

Distribution And Identification Of Root Knot Nematode Species In Bottle Gourd Cultivers.In Different Villages Of Barshi Tehsils In Solapur District, Maharashtra, India

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Abstract

The present investigation was conducted to assess the investigation of root-knot nematode disease on bottle gourd in 10 area which were infected with *Meloidogyne incognita*. The highest frequency was found in Pathri village (90%) followed by Pangri village and Balewadi village. The incidence was 80% in both the areas, the incidence was 70% and 60% in Alipur village and Mungashi and Babhulgaon village respectively. The frequency in Gadegaon villages area was 50%. The lowest frequency 40% was found in Saundare and Khandavi villages.

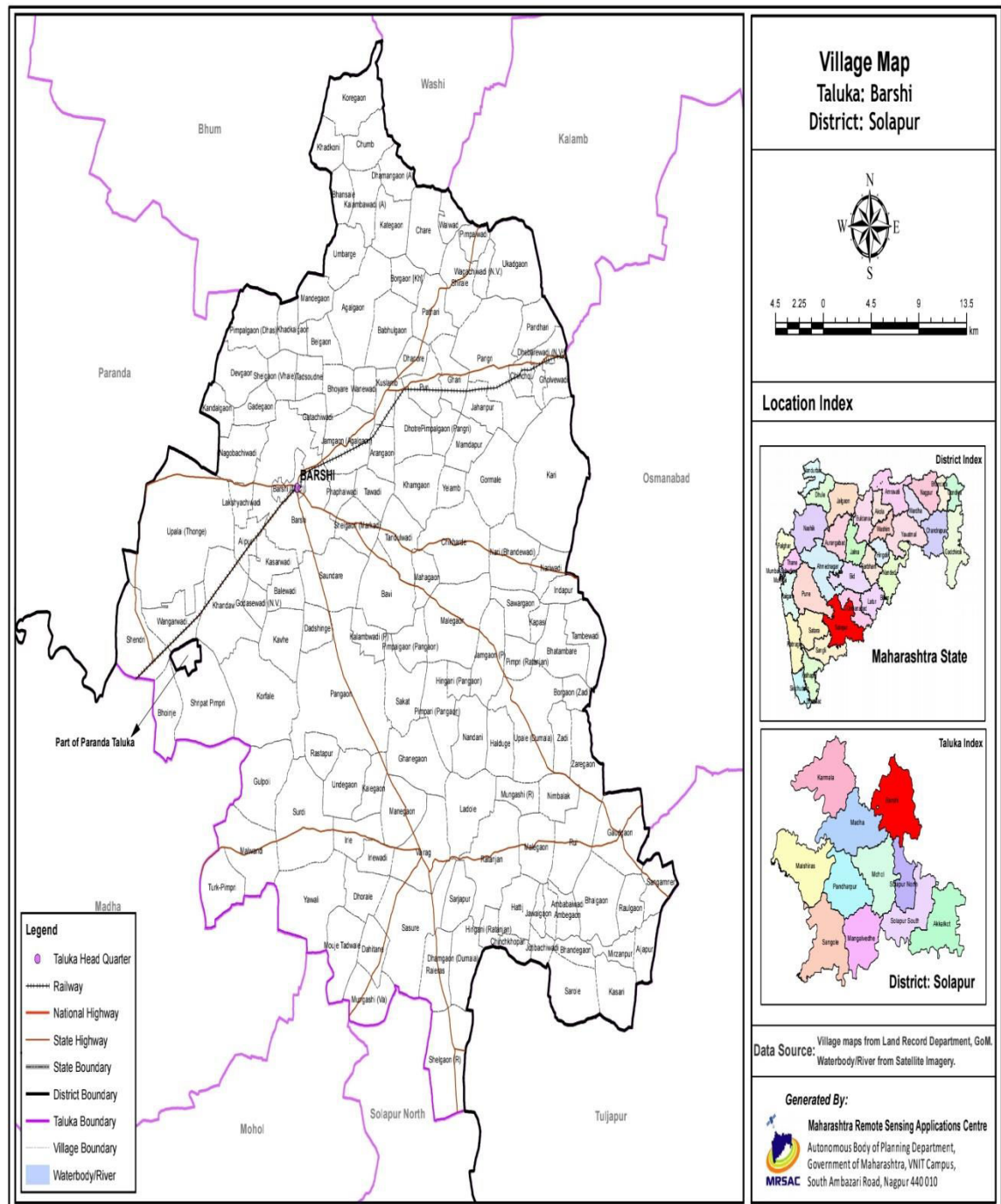
The average both gall index and egg masses index is ranged between 2-5 and 3 and 4. The largest eggmass and gall indicates 5 each was found in Pathri villages, the area where these incidence was most prevalent. The gall & eggmasses indices were 4 in Balewadi, Pangri & Alipur villages. In Babhulgaon, Mungashi, Surdi, and Gadegaon villages farm areas the indices were 3 each. The lowest incidences 2 each were noticed for Saundare and Khandavi villages. Thus the intensity of the disease on bottle gourd was highest in Pathri village closely followed by Pangri, Balewadi, Alipur, Babhulgaon, Mungashi, Gadegaon and Surdi villages farm area on the other hand, the incidence of the disease was relatively low in the fields of Saundare and Khandavi villages.

