Mycoflora associated with floral parts of Hibiscus rosa-sinensis

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As far as authors are aware no systematic information is available regarding the mycoflora associated with different floral parts. Some fragmentary reports in connection with the local infection of one or the other parts of the flower though available are merely of local interest (Schonbeck, 1967; Wolfswinkee, 1966; Plate and Schineider, 1966). Authors (1968) while investigating the phyllosphere and phylloplane microflora of certain crop plants considered worth investigating the nature of mycoflora associated with the different flower parts, which in various ways are similar to the leaves, particularly the sepals and petals. In the present paper the fungi of sepals, petals, stamen and carpel of *Hibiscus rosa-sinensis* have been described.

Materials and Methods

Blossomed flowers of the said plant were collected at random from the botanical garden of the University and brought to the laboratory. Sepals, petals, stamens and carpels were seperated by sterilized forceps and put into different sterilized containers. Small pieces of equal dimension were prepared by means of sterilized razor and the equal number of pieces were introduced separately into 150 cc. conical flasks containing 50 cc. sterilized distilled water. The flasks with the pieces were wrist shaken thoroughly for half an hour and the water with spore suspension was inoculated on nutrient plates containing modified Martin's medium. The flower pieces were taken out, thoroughly washed with sterilized distilled water (15 times) and placed on sterilized filter paper to soak the external water and plated out on the nutrient plates poured with yeast extract Czepek's medium (pH 4). The flowers were collected in April, August and December of 1968 and the fungal population assessed as described above.

The fungal species loosely attached with the floral parts which could be easily washed down in water were obtained by the former method while closely adhering ones by the latter. The plates were incubated for 6 days in B. O. D. incubator at $25 \pm 1°$ C and thereafter the fungi appearing in them were identified and listed.

Results

In table 1 and 2 are listed the fungal species isolated by washing and direct inoculation techniques. Table 3 summarises the number of spp. isolated by the two methods. 25 forms were obtained by washing method. 18, 11, 14 and 10 species were associated with sepal, petal, stamens and carpel respectively. The number of species also differed in different sampling months. The variation in number of species was, however, not remarkable in case of petals and stamens (Table 3) and nearly the same number of species was obtained in three months. The number in case of sepal and carpel was comparatively higher in April and December and least in August. Dominant fungal species differed in different months. Some of the species were uniformly associated with all the floral parts while others showed restricted occurrence. Only *Alternaria* was common dominant in April (Table 1).

Seventeen species were isolated by direct inoculation method. 9, 11, 9 and 4 species were associated with sepals, petals, stamens and carpels respectively. Comparatively higher humber of species from the different parts was obtained in August. Only *Rhizopus* was com mon dominant and appeared almost throughout the course of investigation. *A. niger* and *A. flavus* were also of wide occurrence with considerably higher percentage. The other dominants varied in different months (Table 2).

Discussion

The results obtained in this investigation are similar to those of Phyllosphere and Phylloplane regions (Mishra and Srivastava, 1968 a, b). The floral parts may conveniently be compared to leaf system both in providing space to micro-organisms for colonization and in exuding/secreted various substances from the floral parts which possibly favour the growth of microbes. However, the nature of substances secreting might be different in different floral parts. The sepals being green and photosynthetic might be secreting substances similar to leaf; petals, stamens and carpels being nongreen may differ in this respect. The higher number of species being associated with the sepals clearly suggests a rich nutritional microenvironment of this region, the other parts may be comparatively poor in their nutritional level. The variation in the fungal species at different sampling periods is also due to change in environmental-condition. As observed in the case of phyllosphere by the authors (unpublished data) the number of species obtained by washing method in rainy season was low. This is due to the rainfall which washes down some of the forms from the flower surface.

As such an analogy with the phyllosphere and phylloplane may

conviently be suggested with the floral parts and parallel terms "Flowerosphere" and "Floweroplane" may be introduced to denote the two microenvironmental regions of the flower parts.

Summary

Mycoflora associated with the floral parts of *Hibiscus rosa-sinensis* has been studied by washing and direct inoculation methods. The dominant fungi varied on 3 sampling periods. Only *Alternaria* was invariably obtained as dominant with all the floral parts i. e. sepals, petals, stamens and carpels and the other dominants differed.

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Table 1. Percentage occurrence of fungal species associated with the floral parts of *Hibiscus rosa-sinensis* (washing method)

Fungi isolated	Sepal			Petal			Stamen			Carpel		
	I	II	III	I	II	III	I	II	III	I	II	III
Rhizopus stolonifer		15	12	12		12	19	5	5		26	22
Aspergillus nidulans			2									
Neocosmospera vasinfacta	4						16					
Aspergillus candidus	2			2								
A. ochraceus	2											
A. sydowi	4							22			3	
A. niger			3	2	3	48		5				
Aspergillus terreus									45	4		
A. awamori			4					6				
A. flavus		25	4		14	4		43			60	10
A. aculeatus					8							
Penicillium spiculisporum										23		
Verticillium sp.	4											
Cephalosporium sp.	2						6					
Acremonium sp.		60	10		28				30	4		
Gliocladium roseum					7							
Geotrichum sp.			30					6				
Curvularia spp.			13		40	2		19			14	15
Scolecobasidium constrictum										4		
Cladosporium spp.	14		16	12		32	15		10	15		53
Alternaria spp.	60			58			40			44		
Epicoccum sp.	4						4					
Fusarium spp.			6	14		2			10			
White sterile colony										3		
Yellow sterile colony	4											

Table 2. Percentage occurrence of fungal species associated with floral parts of *H. rosa-sinensis* (Direct inoculation)

Fungi isolated	Sepal			Petal			Stamen			Carpel		
	I	II	III	I	II	III	I	II	III	I	II	III
Rhizopus stolonifer	34	16	45		40		30	6	78	65	42	75
Pythium sp.					6							
Aspergillus nidulans		8				34						
A. niger		6		20	20	30		20	22			
A. terreus							5					
A. flavus		14	15		30			50			20	
A. sydowi		54									38	25
A. aculeatus			25		4							
A. sp.								4				
Alternaria spp.	66			20			20					
Curvularia spp.			15			36						
Monilia geophila								10				
Humicola fusco-atra								10				
Cladosporium spp.				20			45			35		
Fusarium sp.		2										
White sterile colony				20								
Black sterile colony				20								

I = Observation in April, 1968.
II = Observation in August, 1968.
III = Observation in December, 1968.

Table 3. Number of species isolated from the floral parts of *H. rosa-sinensis* by washing and direct inoculation methods

Floral parts	April '68		August '68		December '68	
	W	D	W	D	W	D
Sepal	10	2	3	6	9	4
Petal	6	5	6	5	6	3
Stamen	6	4	6	6	5	2
Carpel	8	2	3	3	4	2

W = Washing method.
D = Direct method.