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EXTRACTION, IDENTIFICATION & DIVERSITY OF MICROSCOPIC NEMATODES IN TOMATO GROWN IN AGRICULTURAL AREA OF SANGANER TEHSIL, JAIPUR (RAJASTHAN)

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Abstract:

Nematodes are a very common place organism determined in agricultural soil. Root-knot nematodes are well known as dangerous sedentary obligate parasites of vegetable across the world. Root knot nematodes are taken into consideration as one of the maximums economically destructive of plant parasitic nematodes of tomato. The survey, extraction and observation of root-knot sickness on tomato in 10 localities in and around the Sanganer Tehsils, Jaipur (Rajasthan), showed that the crops of tomato in all the 10 localities had been infected with root-knot nematodes. The highest frequency (90%) discovered in Muhana location, followed by Neota and Vatika localities. In both the localities the frequency turned into 80%. In Abhaypura and Balawala and Ratalya regions the frequency of the disorder was 60% and 70% respectively. The frequency in Mahapura and Panwaliya region has 50%. The lowest frequency (40%) observed in Mohanpura and Bagru khurd regions. Both gall index and egg mass index (average) ranged between 2-5, 3 and 4. The finest egg mass and gall indicates (5 each) became determined in Muhana place. The gall and egg masses indices have been 4 in almost areas. Meloidogyne incognita and M. Javanica have been recognized to contaminate tomato in different regions.

Keywords: Nematodes, Root-knot, Tomato, Vegetables, Jaipur (Rajasthan)

INTRODUCTION:

Nematodes of the family *Meloidogyne* (root tie nematodes) have a wide scope of hosts and extremely dangerous irritations (Mokrini and Sbaghi, 2017). Nematodes can seriously harm developing plants, incorporating those in the sweltering climate territories of Africa. *Meloidogyne* spp. is the significant vermin of the tomatoes *(Lycopersicon lycopersicum)* and they decrease the yields. (Adesiyan et al. 1990,) during his investigation detailed 28% to 68%. Lessens in tomato yield due to *Meloidogyne* spp. Tomato pervaded by M. incognita can prompt yield misfortune up to 80% (Nagachandrabose and Baidoo, 2017). Their short life pattern of *Meloidogyne* spp. have six to about two months empowers them to endure well within the sight of an appropriate host and their populaces develop to a most extreme ordinarily as harvests arrive at development (Shurtleff and Averre, 2000). Nearness of nematodes in different harvests and vegetables additionally revealed in certain regions of Rajasthan which causes decrease in yield (S.S. AIF and S.B. Sharma, 2003). The root-tie nematode is known to assault in excess of 3000 types of host plants.

