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## *Meloidogyne incognita* - A Threaten to Cucumber Cultivation under Protected Condition

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### **Abstract**

Cucumber is an important vegetable cultivated under polyhouse conditions in the tropical and sub-tropical regions. Cucumber production is majorly limited by infection of root-knot nematode *Meloidogyne incognita* and is considered to be an important pest causing severe yield loss. In this study, the presence of *M. incognita* infecting cucumber under poly house condition in Theni Tamil Nadu was confirmed. Among ten polyhouses surveyed, cucumber cultivated under four polyhouse is infected with *M. incognita* and infestation ranged from 21 to 33%. Nematode infested plants expressed the typical symptoms viz., stunting, and withering, drooping and sudden wilting of plants. Application of biocontrol agent like *Purpureocillium lilacinum* or newer chemicals like Fluopyram or Fluensulfone is effective for the management of root-knot nematodes.

### **Introduction**

Cucumber (*Cucumis sativus*) is an important vegetable crop of the family *Cucurbitaceae* as its multipurpose use like cooking and cosmetic uses. Cucumber is rich in Vitamins, Minerals, and fiber which is the reason for the cultivation of cucumber throughout the world under protected and open field condition. Due to monoculture or narrow crop rotation in polyhouse, the cucurbit crops are frequently cultivated under unfavorable soil conditions. Under protected condition, several biotic factors like pest, pathogens and nematodes are limiting the cucumber cultivation. Among them, nematodes especially *M. incognita* has wider host range infecting economically important vegetables and fruit crops and causes severe yield loss in cucumber cultivation. Plant-parasitic nematodes cause severe yield loss accounting for 173 billion dollars world-wide. In India, it is reported to cause 18.2% yield loss in cucurbits under protected conditions. *M. incognita* is an obligate endoparasite that attacks cucumber roots, inducing giant cell or gall formation. This work illustrates the severity, symptomatology, and management of root-knot nematode infecting cucumber under protected condition.

### **Spread and Survival**

The second stage (J2) of nematode penetrates the root behind the tip root tip and enters into vascular cells. Entered nematodes are set up as a permanent feeding site and feed on the same point till to develop a mature female and during these process, large galls are formed with the developing female. Finally, feeding cells are transformed into multinucleate knot or gall cells. The female lays eggs upto 500 in gelatinous matrix to form egg masses. Most juveniles develop into females and only under adverse condition

high numbers of males are observed. Mostly nematodes are present at a distance of 25 to 50 cm from the base of stem and at a depth of 20 to 40 cm (Prabhu et al., 2020). The nematodes are able to move only a few meters, but inoculum spreads from one plant to another plant by means of flood irrigation and farm implements. Also spread from one location to another by the movement of soil. The nematode *M. incognita*, require optimum temperature ranged from 25 to 30° C for reproduction and survival. Under polyhouse condition, high humidity and temperature are maintained which is conducive for nematode multiplication. Due to its fast multiplication using the warm condition under protected condition, infestation of *M. incognita* spreads very quickly (Ghule et al., 2014).

### Symptomatology

Cucumber polyhouses are surveyed for the presence of root-knot nematode in Theni District, Tamil Nadu. A total of ten polyhouses surveyed, four polyhouses had root knot nematode infection and percent nematode infestation was ranged from 21 to 33% at the time of first visit. Infected cucumber plants showed sudden wilting especially during day time as a typical symptom. Leaves of infected plants were drooped and withered (Figure 1); finally plant showed complete drying (Figure 2). In some cases, poor emergence, stunted growth and death of young seedlings were observed. Further, infected plants when pulled out, development galls on root and rootlets were observed (Figure 3). Infection was gradually increased and spread from one row to another by run-off water. Later infection was spread into entire polyhouse within three to four weeks (Ghule et al., 2014).



Figure 1: Withering and drooping of plant



Figure 2: Sudden wilting of plant



Figure 3: Galls on root of infected plant

### Management

- Remove plant debris of previous season.
- Avoid the movement of soil from infected polyhouse to uninfected one by tractor and other farm implements.
- Apply Farm Yard Manure (FYM) 12.5 and Neem Cake 250 kg/ha.
- Raise border crop with Marigold (*Tagetes* sp.) to trap the nematodes.
- Drench the soil with biocontrol agents viz., *Purpureocillium lilacinum* @ 10 g/liter of water or drench with Fluopyram 70 ml/plant @ 1 ml of fluopyram/ liter of water. Spot application with Fluensulfone 3G @ 40 g/plant (Panayotova et al., 2016).

## Conclusion

Survey indicated that the presence of root knot nematode infection in cucumber cultivated under polyhouse condition in Theni District, Tamil Nadu was confirmed using symptomatology. Cucumber growers are not known to diagnose the nematode infestation by symptomatology. Therefore, cucumber growers should aware about the symptoms and necessary action is needed to be taken to manage nematode infestation using above furnished package of practice.

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