Plant Parasitic Nematodes Associated with Soybean (Glycine Max L.) Fields from Godavari Basin (M.S.) in Jalna District, India

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Abstract

Most soil dwelling nematodes are beneficial organisms that play a role in the break down and release of nutrients from organic matter. Some beneficial nematodes prey on other nematodes as well as soil-borne insect, fungal and bacterial pests. Unfortunately there are several species of nematodes that feed on or in roots, stems or bulbs resulting in significant yield reduction of crop production. When infested plants and roots die in the autumn, root lesion nematodes will move out of the roots into the soil. Present investigation deals with plant parasitic nematodes found in soybean field from Godavari Basin of Jalna District (M.S.) India during August 2010 to October 2010 and Aug 2011 to Oct. 2011. We observed two species belongs to two genera associated with soybean field. The recorded nematode species are Meloidogyne incognita and Rotylenchulus reniformis.

Keywords - *Soybean (Glycine Max), Godavari Basin, Meloidogyne & Rotylenchulus*

I. INTRODUCTION

Through the nematodes were known to us in ancient history, the scientific history of nematodes in India is too young. During the last 40 years in India, mainly because of increased demand of food, significant work has been done on survey and identification of plant and soil nematodes (Qaiser H. Baquri, 1999).

Plant and soil Nematodes or round worms are small, cylindrical, non segmented worms. They are only 50 microns in diameter and about 1mm long or less. They have a resistant cuticle (skin) and an ability to adapt well to environmental change which has enabled them to become the most abundant multicellular animals on earth, 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. Nematodes are an important consumer group in the decomposer subsystem of many ecosystems.

They constitute one of the most numerically important components of the soil fauna (Warwick et al 2002) thus it significantly in diverse ecosystems. Moreover, nematode populations can respond in predictable ways to ecosystem disturbance (Freckman D.W. and Ettema C.H. 1993). Therefore, nematode community composition can be used as sensitive indicators of ecosystem change (Bongers T. 1990). For example, nematode physiochemical conditions such as temperature, moisture content (Pen-Mouratov et al 2004**)** and organic matter (Yeates and Coleman 1982).

Plant parasitic nematodes possess a hollow stylet, mouth part which is like a hypodermic syringe. The stylet is forced into plant cells and enzymes are injected to decompose the cell content. The nematode withdraws the partially digested cell contents through the stylet. Some nematodes such as the root knot and the cyst nematodes establish a specialized feeding site where they remain for the rest of their life cycle. Other nematodes such as the root lesion nematode burrow into the root, feeding and causing damage as they move through the root.

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II. MATERIALS and METHODS

A. *Study Area*

The Godavari Basin of Marathwada (Maharashtra, India) is popular for cultivation of soybean, sugarcane and cotton. We have selected Jalna District from this basin for our study (Figure 1). This district is near to Jayakwadi (Paithan Reservoir) and popular for well irrigated agriculture system. From Jalna Districts 12 spots are selected i.e. Sastha Pimpalgaon, Balegaon, Apegaon, Hasnapur, Ganesh Nagar, Sadegaon, Ogladevi, Ramasgaon, Banegaon, Bhoggaon, Mangrul and Golegaon for our study as shown in Table 1. The actual site selected for the present study is Jalna district geographically lies between N=19°23'58.8" latitude and E= 075°47'20.0"longitude.