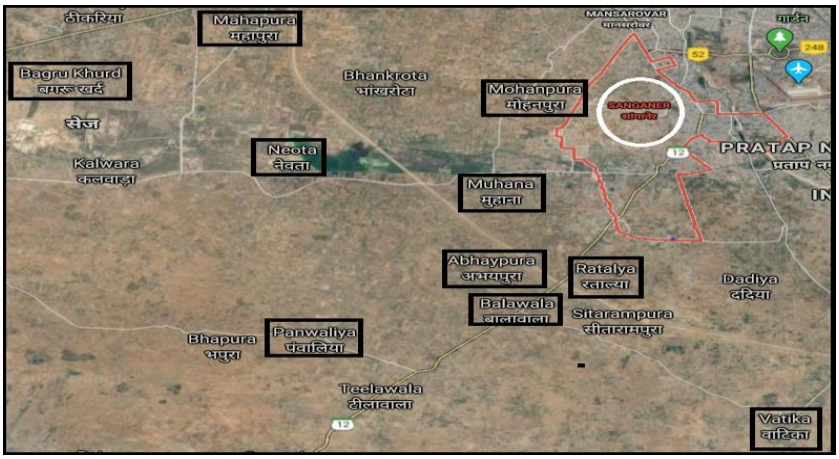
The root-hitch nematode produce nerves on the underlying foundations of numerous vegetable harvests in this way causing extreme misfortunes. Misfortunes brought about by root-tie nematode are evaluated to be 33.68% in brinjal, 28.08% in okra, and 43.48% in French bean, 28.60% in cowpea, 20.00% in peas and 10-15% in stew (Reddy and Singh, 1981). Different hereditary examinations show the relationship of the Nematodes with different vegetables announced by (Davis, E.L., et.al. 2008). Jaipur has two most important crop seasons- Rabi and Kharif: The Rabi crops are winter crops and are sown in October and November and are harvested in March and April. The main Rabi plants are Barley, Wheat, Gram, Pulses, and Oil Seeds. The foremost oilseeds are Rape and Mustard. The Kharif vegetation is the vegetation that is grown within the summer season and is seeded in June and July. These plants are harvested in September and October and include Bajra, Pulses, Jowar, Maize, and Ground Nuts. The regions that are particularly irrigated or acquire plentiful water supply are utilized for the cultivation of improved excessive-yielding styles of rice. Some locations of Rajasthan that has black soil nurture the increase of fundamental cash plants like Cotton. In some regions, Tobacco is likewise grown. Apart from this crop, a collection of fruits and vegetables are also grown in Rajasthan in the local gardens and some fertile regions. We have led reviews of vegetable fields pervaded by root-knot nematodes on Tomato crops from different localities of Sanganer Tehsil of Jaipur, Rajasthan. In this paper we are introducing the consequences of the study led in editing period of tomato crops in Sanganer Tehsil of Jaipur Region, Rajasthan. In our examination we have analyzed in excess of 100 root tests to look at the nematode pervasiveness in a specific zone. The motivation behind this examination was to appraise the dispersion of root-knot nematodes and their frequency on Tomato crops in the area.

DESCRIPTION OF THE AREAS OF STUDY

Rajasthan is the largest state of India’s situated in the northwest part of the country. Rajasthan is comprised of arid and semi-arid conditions. Jaipur has lots of agricultural lands and the farmers use to cultivate both Rabi and Kharif. It lies between 23°30’ to 30°11’ north latitude and 69°29’ to 78°17’ east longitude. Jaipur is the capital of Rajasthan and it is famous as the “Pink City”. Jaipur is located on 26°55’N latitude and 75°49’E longitude. A significant portion of the economy of Rajasthan is agrarian. The agricultural sector of the state accounts for 22.5 percent. The arid state which gets now not more than an annual income of 25 % thrives on agriculture this is done with irrigation systems and painstaking efforts of farmers of Rajasthan. As a major portion of the state is parched and infertile, agriculture becomes very difficult it falls in the following geographical co ordinates: Latitude - 26° 49' 0" North Longitude is 75° 47' 0" East. Sanganer Tehsil is bounded by Jaipur Tehsil towards North, Jhotwara Tehsil towards North, Amber Tehsil towards North, and Bassi Tehsil towards East. Jaipur City, Niwai City, Phulera City, Sambhar City are the nearby Cities to Sanganer. It is in the 383 m elevation (altitude). It has a hot semi-arid climate (Bush) under Koppen's climate classification. It receives over 63 cm of rainfall annually, but most rains occur within the monsoon months between June and September. Temperatures continue to be relatively high during summer from April to early July having average everyday temperatures of around 27.6' C (82' F). The iciness months of November to February are moderate and pleasant, with average temperatures ranging from 18' C (64' F) and with high humidity, however with occasional bloodless waves. Sanganer is a tremendously rural and small part is urban. The areas selected for the study is agricultural areas of this region.

