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EFFECT OF POPULATION LEVELS AND TIME OF INFESTATION OF *APHELENCHOIDES AGARICI* ON THE MYCELIAL GROWTH OF *AGARICUS BISPORUS*

by
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In India, myceliophagous nematodes cause partial to total crop failure of cultivated mushrooms (Thapa *et al.*, 1977). An investigation was undertaken on the effect of different population levels of *Aphelenchoides agarici* Seth *et* Sharma on the mycelial growth of *Agaricus bisporus* (Lange) Singer in compost.

Materials and Methods

Compost bottles were two-third filled with compost that had been autoclaved at 6.81 kg/12.5 cm^2 for twenty minutes. They were then spawned with a culture of *A. bisporus* and 40 bottles were each inoculated with 10, 100, 500 and 1000 individuals of *A. agarici* before the spawn had started to develop. Uninoculated bottles were maintained as a control and each treatment was replicated eight times. Nematode multiplication and the development of the mycelium (per cent of the uninoculated control) were assessed visually at 20, 30 and 45 days after the inoculation.

To investigate the effect of nematode inoculation at different stages of mycelial growth, 60 freshly spawned bottles were kept at 25 ± 1°C for twenty days so as to obtain complete mycelial spread in the compost. The bottles were then inoculated with the four inoculum levels and along with the uninoculated control. Each treatment was replicated eight times. Mycelial disappearance and nematode multiplication were recorded 20, 40 and 60 days after inoculation.

Results

In the bottles inoculated at the time of spawning, inhibition and depletion of mycelium was apparent within two weeks time. The extent of damage to the mycelium was related to the level of nematode inoculum and was progressive with time (Table I). There were significant differences between treatments in per cent mycelial damage after 30 days but results were similar after 45 days except for the treatments receiving lowest inoculum level of 10 nematodes.

Nematode numbers increased in relation to inoculum level but the highest multiplication rate (7740 X) was recorded in the treatment receiving an inoculum of 10 nematodes while treatment with highest initial inoculum of 1000 nematodes showed the lowest multiplication rate.

In the bottles inoculated with nematodes 20 days after adding spawn to the compost (at time of casing), there was no depletion of the mycelium for the first 10 days after inoculation in any treatment. However, treatment with initial inoculum of 500 and 1000 individuals showed slight depletion after this period and after 40 and 60 days there was considerable mycelial damage (Table II). Even at 20 days after inoculation, mycelial growth differed significantly between treatments. Damage caused by the lowest initial inoculum level at 40 days was similar to the damage caused by higher initial inocula at 20 days; the progression of damage was related to the initial inoculum level.

A rapid increase in nematode population was observed in all the treatments up to 40 days. There after populations declined significantly (Table II).

Discussion

The results indicate that *A. agarici* multiples rapidly when an adequate food supply is available and even low initial inocula can cause considerable damage to the mycelium. Depletion of the mycelium was related to the initial nematode inoculum level and to the time of inoculation. The earlier the stage of nematode infestation, the greater was the damage caused. Higher

TABLE I - *Effect of different population levels of* Aphelenchoides agarici *on mycelial growth of* Agaricus bisporus *and nematode multiplication (inoculation at the time of spawning).*

No. of nematodes inoculated	% mycelial damage after			No. of nematodes ($\times 10^4$) after	
	20 days	30 days	45 days	30 days	45 days
10	0.7	50.0	45.0	7.7	26.8
	(1.3)	(2.5)	(8.7)		
100	13.3	40.0	95.0	12.2	56.7
	(3.8)	(6.4)	(9.8)		
500	36.7	78.3	100.0	24.8	82.4
	(6.1)	(8.9)	(10.1)		
1000	46.7	91.7	100.0	26.9	91.9
	(6.9)	(9.6)	(10.1)		
Uninoculated	0	0	0		
	(1.0)	(1.0)	(1.0)		

C.D. for P=0.01
for population levels 0.33
for days 0.23
for interaction 0.57

C.D. for P=0.01
for population levels 2.81×10^4
for days 0.71×10^4
for interaction 1.62×10^4

TABLE II - *Effect of various population levels of* A. agarici *on mycelial growth of* A. bisporus *and nematode reproduction (inoculation at time of casing).*

No. of nematodes inoculated	% mycelial depletion after			No. of nematodes ($\times 10^3$) after		
	20 days	40 days	60 days	20 days	40 days	60 days
10	6.7	26.7	58.3	6.8	72.0	9.9
	(2.8)	(5.3)	(7.7)			
100	13.3	31.7	81.7	9.9	88.6	12.8
	(3.8)	(5.7)	(9.1)			
500	16.7	40.0	88.3	14.9	102.0	15.0
	(4.2)	(6.4)	(9.4)			
1000	18.3	50.0	91.7	21.2	131.1	21.7
	(4.4)	(7.1)	(9.6)			
Uninoculated	0	0	0			
	(1.0)	(1.0)	(1.0)			

C.D. for P=0.01
for population levels 0.36
for days 0.28
for interaction 1.29

C.D. for P=0.01
for population levels 3.92×10^3
for days 3.38×10^3
for interaction 6.83×10^3

multiplication rates were observed when nematodes were inoculated at an early stage, i.e., spawning time as compared to the number of nematodes when inoculated 20 days after spawning (at casing time). Initial fast growth of the nematode population followed by a later reduction has also been reported for *A. composticola* (Arrold and Blake, 1968) and *A. sacchari* (Sharma *et al.*, 1981). Multiplication rate of nematode irrespective of the time of inoculation was found to be density dependent.

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