

Short Communication

Prevalence of Nematode Parasites Around Sugarcane Plants in Different Localities of Osmanabad District (Maharashtra) India

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Sugarcane (*Sacharrum officinarum*) is an important food crop of the tropics and subtropics [1]. Sugarcane is one of the few crops to provide commercial quantities of food fiber and fuel. There are two economically important byproducts in the manufacture of sugar from sugarcane, viz. bagasse and molasses. Bagasse is the fibrous residue from the cane stalks. It is used primarily as a fuel for the sugar factories. Molasses is the remaining liquor in the manufacturing process after separation of the crystallized sucrose. It is used to produce alcohol, organic acids as well as yeast [2]. Sugar production tends to fluctuate due to decrease in sugarcane harvested area and disturbances of pests and diseases one of which is Phytonematodes. Phytonematodes are important plant pest in sugarcane. Nematodes are generally minute, unsegmented round worms. Most of the nematodes that inhabit the soil are microbial predators of other soil organism, but some are plant parasites are known as plant nematode. They are only 50 microns in diameter and about 1mm long or less. Most nematode species have a beneficial role in the soil but we tend to know more about the pest species because of their impact on agricultural production.

Girei and Giroh [3] described number of factors that could be responsible for the low production of sugarcane from the sugar Industries. Nematode are most responsible for the decline in sugarcane production. Nematode diversity on sugarcane is greater than most other cultivated crops, with more than 310 species and 48 genera of endo and ectoparasitic nematodes reported from the root and rhizosphere of the plant. Spaul and Cadet [4] plant parasitic nematodes can damage roots and reduce the growth of cane stalks leading to sugarcane yield loss [5]. The aim of this study therefore is to provide an update on the diversity and population distribution of plant parasitic nematode associated with sugarcane in Osmanabad district Maharashtra state India.

Sample collection: The soil samples were collected from June 2021- May 2022 from the Six localities of Osmanabad district. Samples were collected around the roots of sugarcane

crop up to the depth of 0-15cm. The samples mixed to make a composite sample. From the composite soil sample 250 gm of soil taken for further processing.

Parasite collection: Extracting the nematodes by Cobb's sieving and decanting method [6] followed by Baermann's funnel technique [7]. Extracted sample was observed under stereoscopic binocular microscope for collection. Isolated nematodes were killed in hot water and fixed in FAA (Formal acetic acid) solution and mounted on permanent slide in dehydrated glycerin for further anatomical studies Based on morphological characteristics of adult and juvenile forms the nematodes were identified up to generic level [8].

Calculation: The absolute frequency, absolute density, relative frequency and prominence value were calculated by following Norton formulae [9].

$$\text{Absolute density} = \frac{\text{No. of individual of a species}}{\text{Volume of sample}} \times 100$$

$$\text{Absolute frequency} = \frac{\text{No. of sample containing species}}{\text{No. of sample collected}} \times 100$$

$$\text{Relative frequency} = \frac{\text{Absolute frequency of species}}{\text{Sum of absolute frequency of all species}} \times 100$$

$$\text{Prominence value} = \text{Density} \sqrt{\text{Absolute frequency}} / 100$$

Data depicted in (Table 1) shows the population of plant parasitic nematode from different localities of Osmanabad district During Jun 2021-May 2022. From the data it was clearly observed that the *Hoplolaimus* were reported from five localities. The large population of genus *Hoplolaimus* and *Helicotylenchus* same result is observed by Steven *et al.* [10]. Followed by *Mylonchulus*, *Helicotylenchus*, and *Eudorylaimus*

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were reported from four localities. Mulder *et al.* [11] studied different nematodes genera respectively *Mylonchulus*, *Helicotylenchus*, *Dorylaimus*, *Eudorylaimus* etc. Two genera *Dorylaimus* and *Acrobeles* were reported from three localities. Lastly two genera *Xiphinema* and *Monohystera* were reported from two localities. Variation in soil moisture, temperature, and soil water level was followed by variation in nematode population. A significant positive relationship between these

factors and nematode numbers was observed [12]. In observation (Table 2) shows the *Hoplolaimus* and *Helicotylenchus* having highest frequency of occurrence with absolute frequency (83.33%). followed by *Mylonchulus*, *Acrobeles* and *Eudorylaimus* having same absolute frequency (66.66%). The genera *Xiphinema* and *Monohystera* having similar absolute frequency (50.00%). Lastly the genus *Dorylaimus* having the lowest absolute frequency (33.33%).

