

## STUDIES ON LEAF SURFACE MYCOFLORA OF *SETARIA ITALICA* IN RELATION TO AIR-BORNE FUNGI IN ALMORA HILLS.

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The study of leaf surface and air mycoflora associated with *Setaria italica* revealed the presence of 58 species of fungi. A close correlation between the resident species of the leaf surface and air was observed. The number of phycomyces and Aspergilli was nearly the same in both the environments. Air-spores, however was chiefly dominated by the members of Deuteromycetes.

*Setaria italica* Beauv. is an important minor millet crops of Kumaun Himalaya, and is commonly known as 'Kauni' in this region. Plant leaf surface is a good micro-habitat for the growth of saprophytic as well as parasitic fungi. Studies on leaf surface have attracted the attention of several workers with various viewpoints. The leaf surface of living green leaves, the phylloplane are known to be colonized by a complex array of parasitic and non-parasitic micro-organisms, chiefly fungi and bacteria (Dickinson and Preece, 1976). The present investigation was designed to study the leaf surface of *Setaria italica* with an attempt to observe, if the composition of the phylloplane fungal population is influenced by the air mycoflora in Kumaun hills.

### MATERIALS AND METHODS

Seeds of *Setaria italica* were sown in April, 1984. The leaf surface mycoflora and air mycoflora were in-

vestigated at monthly intervals. To study the leaf surface mycoflora samples were collected in sterilized polythene bags at random from different heights of the plant with sterilized scissors and forceps and brought to the laboratory for isolation of mycoflora by dilution plate technique. Disks of 5 mm diam. were cut from different portions of sampled leaf with sterilized cork borer. 100 such disks were introduced into 250ml flask containing 100 ml sterilized distilled water and shaken by mechanical shaker for 20 min to get homogeneous suspension of propagules. The suspension was further diluted by 1:10. One ml suspension of this dilution was inoculated in each of the 10 petridishes. The inoculated petridishes were then poured with 20 ml Czapek's agar medium and incubated at 25 ± 1° C for 6 days after which fungal colonies were identified and fungi/cm<sup>2</sup> was calculated. To study the air mycoflora 10 petridishes containing 20ml Czapek's

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agar medium were exposed for 5 min at different heights on the date of collection of samples and then incubated for 6 days after which fungi were recorded and their percentage occurrence was calculated.

## RESULTS AND DISCUSSION

The results are summarized in Table I. 58 fungal species were

recorded from both the environments i.e. phylloplane and air. The members of Deuteromycetes constituted 87.90% of the total fungal population. Thirty seven species were of common occurrence in both the environments. *Aspergillus clavatus*, *A. versicolor*, *penicillium granulatum*, *Epicoccum purpurescens*, *Verticillium candelbrum*, *Chaetomium spirale* and *Sclerotium* sp. were found to be associated only with the leaf

Table 1. Distribution of fungal species in phylloplane and air (PP = phylloplane, A = air.)

Name of the fungal species	PP (fungi/cm <sup>2</sup> )	A (%)
<i>Aspergillus niger</i> Van Tieghem	101	24
<i>A. luchuensis</i> Iriui.	50	22
<i>A. flavus</i> Link.	76	28
<i>A. clavatus</i> Desmaz. eres	25	—
<i>A. fumigatus</i> Fresenius	50	34
<i>A. candidus</i> Link.	25	24
<i>A. versicolor</i> (Vuillemin) Tiraboschi	25	—
<i>Alternaria humicola</i> Oudemans	—	24
<i>A. brassicae</i> (Berk) Sacc.	25	14
<i>A. brassicicola</i> (Schw.) Wiltshire	50	14
<i>A. solani</i> Sorauer	25	24
<i>A. alternata</i> Fr. Keissler	25	26
<i>Cladosporium herbarum</i> (Persoon) Link.	50	18
<i>C. cladosporioides</i> (fresen.) de Vries	76	24
<i>Curvularia lunata</i> (Wakker) Boedijn	76	20
<i>C. brachyspora</i> Boedijn	50	22
<i>Drechslera halodes</i> (Drechsler) Subram. and Jain	—	20
<i>D. setariae</i> (Ito and Kuribayashi) Drechsler ex Dastur	101	18
<i>Helminthosporium solani</i> Dur. and Mont.	50	20

Contd...