A systematic survey was completed to find out dependable estimate of tomato crops infested with root knot nematode in excessive vegetable growing vicinity of **Neota, Muhana,**

Abhaypura, Ratalya, Vatika, Balawala, Mahapura, Panwaliya, Mohanpura and **Bagru khurd** of Sanganer Tehsil **Jaipur** district **(Rajasthan).**



Map showing the Sampling Location of Sanganer Tehsil of Jaipur –District, Rajasthan (India)

MATERIALS AND METHODS:

A systematic survey was completed to find out a dependable estimate of tomato subject infested with root-knot nematode in excessive vegetable growing vicinity of Neota, Muhana, Abhaypura, Ratalya, Vatika, Balawala, Mahapura, Panwaliya, Mohanpura and Bagru khurd of Jaipur district (Rajasthan).

Field Sampling:

A study was carried out in different localities in and around Sanganer Tehsil_ Jaipur to evaluate the incidence of root-knot sickness on tomato crops. During the survey of tomato fields in every locality samples of the roots of the vegetation were amassed randomly. Root samples saved in polythene bags and properly labeled have been introduced to the laboratory and carefully tested for the presence of galls. Numbers of galls consistent with root machine, if present, were counted.

Root Sampling:

Roots had been washed clean and were then immersed in an aqueous answer of phlox in B (0.15 g/lit) for 15 mins and then washed with faucet water to stain egg masses. The number of eggs loads according to root-machine changed into then counted. Gall index (GI) and egg mass index (EMI) were determined on the subsequent scale: 0=0, 1=1-2, 2=3-10, 3=11-30, 4= 31-a hundred and 5=more than one hundred galls or egg hundreds in step with root device (Taylor and Sasser, 1978).

The frequency of occurrence (percentage) of the ailment in each locality changed into calculated by the following formula…….

Frequency of occurrence = Number of fields with root-knot nematode infection×100

Number of fields surveyed

Maintenance of inoculum:

The inoculum of a few selected filed populations from every locality became maintained on tomato cv. Pusa Ruby in a greenhouse by inoculating seedling in pots containing autoclaved soils with chopped inflamed root collected from the field. The inoculum was similarly cultured in pure form on tomato roots as follows.

Pure culturing

To make pure subculture of filed population maintained on tomato in the greenhouse, unmarried egg mass inoculation changed into made. Single mature egg mass turned into inoculated in pots across the root of younger tomato seedling for every maintained collection separately. Sub culturing becomes achieved via inoculating new tomato seedling with at least 15 egg masses, every acquired from pure subculture if you want to maintain enough inoculum for similar studies.

Identification of species:

Identification of the species of *Meloidogyne* accumulated from each locality and also maintained in the greenhouse was carried out via applying the perineal pattern method (Eisenback et al., 1981). Mature females were dissected out from large galls at the roots of tomato plants. Perineal styles slide (10-20) from each sample or locality had been organized and examined beneath the microscope to have a look at their characteristics. The species have been recognized based on perineal pattern characteristics (Eisenback et al., 1981).

RESULT AND DISCUSSIONS:

Incidence of root-knot on Tomato

The survey conducted to assess the incidence of root-knot sickness on tomato in 10 localities in and around Sanganer Tehsil- Jaipur (Table-1) confirmed that the plants of tomato in all the 10 localities have been inflamed with root-knot nematodes. Therefore, the normal incidence of the disorder became 100%. Locality –sensible variations inside the incidence of the disease were, however, observed. The highest frequency (90%) changed into discovered in the Muhana area, closely followed utilizing Neota and Vatika localities. In both the localities the frequency was 80%. In Abhaypura, Balawala, and Ratalya regions, the Frequency of the disease became 60% and 70% respectively. The frequency in Mahapura and Panwaliya location became 50%. The lowest frequency (40%) curved into located in Mohanpura and Bagru khurd regions (Table1). The depth of the ailment on tomato in those localities based totally on common gall and egg mass indicate was high in popularity. Area-wise versions had been, however, noticed. Both gall index and egg mass index (common) ranged among 2-five through 3 and four. The finest egg mass and

