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A Southern Root-knot Nematode (*Meloidogyne incognita*) First Reported on Cucumber in Manipur

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ABSTRACT

Root-knot nematode is one of the major pest of vegetable crops that produces root galls in the infected roots, seriously reducing the farmer's produce. According to statistics, phyto-parasitic nematodes affect 12.3% of the world's major crops each year, resulting in yield losses. Most common species of root-knot nematodes have been reported to be vulnerable to cucumber and they can reduce productivity by up to 60% in protected commercial farming. Till now, there was no report of root knot nematode affecting cucumber in the state of Manipur (India). In 2021, an extensive investigation was conducted in each block of Kakching district, Manipur to observe for the root-knot nematode (*Meloidogyne spp.*) infecting the cucumber crop of that area based on morphological characteristic symptoms of the infected plant. The root samples forming galls and soil were collected for confirmatory studies at the laboratory. For the first time, it was discovered during the study that the cucumber crop was infested by the *Meloidogyne* spp. showing the general symptoms like water and nutrient stress, yellowing of leaves, stunted growth, wilting of infested plants and patchiness of plants in the infested field, together with the typical symptoms of gall formation in the root system. According to morphological investigations, the southern root-knot nematode (*M. incognita*) was found to be responsible for the infestation of the cucumber plant sample taken from a farmer's field in the Kakching district of Manipur.

Key words: Cucumber, Manipur, *Meloidogyne incognita*, Southern root-knot nematode.

Cucumber (*Cucumis sativus*) locally known as *Thabi* belongs to Cucurbitaceae family. It is an annual creeper/ climber widely grown in the statewith an area of 200 ha and production of 1580 tonnes in 2020-21(Anonymous, 2022). In Manipur, it is consumed as a salad or as boiled food while fresh fruit juice is used for local application on burns; fruit extract in relieving stomach problems and fruit paste forlocal application on the skin. The seeds are used as tonic, antipyretic, purgative and diuretic.

One of the major pests of vegetable crops, the root-knot nematode forms knots or galls in the infected roots, seriously impacting farmers' produce. Berkeley (1855) discovered root-knot nematodes of the *Meloidogyne* spp. in cucumber plants produced in glasshouses in England. Barber (1901) made the first record of a plant parasitic nematode's occurrence in Kerala (India), citing root-knot nematode, *Meloidogyne* spp. infesting tea. According to reports, 12.3% of the world's major crops have annual yield losses as a result of damage by phyto-parasitic nematodes (Sasser and Freckman, 1987). Cucumber has been found to be vulnerable to most of the common species of root-knot nematodes, which can lower cucumber production in protected commercial cultivation by up to 60% (Ornat *et al.*,1997).

In the farmer's field of Keirak village, in the Kakching block under Kakching district of Manipur, root-knot nematodes have been found to infest cucumbers (Fig 1). Under field conditions *i.e.*, the above-ground, symptoms such as nutrient and water stress, yellowing of leaves, reduced plant growth, wilting and patchiness of crops was seen (Fig 2a).Heavy and compoundgalling of roots were observed in theinfested root showing the typical symptom of *Meloidogyne* spp. (Fig 2b).

The compoundroot system was first washed thoroughly without any damage and cut into small pieces of about 1cm in length followed by staining using the Acid Fuchsine method (McBeth *et al.*, 1941). *Meloidogyne* spp. fully mature females were dissected into two parts after being removed from the stained roots. The additional trimming of the anterior half was done to retain the head end and it was mounted in a drop of simple plain lactophenol. The posterior half was similarly mounted and utilized to createperineal patterns (Taylor *et al.*, 1955). By comparing characteristics found in

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the perineal area and the size and shape of the root-knot nematode with the description provided by Chitwood (1949) comparisons were made in order to identify the species.

Morphological studies of southern root-knot nematode, *Meloidogyne* spp. collected from cucumber crops from the Kakching district of Manipur. Female adults (n= 10): White body with a protruding neck, globular to pear-shaped (oval) form. In the neck and vulva-anus region, there are noticeable annulations. Lips set-off. The stylet is thin and has knobs that are clearly rounded. With a large, cylindrical procorpus and a rounded metacarpus, the esophagus is well-developed. Just behind the level of the style knobs is an excretory pore. Dorsally, the perineal pattern is wavy. The lateral lines are missing and the dorsal arch is high and squarish. There are vulva, anus and phasmid in the perineum (Fig 3). Consequently, the sample taken fromthe cucumber was found to be *M.incognita*.A similar observation was made by Chitwood (1949), who regarded the perineal pattern as the most notable and distinctive feature for identifying root-knot nematode species. According to Kaur and Attri (2013), the perineal pattern is the root-knot nematode's most persistent characteristic.

