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EFFECT OF SOME GROWTH SUBSTANCES ON *TRICHOLOMA GIGANTEUM* MASSEE

By

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The effect of some growth substances *viz.*, IAA, NAA, MH and GA at different concentrations on growth of *Tricholoma giganteum* has been studied in culture. Concentrations of 0.001, 0.01, 0.1, 1, 10 and 100 PPM of each of the growth substances have been taken into consideration. From the results, it is evident that the fungus exhibits maximum amount of growth (13.7 mgs.) at 0.1 PPM of IAA. In case of NAA & GA, the maximum amount of growth are 15.5 mg & 13.2 mg. at optimum concentrations of 1 PPM and 10 PPM respectively. In MH, however, which generally inhibits all types of vegetative growth of higher plants, it is curious enough to note 84.05% increase in comparison with the average control value at its optimum concentration. The inhibitory effect at higher concentrations are significant in case of IAA, NAA and GA. But in case of MH even at 100 PPM the amount of growth is more or less same as in control.

Introduction

The study of the effect of growth substances on higher plants has received considerable attention in recent years. References are, however, very meagre as regards their effect on growth of fungi. Again, the quantum of research work conducted on this aspect of Basidiomycetes appear fragmentary when compared to the extensive studies carried on lower fungi.

Leonian & Lilly (1937) by applying β-Indole acetic acid to a large number of fungi observed that growth substances at lower concentrations accelerated growth while at higher concentrations they showed inhibition. Cochrane (1958), Hessayon (1952), Richard (1949) and Went & Thimann (1937) observed similar inhibitary effect of indole acetic acid on growth of some pathogenic fungi. In India, considerable work was done by Merhotra (1951), Misra & Mehmood (1961) and Sankhla, Mathur and Mathur (1964) on lower fungi along this line of research. Regarding the effect of these substances of Basidiomycetous fungi, the work of Banerjee & Mukhopadhyay (1957) on *Merulius similis* should be mentioned. Recently, Banerjee & Nandi (1966), working with the effect of IAA, IBA and MH on growth of primary and secondary mycelia of *Lentinus praerigidus*, observed that concentrations, above and below 0.1 PPM in case of IAA, above 10 PPM in case of IBA and above 1 PPM in case of MH, inhibit the growth of both types of mycelia.

The present experiment is an attempt to find out the effect of some growth substances at various concentrations on the growth of *Tricholoma giganteum* Massee, a white-spored edible mushroom of the family Agaricaceae. The growth substances under consideration are Indole acetic acid, Napthol acetic acid, Maleic hydrazide and Gibberellic acid.

Material and Methods

To study the effect of different growth substances on *Tricholoma giganteum* Massee in culture, the tissue culture of the test fungus has been allowed to grow on a basal synthetic medium containing graded concentrations of the growth substances. The basal synthetic medium of Lilly & Barnett (1951) has been mainly followed and contains : Glucose 10 gms, Asparagine 2 gms, KH_2PO_4 1gm, $MgSO_4$, $7H_2O$ 0.5 gm, Fe^{+++}0.2 mg, Zn^{++} 0.2 mg and Mn. 0.1 mg per litre of distilled water. The basal synthetic medium has been boiled with activated charcoal (5 g./litre) to free it from any vitamins present as impurities. Calculated amount of each growth substances has been added separately to the medium to prepare a graded concentration of 0.001, 0.01, 0.1, 1, 10, and 100 PPM. The medium is then taken in each 250 c.c. Erienmeyer flask after noting down their initial *p*H. The flasks have been plugged, sterilized at 15 lbs. pressure from 15 minutes and finally inoculated with inocula of uniform agar disc (5 mm. in diameter).

The inocula have been punched out from the advancing zones of vigorously growing mycelium on vitamin free synthetic agar medium in Petri-dish. The flasks in replicates of three have been incubated at 30°C., in complete darkness with adequate controls. After 7 days of incubation, the mycelia are taken out, washed, dried at 80°C. and finally weighed. The final *p*H of the media are noted. The results have been based on the dry weight of the mycelia and are recorded in Tables 1–8.

