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EFFECT OF FUNGAL METABOLITES OF RHIZOSPHERE FUNGI ON SEED GERMINATION AND RADICLE GROWTH OF *CICER ARIETINUM* LINN.

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The effect of fungal metabolites of rhizosphere fungi was studied on percentage seed germination and radicle growth of *Cicer arietinum* Linn. Inhibition in per cent germination of seeds was observed with all the tested metabolites except of white sterile mycelium in which case inhibition was not statistically significant. A decrease in radicle length was recorded in all the treatments.

Keywords : Fungal metabolites; Radicle growth; Seed germination.

Introduction

Rhizosphere is a region of intense microbial activity and the effect of rhizosphere mycoflora on seed germination and radicle growth has been studied by few workers[1-7]. Tiwari[8] reported the adverse effect of fungal culture filtrates on seed germination Wasnikar *et al.*[9] reported toxic effect of fungal metabolites on seed germination of Sesame. The present work is designed to study the effect of fungal metabolites of rhizosphere fungi on seed germination and radicle growth of *Cicer arietinum*.

Material and Methods

The fungal metabolites of fungi listed in Table 1 prepared to study their effect on seed germination and radicle growth. Seeds were surface sterilized with 0.1% $HgCl_2$ followed by several washings with distilled water and then soaked in fungal metabolites of individual fungus for 24 hours.

Fungal metabolites for the purpose were obtained by growing individual fungus in 25ml Czapek's liquid medium of following composition KH_2PO_4 1.0g: $MgSO_4$ $7H_2O$ 0.5g ; KCl 1.09; $FeSO_4$ Trace; Yeast Power 0.5g; $NaNO_3$ 2.0g; dextrose 10.0g and distilled water 1000 ml in 100 ml conical flask. Fungi were allowed to grow for 10 days at 25°C and finally filtered through Whatman's filter paper No. 44. The seeds after soaking in individual fungus metabolite were washed thoroughly with sterilized distilled water before transferring them aseptically into sterilized plates containing filter paper and sterile moist cotton to keep the paper moist. Five replicates with 20 seeds in each plate were prepared for each treatment. The number of germinated seeds were recorded daily till seed germination stopped and final per cent germination was calculated.

For the effect of fungal metabolites on the 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 and allowed to grow for 6 days after which length of the radicles was measured. The data were statisfically analysed.

Result and Discussion

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 seeds soaked in sterile distilled water. The percentage germination of seeds was much effected. Almost all the metabolites tested were inhibitory to seed germination (Table 1). The maximum inhibition in seed germination was caused by *Myrothecium roridum* followed by *Aspergillus niger* and *A. luchuensis*. Seed soaked in the fungal metabolite of white sterile mycelium inhibited the percentage seed germination but the inhibition was not statistically significant (Table 1).

All most all the fungal metabolites inhibited the length of radicle. Distorted and smallest radicles were observed with seed soaked in culture filtrate of *Myrothecium roridum* followed by *Aspergillus niger* and *Aspergillus luchuensis*. Maximum inhibition in the length of radicle was noted in *Myrothecium roridum* (Table 2).

Yadav[7] reported that seeds soaked in the fungal meabolites of rhizosphere fungi inhibited the per cent seed germination and radicle growth. Singh[6] reported the adverse effect of fungal metabolites on seed germination of radish. Roy *et. al.*[5] reported the adverse effect of fungal metabolites on seed germination and radicle growth of *Trigonella foenum graecum*. Doshi and Bhandari[10] observed the inhibition in per cent seed germination of

Table 1. Effect of fungal metabolites of rhizosphere fungi on seed germination.

Name of fungi	Germinated Seed Replicate					Mean of germinated Seed	Germinated Seed%	Value of 't'
	1	2	3	4	5			
Control (distilled water)	20	20	20	20	20	20	100	—
Control (Czepek's medium)	20	19	20	20	20	198	—	0.15
Rhizopus nigricans	17	18	18	16	17	17	86	8.00**
Mucor mucedo	16	17	15	17	16	162	81	6.86**
Chaetomium globosum	15	16	15	14	15	15	75	16.94**
Cephalosporium Coremioides	15	14	15	15	16	15	75	16.94**
Paecilomyces fusisporus	14	15	13	12	15	13.8	69	11.31**
Stachybotrys atra	12	13	11	12	12	12.0	60	27.10**
Trichoderma lignorum	10	10	9	11	10	10	50	33.88**
Aspergillus flavus	12	13	12	12	11	12	60	27.10**
A niger	5	6	4	5	5	5.0	25	50.83**
A. luchuensis	9	9	8	10	9	9.0	45	37.27**
Penicillium citrinum	10	11	10	9	11	10.2	51	28.00**
Nigrospora sphaerica	14	15	13	14	16	14.4	72	11.65**
Cladosporium herbarum	15	14	16	15	15	15.0	75	27.10**
Curvularia lunata	14	13	15	12	15	13.8	69	11.31**
Alternaria tennuis	13	12	14	13	13	13	65	23.72**
Fusarium udum	13	12	14	14	11	12.8	64	13.13**
Myrothecium roridum	4	5	3	4	4	4.0	20	54.21**
White sterile mycelium	20	14	19	15	20	17.6	88	1.97**

** Significant at 1% level = 2.87
* Significant at 5% level = 2.10

Table 2. Effect of fungal metabolites of rhizosphere fungi on radicle growth.

Name of fungi	Germinated Seed Replicate					Mean length of radicles	Value of 't'
	1	2	3	4	5		
Control (distilled water)	51	50	51	51	52	51.0	—
Control (Czepek's medium)	50	52	51	50	50	50.6	0.15
Rhizopus nigricans	49	48	50	48	49	48.8	6.28**
Mucor mucedo	48	48	46	47	46	47.0	9.48**
Chaetomium globosum	43	44	42	41	44	42.8	14.96**
Cephalosporium coremioides	41	39	40	42	40	40.4	22.04**
Paecilomyces fusisporus	37	37	35	37	36	36.4	38.91**
Trichoderma lignorum	19	18	17	20	20	18.8	58.75**
Aspergillus flavus	38	36	36	37	39	37.2	25.18**
A. niger	7	6	6	8	8	7.0	104.38**
A. luchuensis	11	10	11	12	12	11.2	113.74**
Penicillium citrinum	22	22	20	22	21	21.4	78.89**
Stachybotrys atra	14	14	15	13	16	14.4	76.15**
Nigrospora sphaerica	32	33	30	32	31	32.6	38.23**
Cladosporium herbarum	26	25	25	27	24	25.4	53.26**
Curvularia lunata	23	22	26	26	24	24.6	35.01**
Alternaria tennuis	39	40	38	39	39	39.0	40.66**
Fusarium udum	34	30	32	34	35	33.0	21.34**
Myrothecium roridum	5	4	5	3	4	4.2	133.75**
White sterile mycelium	45	44	43	44	46	44.6	

** Significant at 1% level = 2.87
* Significant at 5% level = 2.10

Pleurotus sajor Caju. Kumar *et al.*[11] reported that *Myrothecim roridum* and *A. niger* strongly depressed the seed germination and radicle growth of *Vigna sinensis.*

In the present study, seed soaked in the filtrate of *Myrothecim roridum, A. niger* and *A. luchuensis* found to be heavily infected by their respective spores and perhaps they caused reduction in seed germination and radicle growth. In other treatments the reduction of seed germination and radicle growth may be due to the inhibitory factor present in the fungal culture filtrates. This observation corroborated with the earlier findings[8,9,11-13].

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