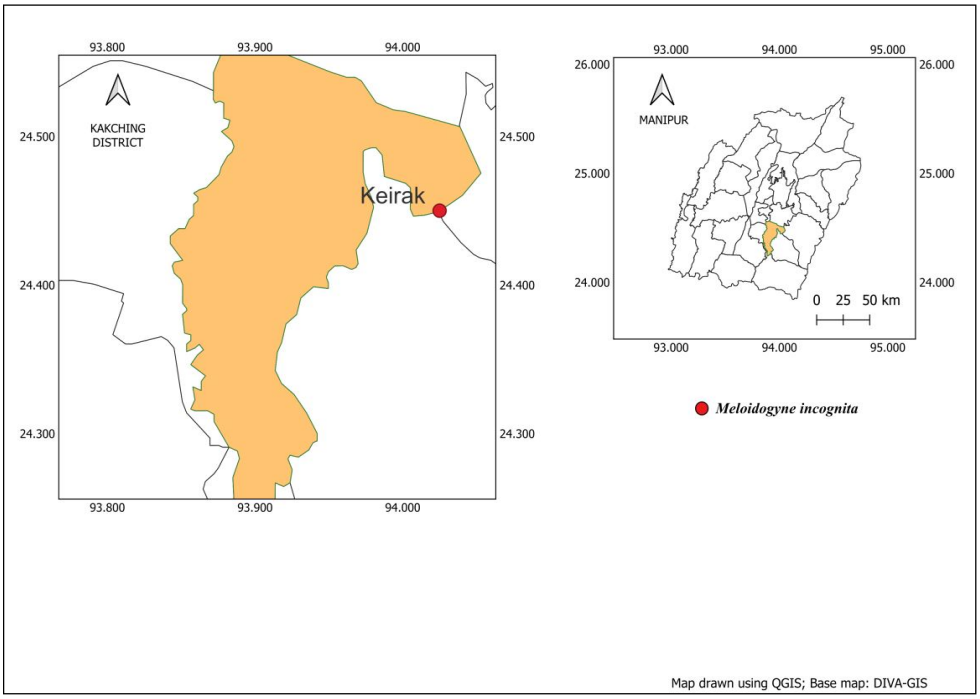

Fig 1: Map showing the location where *Meloidogyne incognita* was reported from cucumber.



Fig 2: Above (a) and below (b) ground symptoms observed at farmer's field.

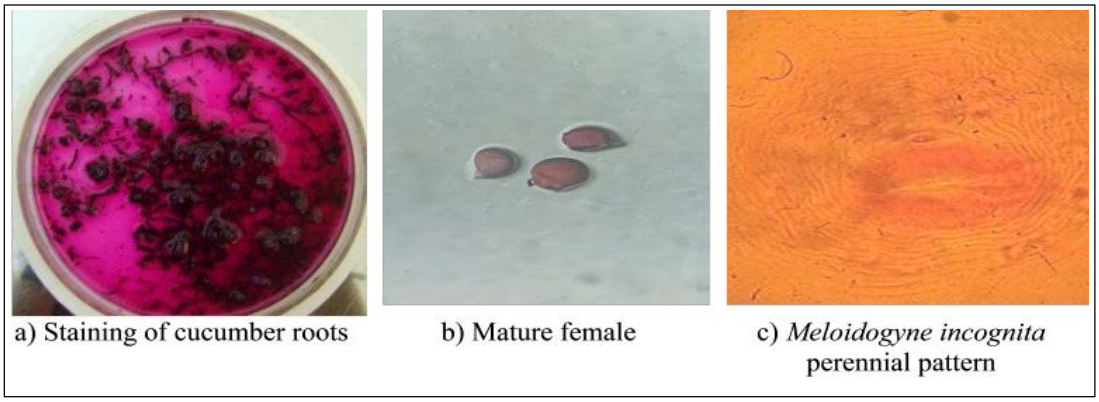

Fig 3: Observation of a root-knot nematode under a microscope.

CONCLUSION

The samples of infected plant roots from farmer's field of Kakching district of Manipur have been found to be Southern root-knot nematode, *Meloidogyne incognita* infecting the cucumber plant. It is the first report recorded from Manipur, India.

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Conflict of interest

All authors declare that they have no conflict of interest.

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