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POPULATION DYNAMICS OF PLANT PARASITIC NEMATODES AROUND CROPS ROOT IN JALNA DISTRICT

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ABSTRACT

The present study is based on the survey accompanied and assessment made by the frequencies of occurrence of economically important plant nematodes in different region of Jalna district. Samples were collected from roots and soil from eighth places of Jalna district. The frequency of occurence and populations varied from place to place which is simply indicative of the fact that the studied area is highly infested with different varieties of nematode genus i.e. Hoplolaimus, Helicotylenchus, Mylonchulus, Longidorus, Xiphinema, Dorylaimus Acrobeles, Monohystera

KEYWORDS

Hoplolaimus, Jalna, sugarcane

RESEARCH PAPER

INTRODUCTION

Nematode is known to attack more than 3,000 separate host plants. In the vegetables crops 33 % loss in Bihar and 60% loss in Delhi. Reddy (1981) reported that *Meloidogyne incognita* caused 39.7 % loss in tomato yield at per –plant nematode population density of 20 larvae per gram of soil. Nematode overall damage is about one percent, but sometimes the damage is as high as 80%. Annual loss due to this nematode in north India is about 10,000 tons of wheat, costing 70 million rupees. The golden nematode of potato, *Globodera rostonchiensis* is a serious problem in Nilgiri Hills. About 2,800 hectares are infested by this nematode. The root- lesion nematode population is a serious pest of coffee in south India. About 1,000 hectares are infected by this nematode (P. P. Reddy et.al.1983).

The imbalance between the birth rate and death rate responsible for population changes, which is determined by the characteristics of the nematode and host plant and the environmental influences (M. R. Khan 2008).

The annual worldwide losses caused by nematodes on the life sustaining crops, which include all grains and legumes, banana, cassava, coconut, potato, sugar beet, sugarcane and sweet potato. Soil nematodes major pests of high valued agricultural crops are the phytonematodes which are highly diversified organisms exhibiting variations in distributing patterns. Damage depend upon pathogenic potential and population growth of nematodes, which are generally influenced by soil texture, crop cycle and anthropogenic factors (chir, chir, et.al. 2008).

The analysis of plant parasitic nematode associated with rhizosphere of chi pine nurseries and pine trees in natural forests of Himachal Pradesh by (Sapna Negi et.al.2009). Population dynamics of plant parasitic nematodes in chickpea- groundnut – cropping system by (S.M. Yadav et.al 2010). Biodiversity of plant parasitic nematode in tea nurseries by (C. Bhattacharya, 2013). Nematode population dynamics in the soil sown with okra in Nigeria by (Olabiyi, T.I. and Oladeji, O.O. 2014). Assessment of Nematode Distribution and Yield losses in vegetable crops by (Rajendra Singh, and Umesh Kumar 2015). Community structure of soil inhabiting nematodes in an apple orchard at Bandipore, Kashmir reported by (A. Rashid Mir S. Tanveer 2016). R. Surega and S. Ramakrishnan also studied comparison of nematode population and their seasonal fluctuation in turmeric crops Under Conventional and drip Irrigation methods.

MATERIALS AND METHODS

Sample collection

The present investigation was carried out on the occurrence of important plant parasitic nematodes associated with sugarcane crops during 2019- 2021. Nematode samples from 8 localities of around Jalna city were collected from around the roots of Sugarcane and soil up to the depth of 0-15 cm. The samples were mixed to make a composite sample. From the composite soil sample 250 gm of soil was taken or further processing.

Parasite collection

Extracting the nematodes by Cobb's sieving and decanting method (1918) followed by Bearmann's funnel technique (Schindler, 1961). Extracted sample was observed under stereoscopic binocular microscope for collection and Syracuse counting disc. 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. (Mai and Lyon,1975).

Calculation The absolute frequency, absolute density, relative frequency and prominence value were calculated by following Norton's formulae (Nortan, 1978).

$$\text{Absolute density} = \frac{\text{(no. of individual of a species)}}{\text{Volume of the sample}} \times 100$$

$$\text{Absolute frequency} = \frac{\text{(no. of samples containing species)}}{\text{no. of samples collected}} \times 100$$

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

$$\text{Prominence value (PV)} = \text{Density} \surd \text{absolute frequency} /100$$

RESULT AND DISCUSSION

During the investigation period, from June 2019 to May 2021, in Jalna district, 91 samples were collected from different eight sites of Sugarcane crops field in which 10 species of different eighth genera from five orders were collected.