Table 1. *Effect of different concentrations of IAA on growth (in mg.) of* Tricholoma giganteum Massee *after 7 days*

Replication	I	II	III	Average
Grades (PPM)				
0.001	10.2	11.2	10.9	10.8
0.01	10.6	10.6	11.7	11.0
0.1	13.5	13.7	13.9	13.7
1	11.3	11.4	11.8	11.5
10	8.1	8.7	8.4	8.4
100	5.2	5.8	5.4	5.5
Control	6.1	7.0	6.2	6.4

Table 2. *Analysis of variance on the results obtained due to variation in concentration of IAA*

Variance due to	D.F.	S.S.	Mean S.S.	F. Value
Treatments	6	156.26	26.4	2640**
Residual error	14	.14	.01	
Total	20	156.4		

** The F value is highly significant at both 5% and 1% level of critical difference.

Table 3. *Effect of different concentrations of NAA on growth (in mg.) of* Tricholoma giganteum Massee *after 7 days*

Replication	I	II	III	Average
Grade (PPM)				
0.001	12.6	11.8	10.9	11.7
0.01	13.2	12.5	11.8	12.5
0.1	13.1	13.0	13.8	13.3
1	13.4	13.1	13.9	13.5
10	11.1	10.2	10.3	10.5
100	7.4	9.0	8.0	8.1
Control	10.6	9.6	8.3	9.5

Table 4. *Analysis of variance on the results obtained due to variation in concentration of NAA*

Variance due to	D.F.	S.S.	Mean S.S.	F-value
Treatments	6	72.59	12.1	13*
Residual error	14	13.42	.96	
Total	20	86.01		

* The F value is highly significant at both 5% and 1% level of critical difference.

Table 5. *Effect of different concentrations of GA on growth (in mg.) of* Tricholoma giganteum Massee *after 7 days*

Replication	I	II	III	Average
Grade (PPM)				
0.001	7.4	7.2	7.6	7.4
0.01	7.8	8.2	7.4	7.8
0.1	8.2	8.5	7.6	8.1
1	10.2	10.5	10.4	10.3
10	12.8	13.3	13.4	13.2
100	6.2	5.8	5.4	5.8
Control	7.2	6.8	7.0	7.0

Table 6. *Analysis of variance on the results obtained due to variation in concentration of GA*

Variance due to	D.F.	S.S.	Mean S.S.	F-value
Treatments	6	109.61	18.26	128.3**
Residual error	14	2.05	.143	
Total	20	111.66		

** The F value is highly significant at both 5% and 1% level of critical difference.

Table 7. *Effect of different concentrations of MH on growth (in mg.) of* Tricholoma giganteum Massee *after 7 days*

Replication	I	II	III	Average
Grade (PPM)				
0.001	9.2	9.4	9.2	9.3
0.01	13.4	13.6	13.8	13.6
0.1	12.8	13.2	12.8	12.9
1	11.8	11.6	10.8	11.4
10	9.2	8.8	8.6	8.8
100	8.1	7.4	7.6	7.7
Control	7.4	7.6	7.2	7.4

Table 8. *Analysis of variance on the results obtained due to variation in concentration of MH*

Variance due to	D.F.	S.S.	Mean S.S.	F-value
Treatments	6	78.28	13.5	5.5**
Residual error	14	33.63	2.47	
Total	20	112.91		

Discussion

From Table 1, it is evident that the amount of growth in IAA is maximum at 0.1 PPM and it gradually decreases with further increase in concentration. In all other cases the growth is better than that in the control flask except in 100 PPM where it is less than the control value. From this, it can be said that optimum concentration of IAA can accelerate growth but distinct inhibition of growth takes place at concentration of 100 PPM.

Table 3 shows that growth of the test fungus increases with increase in concentration from .001 PPM to 1 PPM of NAA with maximum at 1 PPM. Above this point, the amount of growth sharply decreases and at 100 PPM pronounced inhibition of growth has been observed.

From Table 5, it has been observed that in GA, the amount of growth gradually increases with increase in concentration up to 10 PPM. With further increase in concentration pronounced inhibition of growth has been encountered. Thus, optimum concentration of GA can induce better growth, but at supraoptimal concentration, like all other auxins, it inhibits vegetative growth distinctly.

From Table 7 it appears that with the antiauxin MH the vegetative growth increases with the gradual increase in concentration up to 0.01 PPM at which the amount is maximum. Further increase in concentration results to a gradual decrease in the amount of growth. In all the cases except at 100 PPM, MH accelerates growth. At 100 PPM the amount is more or less the same as observed in control.

** The F value is highly significant at both 5% and 1% level of critical difference.

From statistical analysis of the data (Tables 2, 4, 6, 8), it can be concluded that the amount of growth obtained due to variation in concentration is highly significant.

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