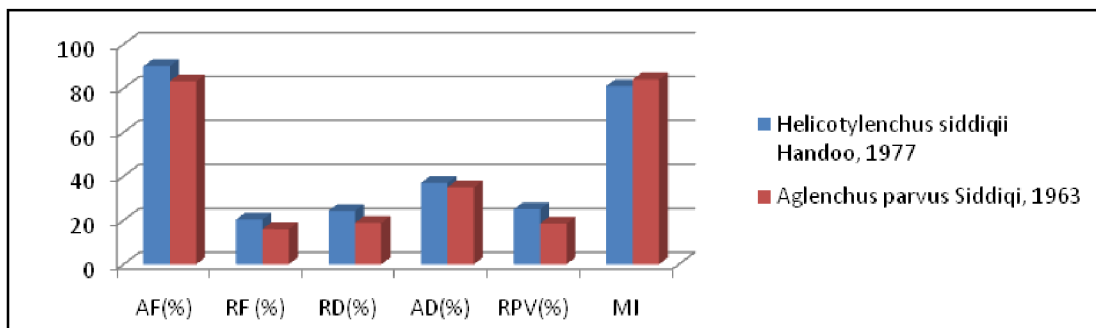


Figure 4: Graphical representation of plant parasitic nematodes associated with *Allium cepa* (Onion) and *Brassica oleracea* (Cauliflower)

Table-1. Community analysis of plant parasitic nematodes associated with *Allium cepa* (Onion) and *Brassica oleracea* (Cauliflower)

Genus	AF(%)	RF (%)	RD(%)	AD(%)	RPV(%)	MI
<i>Helicotylenchus siddiqii</i> Handoo, 1977	90	20.3	24.3	37	25	81
<i>Aglenchus parvus</i> Siddiqi, 1963	83.3	16	18.8	35	18.5	84

AF= Absolute frequency, RF= Relative frequency, RD= Relative Density, AD= Absolute density, RPV= Relative prominence value, MI= Mean Intensity.

in case of *Aglenchus parvus* Siddiqi, 1963 on this host.

The present study revealed that the Tylenchid population buildup on *Allium cepa* was *Helicotylenchus siddiqii* Handoo⁴, with its absolute frequency of 90%. Population of this nematode happened to be highest with the absolute density and mean intensity of 37% and 81% respectively. Among various genera recorded (Table 1, Figure 4) on *Allium cepa* the Relative prominence value of 25% for *Helicotylenchus siddiqii* Handoo⁴, was recorded.

The present results in regard with the survey and population analysis part on this host is in good conformity with the work of other researchers over different parts of the world. A general survey of plant parasitic nematodes associated with Sweet potato⁵ in Niger the results of which validate the present variables. The studied on the biodiversity of plant parasitic nematodes of Cashew Plantations¹ in Tripura, India have listed the similar results. Plant parasitic nematodes associated with vegetables growing greenhouses in south eastern Anatolia region, Turkey were studied¹⁵ depicting sort of similar results. Results of some noteworthy

researchers^{2,3,6,7,9,10} conform well with the present findings and discussions.

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