The population dynamic study of plant parasitic nematode from eight sites of Jalna district such as follow:

1) Jalna
2) Ambad
3) Bhokardan
4) Badnapur
5) Ghansavangi
6) Partur
7) Mantha
8) Jafrabad

Observation table no. 1. shows mean population of plant parasitic nematodes around crops roots during June 2019 to May 2021, from different eight sites of Jalna district; the genus *Hoplolaimus* have highest population which is followed by

Helicotylenchus, Mylonchulus, Longidorus, Xiphinema, Dorylaimus Acrobeles, Monohystera.

The *Hoplolaimus* found in sugarcane have highest population value of 5908.84 and the genus *Monhystera* found in sugarcane has lowest population value i.e. 2132.08. Most of the soil sample contains 6 to 7 genera and some contain five genera. *Hoplolaimus* found in more soil sample but *Dorylaimus, Longidorus, Xiphinema,* found in very few soil samples.

The genus *Hoplolaimus* found in sugarcane has highest mean population (94.18) in month of November and lowest value in the month of May (18.89). *Helicotylenchus* found in sugarcane has highest value in January (74.66) and lowest value in month of May (12.08). The genus *Mylonchulus* found in sugarcane has a highest mean value in month of October (75.66) and low in the month of May (15.16). *Longidorus* found in sugarcane crops; the highest mean value in month of September (42.83) and low in month of May (12.16). *Xiphinema* found in sugarcane crops; the highest mean value observed in month of December (71.16) and lowest value in month of May (22.16). *Dorylaimus* occurred in sugarcane crops; the highest mean value in month of December (52.05) and lowest mean value of May (74.05). The *Acrobeles* found in sugarcane crops, the highest value shows in month of November (94.99) and lowest value in month of May (11.03). The last value from this order is genus *Monhystera* found in sugarcane crops, highest value shows (67.62) in the month of September and it shows lowest mean values (12.25) in the month of May. The last value from this order is genus

Observation table no. 2. Shows mean population of plant parasitic nematodes around crops roots during June 2019 to 2021, from different eight sites of Jalna District. The absolute frequency highest value shows in *Hoplolaimus* has (AF = 87.50%) and the *Helicotylenchus, Mylonchulus,* and *Acrobeles* found same values of absolute frequency such as (AF = 75%), then in the *Monhystera* has value of absolute frequency is (AF = 50%), Then the *Longidorus, Xiphinema,* has also same values is (37.50 %). Lastly the genus *Dorylaimus* has the lowest and same value of absolute frequency of (AF =25%).

The relative frequency of highest value observed in genus *Hoplolaimus* (RF = 11.34), and next with their values of relative frequency are *Helicotylenchus*, *Mylonchulus*, and *Acrobeles* has a same values of relative frequency is (RF = 10.90), in *Monhystera* relative frequency is (RF = 7.27), the *Longidorus*, and *Xiphinema* genus same relative frequency is (RF = 5.45), *Dorylaimus*, has the lowest and same value as (RF = 3.63).

The absolute density has highest value shows of *Hoplolaimus* (14.06). The lowest value shows in genus *Monhystera* is (4.44) respectively. In the *Helicotylencus* has absolute density shows, (AD = 9.10), in the *Mylonchulus* shows value of absolute density is (AD = 6.61), in the *Longidorus* shows values of absolute density is (AD = 2.41), in *Xiphinema* shows values of absolute density has (AD = 3.61), in the *Dorylaimus* values shows of absolute density is (AD = 1.67), in the *Acrobeles* value shows of absolute density is (AD = 859), in the *Monhystera* absolute density shows value has (AD = 4.44).

The prominence value of *Hoplolaimus* is highest (PV = 1.40). in the *Helicotylencus* shows prominence average value is (PV = 0. 78), the prominence lowest value shows in *Monhystera* is (PV = 031).

The present study in this investigation, more number of females of each genus was found but the males are found in few numbers. The same result is found to Tiasi, Jana et. al. (2010).

Table no. 1: - Mean population of plant parasitic nematodes (8 genera) around crop roots during the year June 2019 to May 2021. From eight different sites of Jalna District.

