

**Nematodes Problem and Their  
Management in Horticultural Crops  
Under Protected Cultivation****The Scientific Agriculture (August 2022)  
Volume 01, Issue 02, Page No. 06-08****NEMATODES PROBLEM AND THEIR MANAGEMENT IN  
HORTICULTURAL CROPS UNDER PROTECTED CULTIVATION****M. K. Pandey<sup>1\*</sup>, P. K. Gupta<sup>2</sup>, M.K. Pathak<sup>3</sup>, R. C. Gupta<sup>4</sup>, Sujay Pandey<sup>5</sup>,  
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**Email:** manojpandeysln@gmail.com**Introduction:**

Nematodes constitute one of the major limiting factors in horticultural crops. Nematodes are microscopic, worm like organism but not true microorganism as they have all the system that higher animals possess, except the skeletal, circulatory and respiratory organs. Nematodes are basically aquatic as even in soil, they live in soil water and not soil air. Roots damaged by nematodes are easy prey to fungi which invade the roots and accelerate root decay. Protected cultivation is a cultivation of different crops under controlled environmental conditions which gives manifold increase in yield per unit area. This is being done with green house, shade net, plastic tunnel and mulch. The application of greenhouse technology is feasible in the tropical and subtropical climatic conditions of India for the cultivation of high value crops. To

meet the demand for high quality vegetables, a high-tech cultivation is required. There are different types of polyhouses based on shape, size and cost. The protected cultivation has shown high productivity, better quality produce and early maturity round the year cultivation in a hostile environment and use of microclimate to fulfil the individual requirement of plant. This is useful to cultivate healthy nursery or plant material, hardening of tissue culture plant, floriculture (Singh, 2005). Continuous growing of same crop increase problem of soil borne pest and diseases including plant parasitic nematodes (Daseager & Csinos, 2006; Engindeniz & Engindeniz, 2006; Minutoet al., 2006). The problem of nematode after 3-4 crops increases due to build-up of initial population in first crop and shortening life cycle of nematode due to higher

temperature (Desaeger & Csinos, 2006). The root- knot nematode (*Meloidogyne incognita*) is the major nematode pest that infects these crops. This nematode is responsible for 30 to 40 percent yield losses in various crops. The incidence of fungal and bacterial pathogens would be doubled in the presence of the nematode. This nematode cause breakdown of resistance to fungal and bacterial pathogens in certain varieties of horticultural crops. The nematodes spread from one area to another mainly through infested planting materials.

**Symptoms:**

Basically, this nematode is parasites of roots or underground stem. The root-knot nematodes produce galls or knots on the roots. Root and rhizome necrosis is manifested by varying degrees of retarded growth, leaf yellowing and falling of mature plants with the increase in nematode population.

**Management:**

**Mandatory soil testing for nematodes-** Selection of site for the construction of new polyhouse/ net house is very important. Fields having a long history of vegetable cultivation should be completely avoided. Fields under cereal crops usually may not harbour nematodes that attack polyhouse crops. Ignorance of this particular precaution can lead to disastrous nematode infections in the first crop itself. Therefore, it is strongly recommended that soil samples collected from proposed sites for the construction of new polyhouse/ net house be compulsorily tested for nematode infestation.

**Raising nematode free planting material-**Seeds of varieties suitable for polyhouses may be procured from reliable dealers only. The seedlings must be raised only in soilless media in clean and sterilized plastic trays (or washed thoroughly with bleaching solution) by growers themselves, or procured directly from designated nurseries. Special care should be taken that the soil-less medium should not come in contact with soil and that the trays should also be stacked on raised structure. No farm yard manure or vermicompost may be added in nursery medium in spite of the fact that soil media (cocopeat, vermiculite) do not contain any nutrients for the plants. Only water-soluble fertilizers may be used. Irrigation of nursery trays should be done only with very clean and algae-free water.

**Removal of roots from previous crop-**Roots harbour nematode eggs, and each root gall contains hundreds of nematode eggs. Old galls coalesce that contain thousands of eggs inside. After the crop is over, in spite of pulling the plants along with roots, some galls detach from the roots and the nematode juveniles emerge from the leftover roots in the soil. These nematode juveniles are ready to infect the new crop. Therefore, it is strongly recommended that the roots of previous crop should be removed as much as possible. Digging out the finer roots is most essential. Such removed roots should be piled in a heap outside, dried and burnt. This single practice can remove 80-90% of nematode inoculums from the soil.

**Organic amendments fortified with bio-agents-**Select a shady, cool and

covered place for stacking well rotten FYM or vermicompost or both. One ton of FYM is sufficient for one acre polyhouse. Procure bio-agents like *Tricho dermaharzianum* or *Tricho dermaviride* and *Pseudomonas fluorescens* from a reliable source. *Tricho dermaharzianum* or *Tricho dermaviride* should have a minimum of  $2 \times 10^6$  CFUs per gm; while *Pseudomonas fluorescens* should contain  $1 \times 10^9$  CFUs per gm. Sprinkle/ pour the bio-agent on the heap of FYM at the rate of 2kg/2 L per ton followed by sprinkle little water and then mixing them in FYM. Then fully cover it with banana, coconut leaves or chaff that allows aeration. Mix should not come in contact with soil, and well protected from sunlight and rains. Mix the heap once in a week, followed by moistening and covering again for 3-4 weeks, till the time solarization is going on and seedlings are being raised.

Once the solarisation process is over, remove the polythene sheets from polyhouse, prepare the beds and mix the bio-agents fortified FYM uniformly over the beds in top soil. The quantity would vary depending upon the overall nutrient's status of polyhouse soil.

*Trichoderma* and *Pseudomonas* are important bio-agents that improve the plant health and have broad spectrum activity, including against nematodes. However, should there be specific nematode problems, bio-agents like *Paecilomyces lilacinus* or *Pochonia chlamydosporia* can be procured and

multiplied in the same way in FYM using similar dosage levels as mentioned above. Neem cake powder @ 50-100 g/m<sup>2</sup> of planting bed may be mixed on the top layer about 7-10 days before seeding/transplanting.

**Crop rotation**-Most polyhouse growers are inclined to grow cucumber due to its shorter duration and assured prices. However, growing cucumber continuously leads to faster build-up of nematode populations and may cause crop failure. Among the crops usually grown in polyhouse, cucumber is the most susceptible, followed by tomato and capsicum among the vegetable crops. All available varieties for these crops are susceptible to root-knot nematode. Therefore, it is strongly advised not to grow cucumber continuously. Capsicum is relatively more tolerant to nematode infection and can be introduced in rotation.

**Chemical Nematicides**- At present only one nematicide is registered for use against nematodes in horticultural/vegetable crops. We suggest that chemical application may be done only when absolutely necessary, under conditions for very high initial nematode population. Carbofuran is a granular nematicide that can be applied in soil at the time of seeding/transplanting @ 1-2 kg a.i./ha. However, carbofuran does not give the desired result for long durations under polyhouse conditions as the nematodes tend to rebuild their population within 2-3 months of its use.