<i>Fusarium nivale</i> (Fries) Cesati	25	14
<i>F. oxysporum</i> Schlechtendahl	76	24
<i>F. moniliformae</i> Sheldon	76	36
<i>F. avenaceum</i> (Fries) Saccardo	25	24
<i>F. solani</i> (Mortius) Appel and Wollenweber	25	14
<i>F. dimorbum</i> Penzig	50	16
<i>F. chlamydosporum</i> Wollenweber and Reinking	—	20
<i>Mucor plumbeus</i> Bonorden	25	16
<i>M. pusillus</i> Lindt	25	30
<i>Penicillium digitatum</i> Saccardo	50	14
<i>Penicillium granulatum</i> Bainier	25	—
<i>P. oxalicum</i> Thom.	25	14
<i>P. chrysogenum</i> Thom.	76	18
<i>Rhizopus nigricans</i> Ehrenberg	50	32
<i>R. oryzae</i> Went and Gerling	25	22
<i>Septoria</i> sp. Sacc.	25	10
<i>Trichoderma koningi</i> Oudemans	25	20
<i>T. album</i> Preuss	76	24
<i>Myrothecium roridum</i> Tode	25	18
<i>Epicoccum purpurescens</i> Ehrenberg	25	—
<i>Chaetomium spirale</i> Zopf.	25	—
<i>Torula lucifuga</i> Oudemans	50	20
<i>Phoma humicola</i> Gilman and Abbott.	50	30
<i>P. hibernica</i> Grimes, O'connor and Cummins	—	14
<i>Verticillium candelabrum</i> Bonorden	25	—
<i>Mortierella subtilissima</i> Oudemans	50	20
<i>Pithomyces chartarum</i> (Berk. and Curt.) M. B. Ellis	25	10
<i>Alternaria longipes</i> (Ellis and Evereh) Mason	—	14
<i>A. tenuis</i> Nees	—	14
<i>Bispora antennata</i> (Pers.) Mason	—	22
<i>Scytalidium lignicola</i> Pesante	—	24
<i>Aureobasidium pullulans</i> (DE Bary) Arneuo	—	14
<i>Pestalotia</i> sp. de Not	—	20
<i>Pyricularia setariae</i> Sacc.	—	22
<i>Monilia implicata</i> Gilman and Abbott.	—	56
<i>Nigrospora oryzae</i> Hudson	—	24
<i>Trichophyton</i> sp. Malmsten	—	14
White sterile mycelium	50	22
<i>Sclerotium</i> sp. Tode	25	—
<b>Total number of fungal species</b>	<b>44</b>	<b>51</b>

surface of the test plant, whereas *Alternaria humicola*, *A. longipes*, *A. tenuis*, *Drechslera halodes*, *Fusarium chlamydosporum*, *Phoma hibernica*, *Bispora antennata*, *scytalidium lignicola*, *Aureobasidium pullulans*, *Monilia implicate*, *Pyricularia setariae*, *Nigrospora oryzae*, *pestalotia* sp and *Trichophyton* sp were present only in air. 44 species were recorded from phylloplane and 51 from air.

The dominant fungal forms associated with the leaf surface were trapped concurrently from the air of the field. The number of spores, deposited on the leaf surface was directly proportional to the number of spores present in air (Gregory, 1971). Leaf acts as landing site for various microbes present in air (pady, 1971). Once trapped the micro-organisms grow and multiply there upon in the presence of various nutrients (Tewari, 1973). As evident from the data the leaf surface however did not prove conducive for the growth of all the fungi present on it or in the air. *Aspergillus flavus*, *Alternaria brassicicola*, *curvularia brachyspora*, *Drechslera setariae*, *Helminthosporium solani*, *Fusarium nivale*, *Penicillium digitatum*, *P. oxalicum*, *Pithomyces chartarum* and *Septoria* sp flourished well on the leaf surface probably due to the availability of suitable substrate in the environment. However the micro-environment of the boundary layer might not be suitable for all the micro-organism trapped on the leaf

surface and most of the forms causally present on the leaf surface did not thrive well (Sutton, 1953), among various species impacted on the leaf surface relatively few succeeded in colonizing in it (Hudson, 1971).

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#### REFERENCES

- DICKINSON, C. H. and T. F. PREECE. 1976. Microbiology of aerial plant surfaces. Academic Press, London and New York.
- GREGORY, P. H. 1971. The leaf as a spore trap. In Ecology of leaf surface microorganisms. Academic Press, London N. Y. 239-243.
- HUDSON, H. J. 1971. The development of saprophytic fungal flora as leaf senescence and fall. In Ecology of leaf surface microorganisms. Academic Press, London, N. Y. pp. 447-455.
- PADY, S. M. 1971. Spore release in some foliar saprophytic and parasitic fungi. In Ecology of leaf surface microorganisms. Academic Press.
- SUTTON, O. G. 1953. Micrometereology. Mc. Graw. Hill. N. Y.
- TEWARI, R. P. 1973. Investigation into phylloplane microflora of certain crop plants. Ph.D. Thesis. University of Gorakhpur, India.