gall indicate (5 each) become found in Muhana location, the vicinity in which the incidence became also greatest. The gall and egg loads indices had been 4 in Neota, Abhaypura, Vatika, and Mahapura and Panwaliya areas. In Ratalya and college Farm regions, the indices were 3 each. The lowest includes (2 each) were noticed for Mohanpura and Bagru khurd place (Table1). Thus, the intensity of the disease on tomato turned into a maximum in Muhana carefully accompanied by using Neota, Balawala, Abhaypura, and Mahapura regions in descending order. In the other 3 localities (Ratalya, Mohanpura, and Bagru khurd) the intensity of the disease becomes comparatively low, (Table1).

Identification of the species:

Based on perineal pattern characteristics, *Meloidogyne incognita* and *M. Javanica,* the two species of root-knot nematodes have been recognized to contaminate tomato in different regions included within the study. The species have been both located singly or in combined populations. Out of the two, *M. Javanica* changed into extra frequent. It turned into observed in 9 localities out of 10 both singly or in concomitantly with *M. Incognita.* In four areas (Ratalya, Vatika, and Mahapura and Mohanpura) it turned into encountered alone however in the other four regions it turned into a gift together with *M. Incognita*. It turned into the present in all the localities except Abhaypura location. On the opposite hand, *M. Incognita* becomes a gift alone only in one region (Bagru), in the other 4 areas it was encountered in combined populations with *M. Javanica*. It changed into no longer encountered in Ratalya, Vatika, and Balawala regions (Table2).

The survey conducted in a few localities in Jaipur to evaluate the prevalence of root-knot disease on tomato confirmed that disorder turned into pretty frequent because it became located in all the localities included inside the survey. The occurrence in general changed into high. Similarly, the intensity of the sickness became also high. Tomato cultivation within the place is suffering due to this sickness as a maximum of the fields grown with tomato within the region is infested with root-knot nematodes. These results are according to the observations made in unique parts of the world (Sasser, 1979). A comparable survey conducted utilizing Khan et al. (1984) additionally indicated that tomato is the most affected crop and suffers the maximum amongst vegetables grown in area, because of root-knot nematodes. The gift findings affirm their consequences. Severe stunting and extensive root galling were determined on tomato rootstock resistant to *Meloidogyne incognita*, *M. Javanica,* and *M. Arenaria* in northern Switzerland. Examination of the roots of infected vegetation revealed the presence of root-knot nematodes in big numbers. All techniques of identification were regular with *M. Enterolobii*. The species *M. Enterolobii* is of tremendous significance because it could reproduce on resistant tobacco, pepper, watermelon, and tomato. This is the first file of M. Enterolobii in Switzerland (Kiewnick et al., 2008). The identification of the species showed that *M. Javanica* and *M. Incognita* are the species, in particular, causing the disease within the place. *M. Javanica* is outwardly dominant. Mixed populations of each species in tomato fields are also common. These observations affirm the result of Khan et al. (1984) and Khan and Khan (1985), who determined the commonplace occurrence of those species with the dominance of *M. Javanica* and their combined population within the place. It, besides endorses the view of Khan et al. (1984) that *M. Incognita* is not most effective the species infecting plants in this region as believed for a long time due to loss of pursuance of studies to set up the identification of *Meloidogyne* species occurring within the area. Southern root-knot nematode (*Meloidogyne incognita)* is the largest and important. This

pathogen, not the handiest causes root galling however also increases the severity of Fusarium wilt. The present findings further affirm this contention. *M. Incognita* and *M. Javanica* are also the most frequently encountered species even on the world-extensive basis (Sasser, 1979).

Table 1: Frequency circulations of root-knot nematodes in different areas in and around Sanganer_ Tehsil Jaipur.