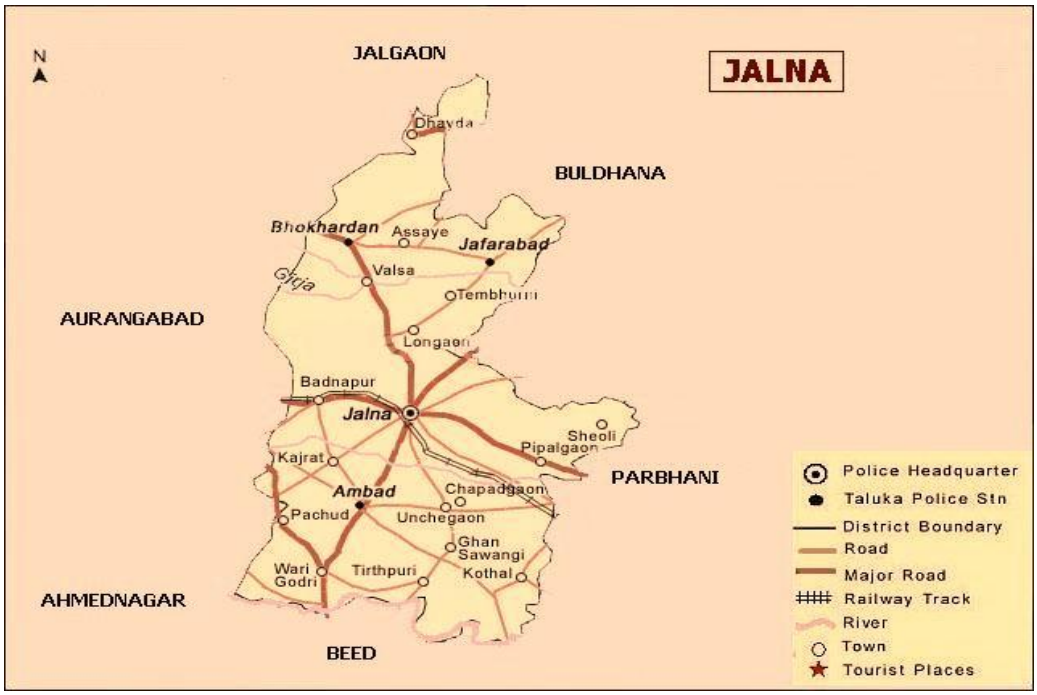

Fig 1: Map showing Godavari Basin of Jalna district from which soil samples Collected for Nematode extraction

TABLE 1: GPS location of study area

Sr. No.	Location	N (North)	E (East)
1	Sastha Pimpalgaon	19°23'02.3"	075°38'27.7"
2	Balegaon	19°23'17.5"	075°36'54.0"
3	Apegaon	19°23'01.3"	075°38'27.8"
4	Hasnapur	19°23'58.8"	075°.48'43.8"
5	Ganesh Nagar	19°23'57.8"	075°47'42.7"
6	Sadegaon	19°24'02.4"	075°52'27.0"
7	Jogladevi	19°23'40.2"	075°54'05.7"
8	Ramasgaon	19°22'39.2"	075°50'04.7"
9	Banegaon	19°21'11.8"	075°54'19.7"
10	Bhoggaon	19°20'43.2"	075°54'13.4"
11	Mangrul	19°18'23.6"	075°57'52.0"
12	Golegaon	19°17'22.8"	076°09'44.2"

B. *Nematode extraction*

Nematodes were extracted from the samples using the Baerman Funnel technique (Southey, 1970). From each collection site 500g soil samples were collected with a hand shovel from the top 10cm soil profile within an area of about 1x1 meter square. These soil samples were sealed in polythene bags and transported to the Laboratory for processing and extraction of nematodes. Root-knot nematodes were extracted from the galls present on the roots and species identification was based on perineal pattern morphology. Nematodes were identified to

taxonomic family and genus according to Goodey (1963); Andrassy (1968, 1979, 1980, 1984), Maggenti (1983, 1991); Bongers (1987); Maggenti et al. (1987), Nickle (1991); Hunt (1993). Taxonomic families were assigned a trophic grouping based on Yeates et al. (1993). Other nematode species were also identified and their numbers recorded using a binocular microscope. For isolation of nematodes "Galleria trap" method was used (Bedding and Akhurst, 1975)

III. RESULTS and DISCUSSION

The present study carried out during two years i.e. August 2009 to October 2009 and Aug 2010 to Oct. 2010. The objective of this work is to present scenario of parasitic nematode diversity and distribution in soybean field of Godavari basin of Jalna District to understand the role of its effect on soybean yield. When we go through this study we find out two species belongs to two genera i.e. *Meloidogyne* and *Rotylenchulus*. The species observed in these fields are *M. incognita* and *Rotylenchulus renirormis* (Table 2).

TABLE 2: Nematode Species Found from Locations of Jalna District During Aug 2010 to October 2010 and Aug 2011 to Oct. 2011.

Sr. No.	Genera	Species	Locations											
			S. Pimpalgaon	Balegaon	Apegaon	Hasnapur	Ganesh Nagar	Sadegaon	Jogladevi	Ramasgaon	Banegaon	Bhoggaon	Mangrul	Golegaon
1	Meloidogyne	*Incognita*	√	√	√	√	√	√	√	√	√	√	√	√
2	Rotylenchulus	*reniformis*	√	√	√	√	√	√	√	√	√	√	√	√

Basically M. incognita is common and dominant species in this area and it is widely distributed. Various workers stated that this species loss soybean yield globally (A. Wrather & G. Ahannon, 2010) but they commit analysis actually loss of soybean yield during their study period. The mentioned only yield losses to soybean cyst nematode have increased during last few years in Argentina and central region of Brazil (A. Wrather & G. Ahannon, 2010).
In India not yet strongly prepared about yield loss due to cyst and root knot nematode. Our study reveals only in relation to distribution of cyst and root knot nematode in soybean field. India not reported yield loss due to nematode.

Objective of this work is to understand nematode diversity and distribution from Godavari basin of Jalna district during August 2009 to October 2009 and Aug 2010 to Oct. 2010. It is very useful in nematode control management strategies which present the loss of soybean yield. It is also provide local solution for global problem means helps to research and scientist.

IV. CONCLUSION

To control nematode population use of various control methods like crop rotation, nematicide, biological control etc. To find out problem for that observation is necessary. Farmer's turns to soybean crop from cotton hence need to monitor of nematode and other micro fauna for great yield or prevent crop loss.

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