Meloidogyne incognita were identified to infect bottle gourd in different areas. The many species were either found alone or in mixed population of *M.incognita* and *M.javanica*.

Keywords : Barshi, Solapur, Bottle gourd, *M. incognita*, *M.javanica*, Root-knot nematodes.

Introduction

Solapur district is the third largest district in the state of Maharashtra. The district with 11 talukas is spread over 1501 thousand hectares. Solapur district occupies 4.83 % of the area and contains 4.10% of the population of the state of Maharashtra. The most extreme and least temperatures of the district are 40.1 °C and 16.1°C respectively. The geographical premise of the soil equally dominant in Solapur district is mainly from the deccan trap volcanic eruption, namely, the basalt. soil generally contains less than total nitrogen in available phosphorus & more in available potash. Geographical location of Solapur district is 17.10°N to 18.32 °E to 76.42 E, 1485 Km.



Village Map Talukas- Barshi, District - Solapur

Source- village maps from Land record Department, GoM. water body/Rives from Satellite Imagery,

Bottle gourd it belong to the family cucurbitaceae which are the most popular vegetable crops grown throughout the world for Consumption in various form. In India major and minor bottle gourd are grown, cucurbitaceae crops occupy strong position as vegetable crops in Indian agriculture, these crops require warm weather and for their growth and development in humid weather most bottle gourd are more prone to nematode diseases. Infected plants show stunted and dry leaves, which affects plant growth as well

as yield. Damage caused by nematodes can reach up to 100% i.e complete crop failure (Gupta, 1986). The crop injures these nematode scots and provides entry for other pathogens. *Meloidogyne* is a highly polyphagous and is one of the most skilled plant parasitic nematodes (Dropkin, 1980). *Meloidogyne* spp are the most broadly distributed and financially destructive to plant parasitic nematode in the tropics and Sub tropics. About 2000 Plants worldwide are infected by root knot nematodes and they cause 5% loss of crops globally (Sasser, 1979). The severity of nematode infection varies with the degree and variety of plants parasitized (Dropkin, 1989). A survey to assess the incidence of root knot disease in Aligarh and its 8 surrounding areas. The disease on tomatoes showed that the crops were affected by the nematode of tomato root nematodes in all 8 areas (Esfahani, 2001).

Nematode infections in Sponge gourd (*Luffa aegyptica*), muskmelon (*Cucumis melo*), Bottle gourd (*Lagenaria siceraria*) watermelon (*Citrullus vulgaris*) and Bitter gourd (*Momordica charantia*) among the 23 vegetable crops at Ludhiana recorded nematode infections (Ahuja and Mukhopadhaya 1985) yield losses caused by root-knot nematode, *M.incognita* were assessed in gherkin fields in Kolar & Bagepalli, Karnataka, India. Root-knot nematode occurrence and severity were high at both areas. The root- knot index went from 3.2 -4.5 on a scale 0-5 in which the number of egg mass ranges from 69 - 89 root per gram (Nagesh et al., 2005). The *Meloidogyne incognita* (nematode) was isolated from the plants roots of *Capsicum annum* L., paprika from a greenhouse in Portoroz at the Adriatic coast, Slovenia. In the open field *Meloidogyne hapla* was first observed in Slovenia in the open field. It was isolated from galls of the sweet pepper cultivated in the open field in Ljubljana (Širca et al., 2004).