S. No.	Areas	Total No. Of field surveyed	No. of field with infection	Frequency (%)	GI 1/EMI 2 (Average)
1	**Neota**	10	8	80	4/4
2	**Muhana**	10	9	90	5/5
3	**Abhaypura**	10	6	60	4/4
4	**Ratalya**	10	7	70	3/3
5	**Vatika**	10	8	80	4/4
6	**Balawala**	10	7	70	3/3
7	**Mahapura**	10	5	50	4/4
8	**Panwaliya**	10	5	50	4/4
9	**Mohanpura**	10	4	40	2/2
10	**Bagru khurd**	10	4	40	3/3

Fig 1. Graph represented frequency circulations of root-knot nematodes in different areas in and around Sanganer-Tehsil Jaipur.

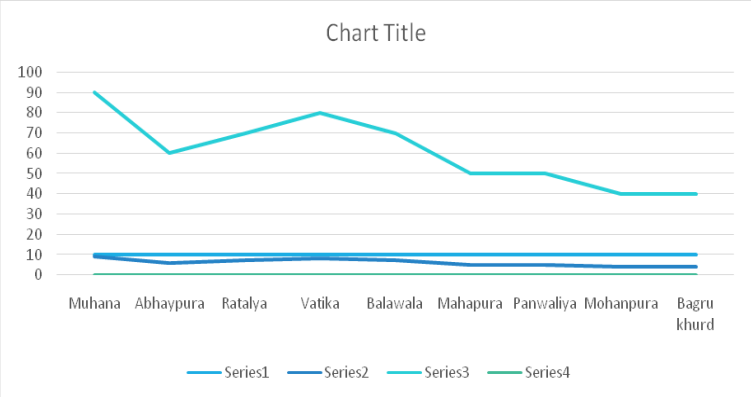
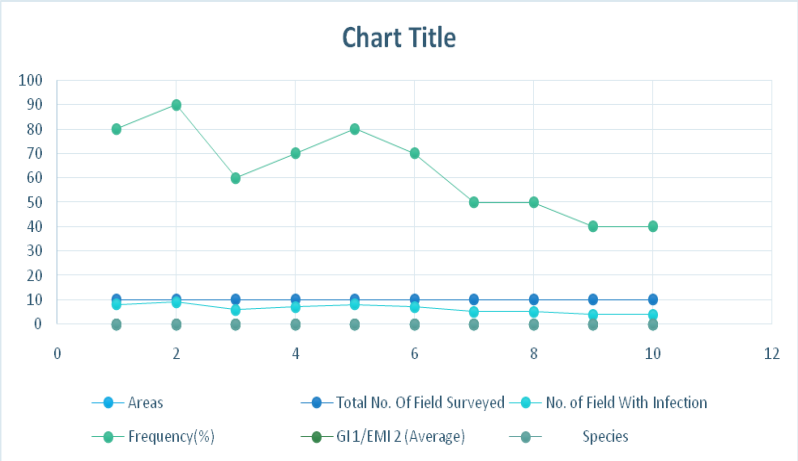


Table 2: Identification of *Meloidogyne* species infecting tomato in different areas in and around Sanganer-Tehsil Jaipur.

Areas	Total No. Of field surveyed	No. of field with infection	Frequency (%)	GI 1/EMI 2 (Average)	Species
Neota	10	8	80	4/4	*M. incognita, M. javanica*
Muhana	10	9	90	5/5	*M. incognita, M. javanica*
Abhaypura	10	6	60	4/4	*M. incognita*
Ratalya	10	7	70	3/3	*M. javanica*
Vatika	10	8	80	4/4	*M. javanica*
Balawala	10	7	70	3/3	*M. javanica*
Mahapura	10	5	50	4/4	*M. incognita, M. javanica*
Panwaliya	10	5	50	4/4	*M. incognita*
Mohanpura	10	4	40	2/2	*M. incognita, M. javanica*
Bagru khurd	10	4	40	3/3	*M. incognita, M. javanica*

Fig 2: Graph represented identification of *Meloidogyne* species infecting tomato in different areas in and around Sanganer_ Tehsil Jaipur 1.



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