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EFFECT OF FUNGAL METABOLITIES OF SEED SURFACE FUNGI ON SEED GERMINATION AND RADICLE GROWTH OF *VICIA FABA* LINN.

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Effect of fungal metabolities of seed surface fungi on the percentage germination of seed and radical growth was studied. Almost all the metabolites inhibited the percentage germination and radicle growth.

Keywords : Radicle growth; Seed germination; Seed surface fungi.

Introduction

Humphreys Jones and Waild[1] have studied effect of seed surface mycoflora and their metabolites on the percentage seed germination and radicle growth. There are number of reports on effect of fungal metabolities on percentage seed germination and radicle growth[2-7].

Material and Method

100 healthy seeds from test plant of *Vicia faba* were surface sterilized with 0.1 percent aqueous $HgCl_2$ and thereafter washed thoroughly three times with sterilized distilled water. Seeds surface dried with Whatman filter paper No. 44. Five seeds were transferred to each plate containing 15 ml Czapek's media of following composition : Agar-agar 15.0 g; KH_2PO_4 1.0g; $MgSO_4$. $7H_2O$ 0.5g; KCl 1.0 g; $FeSO_4$ trace, yeast powder 0.5 g; $NaNO_3$ 2.0 g; dextrose 10.0 g; distilled water 1000 ml. Plates were incubated for 5 days and fungi were identified and isolated.

Selected seed surface fungi were grown in sterilized liquid Czapek's medium in 100 ml conical flasks containing 25 ml of the medium of the following composition : KH_2PO_4 1.0g; $MgSO_4.7H_2O$ 0.5g; KCl 1.0g; $FeSO_4$ trace; yeast powder 0.5 g; $NaNO_3$ 2.0 g; and distilled water 1000 ml. Fungi were allowed to grow for 8 days at 25°C and thereafter the content was filtered through Watman filter paper No. 44.

Surface sterilized seeds (with 0.1% $HgCl_2$) were soaked in the fungal filtrates of individual fungus for 24 hours. Fungal filtrates for the purpose were obtained as described above. The seeds, after soaking in individual fungal filtrate, were washed thoroughly with sterilized distilled water before transferring them into the sterile Petriplates containing filter paper and sterile moist cotton to keep the paper moist. Five replicate with 20 seeds in each plate were kept for each treatment. The number of germinated seeds were recorded daily till the seed germination stopped. Finally percentage germination of seeds was calculated and data were subjected to t' test.

For the effect of the fungal metabolities on growth of the radicles, the first five germinated seeds in the plates were picked up and transferred to the fresh sterilized plates containing sterile filter paper and moist cotton. These were allowed to grow for 5 days after which the length of the radicle was measured and data were subjected to t' test.

Results and Discussion

In the present study twenty-two fungi were isolated from the seed surface of test plant. Out of which eighteen fungi were selected for the present study.

The germination of seed was much affected when seed soaked in fungal culture filtrates. Between two sets of control, in sterile distilled water and Czapek's medium, no significant difference was noted. Therefore, the comparison was made always with seed soaked in sterile distilled water. All treatments gave significant inhibitory effect on seed germination (Table 1).

In the present study seeds soaked in filtrates of *Aspergillus niger, A. luchuensis* and *Alternaria humicola* found to be heavily infected by their respective spores and perhaps this caused reduction in seed germination. In other treatments the reduction of seed germination may be due to the inhibitory factor present in the fungal culture filtates. Similar results were also obtained by Leelavathy[2], Sullia[8], Singh[9] and Kumar and Singh[10].

Seeds soaked in the cultural filtrates of *Tetracoccosporium paxianum* and white sterile mycelium showed insignificant decrease in the length of radicle while in case of other treatments length of the radicle was found to be decreased. Distorted and smallest radicles were observed with seeds soaked in the culture filtrates of *A. niger* and *A. luchuensis* (Table 2).

Effect of microorganisms on seed germination

Table 1. Effect of fungal culture filtrates of seed surface fungi on percentage seed germination of *v. fasa.*

Treatment	Replicate					Mean	% of germination	Value of 't'
	1	2	3	4	5			
Liquid Czapek's medium	20	20	19	20	20	19.8	99.2	0.15
Distilled water	20	20	20	20	20	20	100	-
Rhziopus nigricans	14	12	13	13	12	12.8	64	19.39**
Neocosmospora vasinfecta	12	10	11	13	14	12	60	11.32**
Aspergillus flavus	9	10	8	12	9	9.6	48	15.40**
A. terreus	11	13	9	10	9	10.4	52	12.85**
A. luchuensis	10	8	9	10	7	8.8	44	19.26**
A. niger	6	8	9	6	7	7.2	36	22.01**
Penicillium citrinum	9	10	8	11	10	9.6	48	20.39**
Paecilomyces fusisporus	10	12	9	10	8	9.8	49	15.41**
Nigrospora sphaerica	13	15	12	11	13	12.8	64	10.87**
Cladosporium herbarum	15	12	17	16	14	14.8	74	6.05**
Curvularia tetramera	16	17	14	16	18	16.2	81	5.74**
Curvularia lunata	16	17	16	15	16	16	80	5.75**
Tetracoccosporium paxianum	18	20	17	15	14	16.8	84	3.00**
Alternaria humicola	9	10	07	8	6	8	40	16.98**
Fusarium udum	10	8	12	9	9	9.6	48	15.40**
White sterile mycelium	19	18	20	15	12	16.8	84	2.18*

*Significant at 5% level
** Significant at 1% level

Table 2. Effect of seed surface fungi filtrates on radicle growth in *V. faba.*

Treatment	Length of radicles measured in mm Replicates					Mean length of radicle	Value of 't'
	1	2	3	4	5		
Liquid Czapek's medium	31	29	28	25	30	29.6	0.072
Distilled water	30	32	31	27	28	28.6	-
Rhizopus nigricans	21	22	24	19	18	20.8	6.23**
Neocosmospora vasinfecta	20	17	21	20	17	19	8.49**
Aspergillus flavus	15	14	16	10	12	13.4	11.9**
A. terreus	20	22	19	21	16	19.6	7.22**
A. luchuensis	13	14	12	10	16	13	12.19**
A. niger	7	5	10	5	8	7	17.05**
Penicillium citrinum	18	21	15	20	16	18	7.91**
Paecilomyces fusisporus	17	21	18	19	15	18	8.52**
Nigrospora sphaerica	20	19	24	16	21	20	6.01**
Cladosporium herbarum	23	25	24	21	18	22	4.75**
Curvularia tetramera	24	20	26	25	25	24	4.00**
Curvularia lunata	23	25	22	24	21	23	5.66**
Tetracoccosporium paxianum	27	24	30	26	28	27	1.91
Alternaria humicola	11	9	12	11	12	11	17.30**
Fusarium udum	16	20	17	13	14	16	8.87**
White sterile mycelium	25	21	30	29	24	26	2.02

*Significant at 5% level
** Significant at 1% level

has been studied by a few workers. Leelavathy[2] reported that the culture filtrate of *Trichoderma viridi* had some toxic substances, which might have affected the percentage germination of seed of *Dichanthium annulatum*. Sullia[8] observed that the seeds soaked in filtrate of *Aspergillus niger* showed less germination perhaps due to presence of some inhibitory factor in the fungal cutlure filtrate. The decrease in length of radicle was perhaps due to the presence of growth inhibitory factors in the fungal metabolites.

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