Root- knot incidence and severity a conducted a survey to assess, root- knot disease on crops in 21 districts, especially rice and vegetable crops was reported by a large production center in Uttar Pradesh (India) Represents based on the events, the population density on the affected crops and the associated damage, the *Meloidogyne* species were considered to be the most important of parasites locally. The increasing incidence of this nematode and its damage has been attributed to tomato, rice, eggplant, okra, cowpea, cucumber, onion, pumpkin and bitter gourd grown in northern India. Numerous crops, including rice, tomato, okra, cowpeas, onions pumpkins, eggplants and bitter gourds are suffering root decay of reduce root system (Anamika et al., 2011).

In the present study attempts have been made to investigate root- knot nematode problem of bottle gourd in and around Barshi talukas in Solapur district by assessing incidence and intensity of the disease.

Materials and methods

Survey

A survey was carried out in the areas around Barshi Tehsil in areas where bottle gourd species are grown to assess the incidence of root knot disease. Symptoms of stunting and yellowing in the plant were randomly collected during the survey. Samples of five to ten roots were kept in polythene bags and with proper labeling the village name, soil type, field number etc. were recorded and the samples were brought to the laboratory and thoroughly examined for the presence of galls .The number of galls per root system, if any, was counted. The number of egg masses per root system was then calculated. The gall index (GI) and egg mass index (EMI) were determined on the following scale (Taylor and Sasser, 1978).

Root-knot index

0	No galls per root system
1	1-2 galls per root system
2	3-10 galls per root system
3	11-30 galls per root system
4	31-100 galls per root system
5	More than 100 galls per root system

The frequency was calculated from the following formula.

$$\text{Frequency of Occurrence} = \frac{\text{Number of fields with root-knot nematode infection}}{\text{Number of fields surveyed}} \times 100$$

Preparation of inoculum

Samples of nematode infected bottle gourd were obtained from different villages in Barshi tehsils. The inoculum was prepared in pure form on bottle gourd roots as follows

Pure Culturing

Make pure culture of field population, maintained on bottle gourd in greenhouse single egg mass was inoculated around the root of the young bottle gourd seedlings in pots. Sub-culturing was done by separately inoculating new bottle gourd seedling with at least 20 egg masses, each obtained from pure culture in order to maintain sufficient inoculum for further studies.

Identification of the species

Species identification of *Meloidogyne* species was collected from each area and also applied in the greenhouse using the perennial pattern method (Eisenback et al., 1981). Adult female dissected from large galls on the roots of bottle gourd plants. Perineal pattern slides (10-20) were prepared from each sample area and examined under a microscope to study their characteristics. Species were identified based on the characteristics of the perennial pattern (Eisenback et al., 1991)

Results and Discussion

The survey conducted assess incidence disease on bottle gourd 10 localities and around Barshi tehsils (Table-1) showed that the crops bottle gourd all the localities were infected with root- knot nematodes. Therefore overall incidence of the disease was 100 percent.

Area wise variations in the incidence of the disease root were, however, found. Highest frequency 90% was found in Pathri village, closely followed by Balewadi and Pangri villages. In both villages the frequency was 80 %. In Alipur village and Babhulgaon and Mungashi villages the frequency of the nematode disease was 70% and

60% respectively. The frequency in Gadegaon and Surdi villages area was 50%. The lowest frequency 40% was found in Saundare and Khandavi village (Table 1).

The intensity of the disease on bottle gourd in these area based on average gall and egg mass indicate was high in general. Area wise variations were, however, noticed. Both gall index and egg mass index (average) ranged between 2-5 through 3 & 4. The greatest egg mass and gall indicates 5 each was found in Pathri villages, the area in which the incidence was also greatest. The gall and egg masses indices were 4 in Balewadi, Pangri, & Alipur villages. In Babhulgaon, Mungashi, Surdi and Gadegaon villages farm areas the indices were 3 each. The lowest incidences 2 each were noticed for Saundare and Khandvi villages (Table 1). Thus the intensity of the nematode disease on bottle gourd was highest in Pathri villages closely followed by Pangri, Balewadi, Alipur, Babhulgaon, Mungashi, Gadegaon and Surdi villages farm area in descending order. In other hand two areas Saundare and Khandavi villages farm in the intensity of the disease was comparatively low (Table 1).