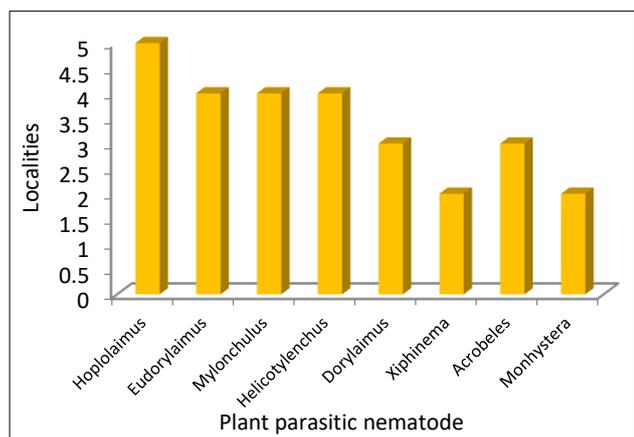
Table 1 Survey of plant parasitic nematode in different localities of Osmanabad district (M.S) India

Plant parasitic nematode	Kallam	Washi	Tuljapur	Omerga	Lohara	Osmanabad	Total
<i>Hoplolaimus</i>	+	+	+	+	-	+	5
<i>Eudorylaimus</i>	+	+	+	-	-	+	4
<i>Mylonchulus</i>	+	-	+	+	+	-	4
<i>Helicotylenchus</i>	-	+	-	+	+	+	4
<i>Dorylaimus</i>	+	+	-	-	-	+	3
<i>Xiphinema</i>	+	+	-	-	-	-	2
<i>Acrobeles</i>	-	-	+	-	+	+	3
<i>Monohystera</i>	-	+	-	+	-	-	2

+ = Present and, - = Absent

Table 2 Absolute frequency, relative frequency absolute density and prominence value of plant parasitic nematode associated with sugarcane plants in Osmanabad district, (M.S) India

Plant parasitic nematode	Absolute frequency (%)	Relative frequency (%)	Absolute density (%)	Prominence value (%)
<i>Hoplolaimus</i>	83.33	16.66	11.32	1.03
<i>Eudorylaimus</i>	66.66	13.33	5.03	0.41
<i>Mylonchulus</i>	66.66	16.66	7.51	0.61
<i>Helicotylenchus</i>	83.33	13.33	8.12	0.74
<i>Dorylaimus</i>	33.33	6.66	2.28	0.13
<i>Xiphinema</i>	50.00	10.00	5.16	0.36
<i>Acrobeles</i>	66.66	13.33	7.68	0.62
<i>Monohystera</i>	50.00	10.00	4.39	0.31



Graph 1 Showing the occurrence of plant parasitic nematode in studied localities around Osmanabad district (Maharashtra) India

The relative frequency of *Hoplolaimus* and *Helicotylenchus* was recorded as maximum (16.66%). followed by *Mylonchulus*, *Acrobeles* and *Eudorylaimus* were same absolute frequency (13.33%). The genera *Xiphinema* and *Monohystera* having similar relative frequency (10.00%). Lastly the genus *Dorylaimus* has the lowest absolute frequency (6.66%). *Hoplolaimus* occurred in high densities which was (11.32) followed by *Helicotylenchus* (8.12), *Acrobeles* (7.68), *Mylonchulus* (7.51), *Xiphinema* (5.16), *Eudorylaimus* (5.03) *Monohystera* (4.39) and *Dorylaimus* (2.28). In consideration to prominence value *Hoplolaimus* exhibited the highest

prominence value (1.03). Followed by *Helicotylenchus* (0.74), *Acrobeles* (0.62), *Mylonchulus* (0.61), *Eudorylaimus* (0.41), *Xiphinema* (0.36), *Monohystera* (0.31) and *Dorylaimus* has the lowest prominence value (0.13).

The abundance and distribution of the plant parasitic nematodes are influenced by the soil texture, crop cycle and anthropogenic factors [13]. Community analysis of plant parasitic nematodes have been studied by Ansari and Ahmed [14], Blair and Stirling [15], Michel *et al.* [16], Rawhat Un Nisa *et al.* [17], Zalpuri [18], Srinivasan *et al.* [19]. Very little work has been done regarding the community structure of the Phytonematodes.

The maximum diversity was found to be *Hoplolaimus* and *Helicotylenchus* species and lower diversity of *Dorylaimus* species. Other species include *Eudorylaimus*, *Acrobeles* and *Mylonchulus* which also infest the sugarcane plants.

SUMMARY

The present communication deals with the population dynamics of nematode species in sugarcane crop from Osmanabad district (Maharashtra) India. Samples were collected from roots and soil from six places of Osmanabad district. The frequency of occurrence and population varied from place to place. Eight species of plant parasitic nematode were found associated with the roots and rhizosphere of the sugarcane crop. They include *Hoplolaimus*, *Helicotylenchus*, *Mylonchulus*, *Eudorylaimus*, *Xiphinema*, *Monohystera*, *Acrobeles* and *Dorylaimus*. It is concluded that all the sites of

Osmanabad district have heavy infections of nematodes. The population of nematodes in the sugarcane field may affect sugarcane productivity. As India is agricultural country so, there is need to control the growth of nematodes, because nematode destroy the sugarcane plant which finally affect agricultural as well as economy of farmer and state also.

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