

## STUDIES ON THE PATHOGENICITY OF *Helicotylenchus dihystera* ON *Celosia cristata*

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### ABSTRACT

Significant reduction in plant growth parameters were noticed at and above inoculum level of 4000 gravid females of *H. dihystera*/kg soil. Hence, this inoculum level was considered as a damaging threshold level for celosia. It was observed that the nematode population increased with increasing the inoculum of *H. dihystera*. The maximum nematode population was recorded at the highest inoculum level and the minimum population at the lowest inoculum level. Symptoms like stunted growth, chlorosis of leaves and sparsely developed roots were observed during the experimental studies.

**KEYWORDS :** Spiral nematode, Pathogenicity, *Celosia cristata*

*Celosia cristata* L. occurs in warm countries. It is cultivated not only as an ornamental, but used as a vegetable and pot-herb in many Western African countries. During the survey of plant parasitic nematodes associated with ornamental plants, *H. dihystera* was found to be associated with *Celosia*. The literature reveals that no information is available on the host-parasitic relationship, particularly between initial inoculum level and subsequent damage to the plant. Keeping this in view, the present investigation was undertaken to study the pathogenicity of spiral nematode, *H. dihystera* on *Celosia cristata*.

### MATERIALS AND METHODS

In order to determine the pathogenic potential of spiral nematode (*Helicotylenchus dihystera*), the two week old seedlings of *C. cristata* were transplanted singly in 6" earthen pots containing 1kg sterilized soil + river sand + farmyard manure (3:1:1) mixture and three days after transplantation the seedlings were inoculated with 500, 1000, 2000, 4000 and 8000 gravid females of *H. dihystera*. The inoculations were done by making 4-5 holes near the rhizosphere of each seedling. After inoculations the holes were closed with soil followed by light irrigation, uninoculated plants served as control.

The experiment was terminated after 60 days of inoculations. Observations were recorded on plant growth parameters (length, fresh weight and dry weight of shoot and root) and population of nematodes in soil and root. For interpretation of results, the reduction in plant growth was calculated in terms of percentage dry weight reduction.

Reproduction factors (R) was calculated by the formula  $R = Pf/Pi$ , where (Pf) represent the final and (Pi) initial population of nematode. To estimate nematode population in roots, 1gram root in water was macerated in a waring blender for 30 seconds, thus releasing the females present in the roots for counting.

### RESULTS AND DISCUSSION

It is evident from the data presented in Table -1 that the growth parameters of *Celosia cristata* significantly increased in the plants inoculated with 500 and 1000 gravid females/kg soil. The percentage of improvement in plant growth was +7.3 and +11.2 recorded in the corresponding treatments. The increased in plants growth parameters of *C. cristata* might be due to some stimulatory factors such as root degeneration i.e destruction of root tips or tissues by nematodes may elicit the formation of new roots without new roots influencing any control over the number of root damage or increased production of growth hormones. These results are also in agreement with those of Wallace (1971) and Muthukrishanan et al. (1975). Reduction in plants growth parameters was observed at and above 2000 inoculum levels. However, the significant reduction in plants growth parameters was noticed at and above 4000 inoculum levels. My results are also in confirmity with those of Firoza and Maqbool (1995) who reported the damaging threshold level of *Helicotylenchus dihystera* was 4000 nematodes/kg soil on brinjal, tomato and wheat. At this level, symptoms like chlorosis, stunted growth and sparsely developed root were observed by them in plants.

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Table 1 : Studies on the pathogenicity of *Helicotylenchus dihystra* on *Celosia cristata*

Inoculum levels	Plant Length (cm)		Plant fresh weight (g)		Plant dry wt. (g)		Percentage Reduction		
	Shoot	Root	Shoot	Root	Shoot	Root	Total	Over Control	
0	74.4	29.6	104.0	149.0	52.0	201.0	47.2	13.0	-
500	85.0	30.7	115.7	164.5	55.7	220.2	52.2	12.4	+7.3
1000	87.6	32.4	120.0	171.0	56.4	227.4	55.0	12.0	+11.2
2000	73.1	29.1	102.2	145.2	49.2	104.4	46.7	12.2	-2.1
4000	63.3	22.4	85.7	118.7	41.0	15.7	37.2	9.7	-22.0
8000	55.1	19.0	74.14	105.7	29.4	135.1	31.0	8.2	-34.8
C.D.(P=0.05)		8.65		12.00		2.36			
C.D.(P=0.01)		13.56		18.82		3.70			

Table 2 : . Effect of different Inoculum Levels On The Multiplication of *Helicotylenchus dihystra* in *Celosia cristata*

Inoculum levels	Nematodes /kgsoil	Females /root system	Total	Reproduction factor (R=Pf/Pi)
500	20121	80	20201	40.4
1000	24859	138	24997	24.9
2000	32750	164	32914	16.4
4000	40120	204	40324	10.0
8000	44918	252	45170	5.6
C.D.(P=0.05)				3.27
C.D.(P=0.01)				5.42

The results presented in table, 2 revealed that the final population of *H. dihystra* was highest in and around plants inoculated with 4000 gravid females/plant while the lowest population was recorded in the plants inoculated with 500 gravid females/plants. The reproduction factor of *H. dihystra* was significantly reduced with the increase in the inoculum levels. Thus the rate of nematode multiplication showed a declining trend with the increasing

initial inoculum levels, suggesting it to be a density dependent phenomenon.

Results revealed that with the increase in the inoculum levels of *H. dihystra* there was corresponding decrease in the rate of nematode multiplication. The reason for the reduction in nematode multiplication with increasing inoculum levels may be due to shortage of food or competition for sites suitable for feeding. The progressive decrease in the nematode multiplication with increasing inocula of nematode has also been reported by Sartaj et al, (1999) and Kumar and Singh (2007). Moreover, my results are not in agreement with those of Rao and Swarup (1974), Sartaj et al. (1999) and Kumar and Singh (2007) who reported that the damaging threshold level of *H. dihystra* varied between 500 to 5000 inoculum level on different crops. This variation may be possibly either due to different crop plants used or change in experimental conditions.

It was concluded from the above results that the damaging threshold level of *H. dihystra* to *Celosia cristata* was found to be 4000 gravid females/kg soil.

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