

Effect of foliar application of culture filtrates on phylloplane mycoflora of mustard

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The number of phylloplane fungi/cm² leaf varied insignificantly on mustard leaves treated with the metabolites of *Cladosporium cladosporioides* and *Alternaria brassicae* in the beginning but decreased significantly after about a month. *C. cladosporioides*, *C. herbarum*, *A. pullulans* and *E. nigrum* were tolerant to the metabolites used while *T. viride* was most susceptible.

INTRODUCTION

Effect of fungicides and other agro-chemicals on the microbial populations of aerial surfaces of plants have been extensively reviewed by Hislop (1976). The composition of phylloplane microflora thriving in a particular environment is the result of competition for nutrients, space and tolerance towards metabolic products of interaction microbes. Although several attempts have been made to observe changes in the composition of the microfungi associated with root regions, little information is available on such changes on the leaf surface particularly due to the application of culture filtrates of associated microfungi. I have investigated, therefore, the effect of culture filtrates of *Cladosporium cladosporioides*, the most frequently isolated saprophyte on the phylloplane and *Alternaria brassicae* (a pathogenic fungus on mustard leaf) on composition of phylloplane mycoflora of mustard.

MATERIALS AND METHODS

Mustard (*Brassica campestris* L. var. YS-42) was sown in earthenware pots (18 × 25 cm) (2 plants/pot) and the experiments were performed after 30 days of growth of the plants. The fungal culture filtrates were obtained by the following

method: 5 mm blocks, taken from actively growing regions of 5 day old culture of each individual fungus, were inoculated into separate 250 ml conical flasks each containing 100 ml of sterilized liquid potato dextrose medium. After 10 days of incubation at $25 \pm 1^\circ\text{C}$ the static cultures were filtered firstly through Whatman filter paper no. 44 and then through Seitz filter. 5 ml/plant of each metabolite was sprayed thrice on 10 plants, separately at 20 days interval, growing in the Botanical Garden, Banaras Hindu University. Plants sprayed with sterilized distilled water and liquid potato dextrose medium served as controls. The first spraying was done on 2 December. After each spraying, the leaf samples were collected twice, one after 6 days and the other after 16 days for the isolation of leaf surface mycoflora. The mycoflora were isolated by dilution plate technique and fungi/cm² leaf was calculated (S i n g h, R a i 1980).

Table 1
Effect of culture filtrates on the numerically more important phylloplane fungi
/The number against a species represents fungi/cm²/

