



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(6): 418-419

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Received: 04-09-2019

Accepted: 06-10-2019

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First report on occurrence of citrus root-knot nematode, *Meloidogyne indica* on khasi mandarin in Meghalaya

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Abstract

Occurrence of citrus Root-knot nematode, *Meloidogyne indica* on the Khasi mandarin roots was first time noticed in village Mawphanniew of West Khasi hills in Meghalaya. The present observation delineated the information on *M. indica* from roots by its extraction and got identified with description of perineal pattern. In this regard, a strict vigil on arresting further its spread is being hereby proposed. The random survey indicated that the presence of root-knot nematode (14.8 (J2) / 200 cc of soil) only on Khasi mandarin saplings confirming the species as *M. indica* showing with monolocular galls (3.5 gall index) by its development but not get attained to a maturity level with production of egg masses and eggs and larval deposition in it. However, the younger saplings being prone to attack by them causing decline of citrus showing the plantation with sparse plants which led to replanting subsequently. Hence, the source of seedling, culling of affected seedlings while performing procurement is being recommended to the local farmers for prevention of its spread in a larger way in the state of Meghalaya.

Keywords: *M. indica*, perineal pattern, monolocular galls

Introduction

In fruit crops, Citrus (Family: Rutaceae) is a third important one. The family possessed with a wide group of tree species. Among them, 'Khasi mandarin' (*Citrus reticulata* Blanco) is one of the region specific fruit crop in North Eastern Hill region, grown mainly in the state of Meghalaya and Arunachal Pradesh. Occurrence of the species of citrus root knot nematode, *Meloidogyne indica* is known to infest only on citrus. It was earlier reported in and around the plantation in New Delhi, India which was described by Whitehead in the year of 1968. The spread was subsequently noted in the districts of Banaskantha, Mahesana and Anand in Gujarat by attacking on various lime groups but earlier it was not reported anywhere in India (Patel *et al.*, 1999) [3]. Now their occurrence noted in various parts of India. In this contest, it is also observed in the state of Meghalaya. Since, this state shelters for its own traditional citrus species of Khasi mandarin its need to care. Because the symptom of damage in trees noted that yellowing followed by twig blight and severe stunting which led to citrus decline as the symptom of damage progresses as time passes.

Materials and Methods

Infested roots were collected from village Mawphanniew of West Khasi Hills district of Meghalaya, India (25°41'25.487" N, 91°36'40.719" E). Samples were cleaned and stained by hot acid fuchsin lactophenol solution technique (Byrd *et al.*, 1983) [2]. Further the collected root samples extracted by modified Baermann's technique (Whitehead and Hemming, 1965) [7] for second stage juveniles (J2s) and males. Minimum of ten plant root systems were evaluated and roots are scored for degree of galling with index (0-5) (Barker, 1978) [1].

Results and Discussion

The affected plants by *M. indica* showed with symptoms that witnessed for citrus decline due to the genera of *Tylenchulus semipenetrans* such as yellowing and withering of leaves, twig drying without bearing of fruits. Every plant in the orchard was shown with symptoms of damage caused by the root knot nematode in any of the crop on above and below ground level (Fig.1). Whereas the Gall index herein observed with a value of 3.5 (0-5) which cannot be negligible even though it's observed in very few pockets. Since, the nematode species consider

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as a serious pest in Gujarat lime gardens it should be taken care for further action.

The detailed morphological characteristics of the species study revealed wide stylet base, the saccate body and the posterior cuticular pattern of the female as the low rounded head with two annules behind the head-cap on the sublateral head sectors, the anterior longer than the posterior, the position of the cephalids,

the well swept back stylet knobs and the fairly long ventrally concave tail of the male and the short bluntly rounded conoid tail of the larva with finger print like posterior cuticular pattern. The characteristics derived by its description which was compared with earlier one of Whitehead (1968)^[8] and Phani *et al.* (2018)^[4].



Fig 1: Symptoms and root galls causing by *M. indica* on Khasi Mandarin

Summary and conclusion

The species, *M. indica* was found occurring on Khasi mandarin in West Khasi hills district of Meghalaya also in sequence of occurrence of it in the state of Delhi, Gujarat, Rajasthan and Tamil Nadu (Phani *et al.*, 2018, Walia *et al.*, 2018)^[4, 6]. The origrarious females found with galls only but not as a fully developed one to form an eggmass after egg production, But, the population of juveniles are found lesser in number when compared to remaining ecto parasitic genera extracted from the rhizosphere region. The reason may be that the inherently the citrus roots are not amenable for its further development even though the entry of larvae into the root system is being made possible due to its fragile nature when the sapling are young in stage. During the survey, the uprooted plants showed with many number of galls ranging from smaller to bigger in sizes with poor formation of root system without having profuse lateral roots.

Therefore, it should be checked from its further spread through clean cultivation of orchard and its maintenance throughout the year with available resources of the farmer.

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