Identification of the species :

Characteristics of perennial Patterns based on the *Meloidogyne incognita* and *Meloidogyne javanica*, two species of root knot nematodes were identified in different villages surveyed. These species were found either alone or in mixed populations. It was found in 9 out of 10 areas either alone or in association with *M. javanica*. It was encountered alone in five areas, Gadegaon, Alipur, Pathri, Surdi and Khandvi, but in the other five villages it was present along with *Meloidogyne javanica*. It was present in all the villages except the villages. On the other hand, *M. javanica* was present in only one area in Gadegaon village alone, the other five areas encountered mixed population with *M. incognita*. It was not encountered in Alipur, Pathri, Surdi and Khandvi villages (Table 2).

In some villages of Barshi tehsil, a survey conducted on the incidence of root-knot nematode disease on bottle gourd shows that the disease is quite prevalent as it was observed in all the villages included in the survey. Incidents were usually higher. Similarly, the severity of the disease was also high. Apparently, the disease is affecting bottle gourd cultivation in the area as most of the fields grown with bottle gourd in rural areas are affected by root-knot nematodes. These results are based on observations made in different parts of the world (Sasser, 1979). In the early spring of 2006, cucumber plants grown in greenhouses on Zeta Plain, Zetska, ravnica, Montenegro were found to have severe plant stunting, chlorosis and widespread root galling. The most common species was *M. incognita*, isolated from the roots of tomatoes, peppers, cucumbers and lettuce from 9 regions.

M. incognita are the most common cucurbita crops, where they parasitize root tissues and cause severe damage to root galls, such kind of work has been carried by earlier workers like Barker and Olthof (1976); Sasser (1979), Abawi and Widmer (2000); Anwar and Mckenry (2010); The predominance of root -knot nematode disease in some region of Chattisgarh has been earlier reported by Sao et al., (2008) in tomato and bean showing high average population density.

A similar survey reported by Khan and Khan (1990) vegetable crops in Uttar Pradesh to know the level of infestation and distribution pattern of root- knot nematodes associated with vegetable crops, *M. javanica* and *M. arenaria* cucumber is the most affected crop presence of nematodes, *M. incognita* on cucumber six vegetable crops grown in Uttar Pradesh (khan et al, 1988).

The present findings further confirm this contention. *M. incognita* and *M. javanica* are also most frequency encountered species even on worldwide basis (Sasser, 1979).

Table- 1 Frequency distributions of root knot nematodes in different localities in and around Barshi tehsils

Villages	Total No. of fields surveyed	No. of field with infection	Frequency (%)	GI ¹ /EMI ² (average)
Alipur	10	7	70	4/4
Babhulgaon	10	6	60	3/3
Balewadi	10	8	80	4/4
Gadegaon	10	5	50	3/3
Pathri	10	9	90	5/5
Saundare	10	4	40	2/2
Surdi	10	5	50	3/3
Pangri	10	8	80	4/4
Mungashi	10	6	60	3/3
Khandavi	10	4	40	2/2

GI¹ =Gall index, EMI² =Eggmass index on Taylor and Sasser scale

Table-2 Identification of *Meloidogyne* species infecting bottle gourd villages in and around Barshi tehsils

Villages	<i>Meloidogyne</i> species
Alipur	<i>M. incognita</i>
Babhulgaon	<i>M. incognita</i> <i>M. javanica</i>
Balewadi	<i>M. incognita</i> <i>M. javanica</i>
Gadegaon	<i>M. javanica</i>
Pathri	<i>M. incognita</i>
Saundare	<i>M. incognita</i> <i>M. javanica</i>
Surdi	<i>M. incognita</i>
Pangri	<i>M. incognita</i> <i>M. javanica</i>
Mungashi	<i>M. incognita</i> <i>M. javanica</i>
Khandavi	<i>M. incognita</i>

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