

FURTHER CONTRIBUTIONS TO THE CELLULOSE DESTROYING FUNGI OF PAKISTAN

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Abstract. Fungi causing deterioration of cellulosic materials such as paper, cloth, straw and cotton in nature were collected and examined. A total number of 35 fungi belonging to the *Myxomycetes*, *Phycomycetes*, *Ascomycetes* and *Fungi imperfecti* were isolated. Fungi belonging to *Ascomycetes* and *Fungi imperfecti* were predominant and species of *Chaetomium* and *Aspergillus* were most frequent in their respective groups.

Present investigation was carried out in an effort to further the work of previous investigators and hence certain cellulolytic materials like paper, cotton, cloth and straw were examined to isolate microorganisms colonizing these materials.

Fungi have long been known attacking and destroying cellulosic materials like paper, cloth, straw and cotton. Ahmad reported *Ascotricha pusilla* (Ell. & Ev.) Chivers on paper and cardboard and isolated *Stachybotrys atra* Corda and *Trichosporium cerealis* (Thuem.) Sacc. from old papers.^{1,2} Khanum and Ahmed collected 24 fungi belonging to 9 genera,⁴ while Ahmed and Ahmed reported *Penicillium frequentans* Westling from filter papers.³

Materials and Methods

Cotton, filter paper, cloth, straw and rope (hemp) were collected from localities of Jinnah Hospital, Karachi University campus and P.C.S.I.R. Laboratories Karachi and was directly examined under the microscope. The material was inoculated separately in petri-plates containing 20 ml potato dextrose-agar, potato malt-agar or Czapek's agar media. To inhibit bacteria and fast growing fungi Rose Bengal in the ratio of 1:30000 was used in each medium. Small obviously infested portions were carefully cut and placed onto the medium. The petri-plates were then incubated at 28°C for one week. They were examined every 24 hr or as and when found necessary.

Pure cultures from the emerging colonies were made in tubes containing PDA slants. The fungi so isolated were examined under low and high power of microscope for identification. Characters like size of fruiting bodies, colour and growth pattern were taken into consideration for specific identification. Cultures were also sent to Commonwealth Mycological Institute for confirmation. Herbarium specimens of all species have been deposited in Mycological Herbarium, PCSIR, Karachi.

Results

Thirty-five species belonging to 21 genera of fungi were isolated from various cellulolytic materials. Three of those belong to *Myxomycetes* one to *Phycomycetes*, fifteen to *Ascomycetes* and sixteen to *Fungi imperfecti*.

Myxomycetes

Licea tenera John, on paper, PCSIR Herb. no 78.

Physarum pusillum Lister, on paper, PCSIR Herb. no 183.

Perichaena corticalis Rost., on paper, PCSIR Herb. no. 198.

Phycomycetes

Pilobolus kleinii van Tieghem, on paper, PCSIR Herb. no. 187.

Ascomycetes

Chaetomium globosum Kunze ex Fries, on paper, cloth, rope and cotton PCSIR Herb. no. 302, 305.

C. funicola Cooke, on paper and cotton, PCSIR Herb. no. 218.

C. aureum Chivers on paper and cotton, PCSIR Herb. no. 304.

C. spirale Zopf, on paper and cotton, PCSIR Herb. no. 306.

C. convolutum Chivers on paper, PCSIR Herb. no. 283 & 287.

C. olivaceum Cooke and Ellis, on paper, PCSIR Herb. no. 284.

C. fusisporale Rai and Mukerji, on paper, PCSIR Herb. no. 285.

Ascobolus americanus (Cooke et Ellis) Seaver, on paper, PCSIR Herb. nos. 14, 16, 36, 40, 46, 50, 53.

A. immersus Pers., on paper, PCSIR Herb. no. 16.

Ascophanus aurora (Crovan) Boud., on paper, PCSIR Herb. nos. 33 & 63.

Microascus stysanophorus (Matt.) Baron et al., on paper, PCSIR Herb. no. 282.

Saccobolus violascens Boud., on paper, PCSIR Herb. no. 13, 30 & 64.

Sordaria fimicola (Rob.) Ces & De Not., on paper, PCSIR Herb. no. 303.

Strattonia karachienses Ahmed & Fatima, on paper and straw, PCSIR Herb. no. 98.

Sporormiella tetramera Ahmed & Cain, on paper, PCSIR Herb. nos. 21 & 60.

Fungi imperfecti

Aspergillus flavus Link ex Fries, on paper, cloth and cotton, PCSIR Herb. no. 285.

A. fumigatus Fresenius, on paper, cloth and cotton, PCSIR Herb. no. 155.

A. terreus Thom, on paper, cloth and cotton, PCSIR Herb. nos. 134 & 151.

A. niger van Tieghem, on paper, cloth and cotton, PCSIR Herb. no. 153.

A. ustus (Bainier) Thom & Church, on paper, cloth and cotton, PCSIR Herb. nos. 141 & 171.

A. nidulans (Eidam) Winter, on paper, cloth and cotton, PCSIR Herb. no. 286.

Alternaria sp., on paper and cotton, PCSIR Herb. no. 103.

A. alternate (Fr.) Keissler, on paper, cotton and cotton rope, PCSIR Herb. nos. 132, 156, 291, 310.

Fusarium sp., on paper, PCSIR Herb. no. 199.

Helminthosporium hawaiiensis Bugnicourt, on paper and cotton, PCSIR Herb. no. 103.

Memnoniella echinata (Riv.) Galloway, on paper, cotton and cloth, PCSIR Herb. nos. 98, 106, 199.

Penicillium ehrlichii Kleb., on paper, PCSIR Herb. nos. 101, 102.

P. capsulatum Raper & Fennell, on paper, PCSIR Herb. no. 281.

Stachybotrys atra Corda, on paper, cotton and cloth, PCSIR Herb. nos. 98, 104, 308.

Streptomyces sp., on paper, cotton and cloth, PCSIR Herb. nos. 301, 309.

Stemphylium sp., on paper, PCSIR Herb. no. 103.

The results indicate that members of *Ascomycetes* and *Fungi imperfecti* play a dominant role in the decomposition of cellulose. It may be pointed out, however, that this sampling of cellulolytic fungi does not necessarily mean that other fungi do not attack cellulolytic materials. Very comprehensive data will be required to reach any definite conclusion. Species of *Chaetomium* and *Aspergillus* were the most prevalent fungi in their respective classes. *Aspergillus* species attacked all the three cellulolytic materials namely cotton, cloth and paper invariably.

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References

1. S. Ahmed, Fungi of West Pakistan, Monograph No. 1, Biological Society of Pakistan (1956).
2. S. Ahmed, *Biologia*, **21**, 138 (1962).
3. Q.A. Ahmed, and N. Ahmed, *Pakistan J. Forest*, **16**, 402 (1966).
4. R. Khanum and Q. A. Ahmed, *Pakistan J. Sci. Ind. Res.*, **1**, 251 (1958).