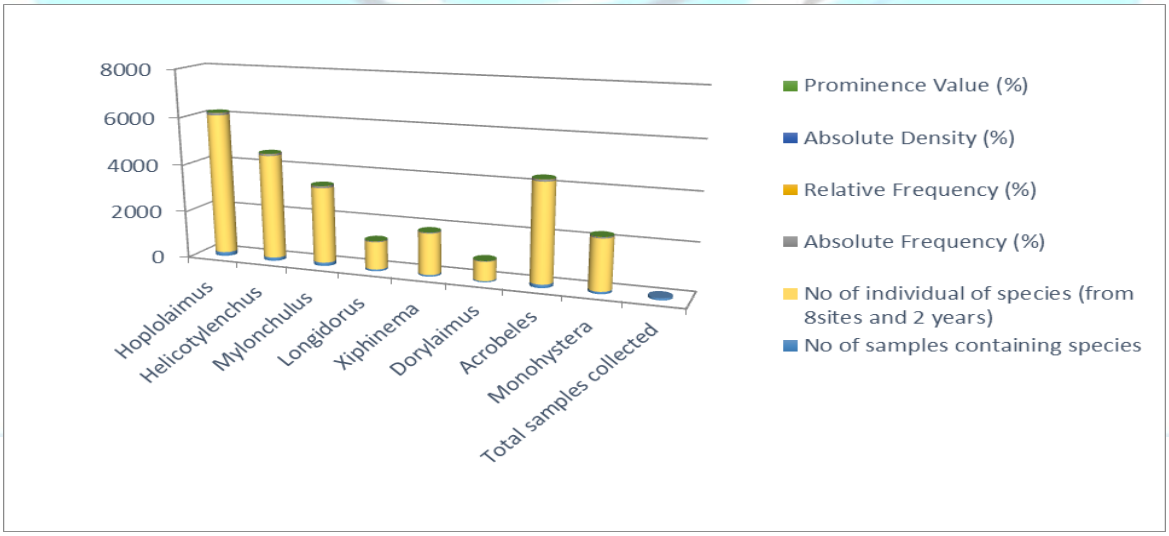
Order	Tylenchida		Monhysterida	Dorylaimida			Rhabditida	Monhysterida
Genus / Month	Hoplo.	Helico.	Mylo.	Longi.	Xiphi.	Dory.	Acro.	Mon.
Jun	75.62	71.16	23	42.33	45.66	33.75	30.67	47.28
Jul	76.56	54.91	35.75	33.66	29.16	25.00	36.99	47.12
Aug	81.37	57.99	39.91	37.33	42.33	28.5	41.83	64.87
Sep	93.87	62.74	64.08	42.83	51.99	50.75	41.74	67.62
Oct	92.05	67.24	75.66	29.41	69.99	31.25	77.91	66.5
Nov	94.18	71.16	58.46	40.83	34.66	43.25	94.99	45.00
Dec	86.93	69.99	46.33	33.99	71.16	52.05	92.00	33.75
Jan	61.25	74.66	48.83	24.33	69.33	38.00	94.33	26.05
Feb	62.99	70.33	43.24	31.49	62.16	40.05	75.49	34.05
Mar	57.36	63.05	56.16	30.33	47.33	25.05	54.16	33.87
Apr	42.06	52.83	23.00	28.33	30.33	25.00	36.49	53.76
May	18.89	12.08	15.16	12.16	22.16	9.25	11.03	12.25
Total mean	844.12	728.59	529.58	387.02	578.26	403.25	687.71	533.2
Found Site	7	6	6	3	3	2	6	4
Total Count	5908.84	4371.54	3177.48	1161.00	1734.78	806.05	4126.26	2132.08

Abbreviations: - Hoplo- *Hoplolaimus*, Helico- *Helicotylencus;* Mylo- *Mylonchulus;* Longi- *Longidorus*, Xiphi- *Xiphinema;* Dory- *Dorylaimus;* Acro – *Acrobeles* Mon- *Monhystera*.

Table no 2: - Population dynamics of plant parasitic nematodes around crops root of eight different sites from Jalna District during June 2019 to May 2021.

Plant parasitic Nematode	No of samples containing species	No of individual of species (from 8sites and 2 years)	Absolute Frequency (%)	Relative Frequency (%)	Absolute Density (%)	Prominence Value (%)
Hoplolaimus	168	5908.84	87.50	11.34	14.06	1.31
Helicotylenchus	144	4371.54	75.00	10.90	9.10	0.78
Mylonchulus	144	3177.48	75.00	10.90	6.61	0.57
Longidorus	72	1161.00	37.50	5.45	2.41	0.14
Xiphinema	72	1734.78	37.50	5.45	3.61	0.22
Dorylaimus	48	806.05	25.00	3.63	1.67	0.083
Acrobeles	144	4126.26	75.00	10.90	8.59	0.74
Monohystera	96	2132.08	50.00	7.27	4.44	0.31
Total samples collected	91					

Showing graph, the population dynamics of plant parasitic nematode around crop roots of eight different sites from Jalna District.



CONCLUSION

From the above observation, it is concluded that the various villages of Jalna have a heavy infection of various species of plant nematodes. Their occurrence may cause serious threats to affect the Sugarcane, Soybean, crops. Highest population observed the genus *Hoplolaimus* species in Sugarcane crops. Lowest population observed the genus *Monhystera* species in maize crops. As India is an agricultural country, there is need to check and control, growth of nematodes.

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