Species	Spraying																			
	I								II								III			
	Samplings																			
	1				2				1				2				1			
C	Cp	Cc	Ab	C	Cp	Cc	Ab	C	Cp	Cc	Ab	C	Cp	Cc	Ab	C	Cp	Cc	Ab	
<i>Choanephora cucurbitarum</i> /Berk.et Rav./ Thaxt.	20	18	8	4	16	4	-	10	10	4	-	-	-	-	-	-	-	-	-	-
<i>Mortierella subtilissima</i> Oud. et Koning	15	20	4	4	10	8	-	4	10	4	-	-	13	22	-	-	5	-	-	-
<i>Acrophialophora fusispora</i> /Saksena/ M.B. Ellis	-	57	4	-	4	-	38	-	8	-	4	-	4	4	10	-	15	-	4	-
<i>Alternaria alternata</i> /Fr./ Keissler	20	24	20	18	34	20	-	8	54	58	-	-	50	45	61	21	116	161	95	116
<i>A. humicola</i> Oud.	19	10	18	25	20	8	-	-	20	12	-	-	30	35	-	-	70	69	45	65
<i>Aspergillus flavus</i> Link	10	-	-	-	5	4	-	4	-	4	13	-	10	6	-	-	-	-	5	-
<i>A. niger</i> van Tiegh.	-	17	-	-	9	8	8	-	8	9	-	13	6	-	5	10	23	20	10	35
<i>Aureobasidium pullulans</i> /de Bary/ Arnaud	9	17	17	51	10	-	-	-	10	42	60	4	25	31	112	107	20	35	24	41
<i>Bipolaris spicifera</i> /Bain./ Subram.	18	10	4	14	20	20	4	10	20	25	4	8	45	60	-	-	52	-	-	-
<i>Cladosporium cladosporioides</i> /Fres./ de Vries	142	180	230	240	213	243	217	248	330	342	196	236	369	398	357	402	428	481	352	380
<i>C. Herbarum</i> /Pers./ Link et Fr.	19	38	68	58	30	34	48	41	49	76	47	89	58	62	45	71	78	81	78	50
<i>Curvularia lunata</i> /Wakker/ Boedjan	-	-	-	-	21	8	13	17	4	-	-	-	10	24	-	-	20	40	33	38
<i>Epicoccum nigrum</i> Link.ex Wallr.	-	-	-	-	-	-	-	-	20	17	13	-	16	20	20	-	10	32	32	42
<i>Nigrospora oryzae</i> Petch	4	8	17	4	8	-	4	-	6	-	-	19	12	18	-	51	-	-	-	-
<i>Penicillium citrinum</i> Thom	9	-	-	-	6	111	66	94	10	-	-	18	-	-	-	15	-	-	15	36
<i>Trichoderma viride</i> Pers. ex Fr.	-	-	-	-	30	40	10	-	40	52	-	-	167	105	-	-	110	102	-	-
Black sterile mycelium	17	-	-	-	17	34	8	4	6	13	17	17	-	-	-	-	30	51	5	20
White sterile mycelium	-	17	-	4	4	21	-	21	-	-	4	-	6	-	-	5	5	-	-	5
Average no.of fungi/cm ²	354	495	481	521	489	539	410	506	605	640	392	434	903	698	630	753	974	1020	736	780
Total no.of species isolated	18	17	17	15	20	17	10	17	21	18	11	10	22	18	9	11	24	12	13	14

C - Distilled water control, Cp - Liquid potato-dextrose control, Cc - Metabolite of *Cladosporium cladosporioides*, Ab - Metabolite of *Alternaria brassicae*; - No fungi, 1 - After 6 day of spraying, 2 After 16 days of spraying

RESULTS AND DISCUSSION

No significant increase in the number of fungi/cm² leaves treated with potato dextrose medium, in comparison to the control with distilled water occurred during the whole experimental period.

A perusal of Table 1 indicates that the number of phylloplane fungi/cm² leaf varied insignificantly on treated as well as controlled leaves in the first and second samplings. However, the number of fungi/cm² leaf decreased significantly on the leaf samples treated with the metabolites of both the fungi in the third, fourth and fifth samplings. Some fungi, namely *Aspergillus luchuensis*, *Rhizoctonia solani*, *Rhizopus nigricans* and *Trichoderma viride*, were recorded susceptible to the metabolites of both the fungi. However, *Aspergillus terreus* was noted susceptible to the metabolite of *C. cladosporioides* while *Acrophialophora fusispora*, *Aspergillus fumigatus* and *Beltrania* sp. to the metabolite of *A. brassicae*.

Fungal metabolites are known to inhibit the growth and sporulation of several fungi due to presence of antibiotic substances. Therefore, decrease in percentage of various fungi recorded under different treatments may be attributed to the presence of inhibitory substances like antibiotics and/or to microbial antagonism. A few fungi, namely *Cladosporium cladosporioides*, *C. herbarum*, *Aureobasidium pullulans* and *Epicoccum nigrum* increased in various samplings mostly because of their tolerance, *E. nigrum*, *A. pullulans* and *C. cladosporioides* were recorded to be highly antagonistic for *A. brassicae* in vivo by Singh (1977). He also reported the growth inhibition of *A. brassicae* by the metabolite of *C. cladosporioides* in vivo. Diem (1969) and Warren (1972) have also reported the antagonistic behaviour of *Cladosporium* sp. Tolerance to antagonism has been reported to be an important character for success of a fungus in mixed culture (Park, 1960).

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