

## THE FUNGAL FLORA OF THE MANGROVE SWAMPS OF GOA

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### ABSTRACT

Mangrove swamps of Goa showed the presence of fungi belonging to 14 different genera, predominant ones being *Monilia*, *Mucor*, *Syncephalastrum*, *Aspergillus* and *Trichothecium*. Most of the isolates were found to be physiologically active and exhibited cellulolytic, amylolytic and pectinolytic activities.

Fungi are known to be of primary importance in the degradation of plant material (Jones, 1974; Kaushik and Hynes, 1971). A variety of such fungi are found in mangrove swamps where the foliage comprises the major organic material (Rai, Tiwari and Mukerji, 1969; Chowdery, 1979). The mangrove swamps of Goa situated along the Mandovi and the Zuari estuaries undergo well marked seasonal changes in physico-chemical parameters and microbial population (Matondkar, Mahtani and Mavinkurve, 1980).

The present studies were undertaken to assess the qualitative nature of the fungal flora, particularly with respect to their physiological activities.

Sampling sites and techniques used for enumeration of isolated colonies of fungi during the different seasons have been described earlier (Matondkar, Mahtani and Mavinkurve, 1980). The sediment samples from swamps at Borim station, collected in sterile containers were diluted and plated on saboraauds agar plates. After 3-4 days incubation at room temperature, the isolated colonies were picked up at random, purified and maintained on saboraauds agar slants. The cultural and sporulating characteristics of these isolates were studied by growing the cultures on sterile cover slips placed at an angle in saboraauds agar medium. Isolates were identified according to standard schemes (Harrigan and McCance, 1973; Gilman, 1967) and further characterized for physiological activities according to the methods described by Rodina (1972).

In the present study seventyfour isolates were obtained, depicting diverse cultural and morphological features. The colonies exhibited slimy, dry or cottony texture, majority of them being non-spreading. Thirtysix of these displayed characteristic yellow, brown or red pigmentation, some of which were soluble in nature. The isolates showed typical mycelial and sporulating structures, for example, spores of distinct green colour were formed by the strains of *Mucor*, *Syncephalastrum* and *Aspergillus*; black by *Aspergillum* and *Cladosporium* and yellow by *Sporotrichum*. The isolates identified on the basis of morphological and cultural characteristics were found to belong to diverse genera of fungal population.

The grouping of these is depicted in Table I. The absence of a few genera in September could be due to a small number of isolates studied in the present work. It is seen that *Monilia* is a predominant genus, being represented in all the samples. The other isolates in the order of their dominance were *Syncephalastrum*, *Sporotrichum*, *Mucor*, *Aspergillus*, *Trichothecium*, *Botrytis*, *Fusarium*, *Scopulariopsis*, *Cladosporium*, *Pullularia*, *Alternaria*, *Penicillium*, and *Byssochlamys*. The association of a few of these fungi, such as *Alternaria*, *Aspergillus*, *Fusarium*, *Cladosporium*, and *Penicillium* has been amply demonstrated earlier in the degradation of mangrove vegetation (Fell and Master, 1973; DeSouza, Araujo, Karande and Freitas, 1979)

The leaf fall in mangrove area is particularly heavy during the rainy season. The leaves provide the necessary nutrients and substratum for fungi to thrive on and multiply, thereby leading to their high counts in this season (Matondkar, Mahtani and Mavinkurve, 1980). The fungal population seems to be particularly important at this stage as most of these release highly potent extracellular hydrolytic enzymes. Distribution of the physiological activities displayed by the cultures in the present study is given in Table II. Each of the seventy-four fungal isolates elaborated at least one of the hydrolytic enzymes like

Table I. Generic distribution of fungi in mangrove swamps.

Sampling period	May (Premonsoon)	September (Monsoon)	January (Postmonsoon)
Fungi/g sediment	$2.2 \times 10^4$	$5.2 \times 10^4$	$3.8 \times 10^4$
No. of isolates	8	22	44
	% isolates		
<i>Scopulariopsis</i>	12.5	—	4.54
<i>Syncephalastrum</i>	25.0	—	15.90
<i>Monilia</i>	37.5	18.18	11.36
<i>Mucor</i>	25.0	—	13.63
<i>Aspergillus</i>	—	13.63	6.81
<i>Fusarium</i>	—	—	9.09
<i>Cladosporium</i>	—	9.09	2.27
<i>Trichothecium</i>	—	22.72	2.27
<i>Pullularia</i>	—	9.09	2.27
<i>Sporotrichum</i>	—	4.54	18.18
<i>Alternaria</i>	—	13.63	—
<i>Botrytis</i>	—	4.54	9.09
<i>Byssochlamys</i>	—	4.54	—
<i>Penicillium</i>	—	—	4.54

Table II. Distribution of physiologically active fungi.

Sampling period	May	September	January
No. of isolates	8	22	44
	% positive isolates		
Cellulase	12.5	63.6	56.81
Amylase	62.5	91.0	86.36
Pectinase	25.0	54.6	36.36

amylase, cellulase or pectinase majority of them producing more than one. Amylase was produced by most of the isolates. *Monilia*, although predominant (Table I) did not exhibit cellulolytic or pectinolytic activity whereas *Cladosporium*, *Alternaria* and *Byssoschlamys* were highly cellulolytic and pectinolytic.

The importance of the fungal groups in the plant litter decomposition has been established in terrestrial as well as marine environments (Jones, 1974). The fungal enzymes are essentially needed to initiate the sequence of degradative processes in mangrove litter, which would make available the necessary nutrients and small molecular weight components for the growth of bacteria and yeast. And it is the action of the latter groups of microbes that leads to the solubilization and detritus formation, thereby increasing the productivity of this ecosystem.

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