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DISTRIBUTION OF ASPERGILLI IN EARLY STAGES OF SUCCESSION IN COASTAL SAND DUNES OF ORISSA

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This paper reports 25 species of Aspergilli from coastal soils and adjacent soils with uniculture plantation of *Casuarina equisetifolia* for a period of two years covering three distinct seasons. Higher percentage contribution of Aspergilli was recorded from unproductive coastal sand dunes in spite of its low nutrient status, which can be due to less competition with other categories of fungi.

Keywords: Abundance; Coastal sand dune; Distribution; Succession.

Primary colonists show more rapid germination of spores, more growth and better ability to grow at lower relative humidity than secondary colonists[1] . *Aspergillus* being a primary colonizer is phyllospheric in nature had important role in leaf litter decomposition[2] . It is one of the important genus of fungi in Indian soils, dominating both in the frequency and in relative density[3,4] . The present paper highlights the role of seasons, edaphic factors and surface vegetation on the incidence and abundance of Aspergilli in a virgin coastal soil of South Orissa, India.

Two sites (19°.15' latitude and 84°. 50' longitude) were selected from two different localities and designated as Soil A and Soil B, where as sub surface soils (15 cm depth) was named as A_1 and B_1. Soil A represented a virgin unproductive coastal sandy belt without any vegetation. Soil B represented a coastal sandy belt with uncultured plantation of *Casuarina equisetifolia.* Soil sampling was done at the monthly intervals and the microfungi were isolated adopting standard procedures as described earlier[5] . Soil was analyzed to monitor the change in edaphic factors and nutrient status of the respective soils.

The frequency (%) and relative density (%) of individual fungi were calculated by employing the following formulae

$$\text{Frequency \%} = \frac{\text{Number of observations in which a species appeared}}{\text{Total number of observations}} \times 100$$

$$\text{Relative density \%} = \frac{\text{Number of colonies of a species in all the plates}}{\text{Total number of colonies of all the species in all the plates}} \times 100$$

Presently, it revealed that higher concentration of fungal population in general and Aspergilli in particular concurred with higher moisture, low temperature and higher nutrient level at Site B than at Site A (Table 1). This corroborates to the finding of Behera and Mukherji[6]. All the two sites showed high fungal population during rains and winter (Aug. –Jan.) and low population during summer (Mar. –Jun.). But *Aspergillus* species did not exhibit seasonality. They appeared throughout the period of observation. Interestingly, the percentage contribution of Aspergilli at Site A was more than the Site B. This can be attributed to the wider ecological spectrum of the genus and low competition with other category of fungi. The total number of isolates, genera and species from individual sites (Table 2) indicate that members of Aspergilli contribute more than 15 % towards the species composition in each site.

Out of 25 species (Table 3) isolated from two sites, Soil B harboured the highest (21) while Soil A, the lowest one (17). *A. awamori* was recorded maximum times while contributing highest towards total population followed by *A. niger, A. fumigatus, A. nidulans* and *A. terreus* with little alterations in all the sites as reported from different parts of India[3,4]. Restricted appearance of *A. funiculosus, A. versicolor* at Site A and *A. koningi* at Site B was also observed. This is possibly due to the effect of different surface vegetation of the sites corroborating Tresner *et al.*[7]. But the number of Aspergilli as reported here is less in comparison to its large varieties. It is evident from the present study that both soil factors and surface vegetation play a significant role in determining the incidence and abundance of Aspergilli in different seasons.

It is suggested that, a large number of permutations and

Table I. Edaphic factors and fungal population of study site (Average of two years).

Site	Temperature (°c)	Moisture content (%)	PH	Total Organic Carbon (%)	Total Nitrogen (%)	Total fungal Population (10^2 g.d.w.)	Aspergilli Population (10^2 g.d.w.)	Contribution of Aspergilli (%)
A	32.3	0.38	7.5	0.2	0.0108	36.47	14.46	39.6
A_1	30.8	0.96	7.5	0.17	0.0105	35.49	12.11	34.1
B	30.3	0.57	7.1	0.32	0.0143	41.84	12.71	30.4
B_1	28.9	1.21	7.4	0.24	0.0106	38.5	12.25	32.1

g.d.w. = Gram dry weight

Table 2. Total count of fungi isolated during the study period.

Sites	Total number of isolates	Total genera	Total species	*Aspergillus species*	Contribution (%)
A	834	54	91	14	15.4
A_1	795	46	80	13	16.3
B	903	36	78	18	23.1
B_1	875	38	85	17	20.0
Total	3407	69	141	25	17.7

A - Surface soil without vegetation;
A_1 - Sub surface soil without vegetation
B - Surface soil inside plantation
B_1 - Sub surface soil inside plantation

combinations of media and technique should be tried to unravel the innumerable Aspergilli still unreported in coastal soils of Orissa.

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Table 3. Rank of different Aspergilli based on their density of occurrence at different sites.

SL. No.	Spp. of *Aspergillus*	Frequency (%) sites				Relative density (%) sites				Rank sites			
		A	A_1	B	B_1	A	A_1	B	B_1	A	A_1	B	B_1
1	*Aspergillus awamori*	100	100	58.3	66.6	8.99	5.4	6.42	3.31	2	1	3	5
2	*A. caepitosus*	8.3	-	-	25.0	0.24	-	-	0.46	10	-	-	12
3	*A. candidus*	-	4.1	16.6	66.6	-	0.13	0.22	2.17	-	11	16	6
4	*A. carbonarius*	-	-	25.0	-	-	-	0.55	-	-	-	7	-
5	*A. clavatus*	4.1	4.1	16.6	37.5	0.24	0.13	0.33	0.57	11	12	14	9
6	*A. flavus*	79.1	25.0	70.8	100	2.03	0.5	2.1	7.08	6	7	5	1
7	*A.fonsecaceus*	-	-	37.5	-	-	-	0.55	-	-	-	8	-
8	*A. fumigatus*	100	100	75	79.1	7.07	4.15	4.98	3.43	3	3	4	4
9	*A. fumiculosus*	16.6				0.36				9			
10	*A. humicola*	-	-	16.6	-	-	-	0.22	-	-	-	17	-
11	*A .koningi*	-	-	-	25	-	-	-	0.45	-	-	-	13
12	*A. luchuensis*	-	-	16.6	33.3	-	-	0.33	0.57	-	-	15	10
13	*A. nidulans*	100	100	25	50	14.8	5.03	0.55	1.02	1	2	9	7
14	*A. niger*	100	100	100	100	5.39	3.39	7.97	6.28	4	4	1	2
15	*A. quadrilineatus*	16.6	4.1	-	-	0.6	0.13	-	-	7	13	-	-
16	*A. repens*	12.5	12.5	-	-	0.24	0.25	-	-	12	10	-	-
17	*A. sparsus*	-	-	-	37.5	-	-	-	0.69	-	-	-	8
18	*A. sulphureus*	-	20.8	20.8	25.0	-	0.38	0.44	0.57	-	8	12	11
19	*A. sydowi*	-	8.3	4.1	16.6	-	0.26	0.11	0.34	-	9	18	14
20	*A. tamarii*	4.1		33.3		0.12	-	0.55	-	13	-	10	-
21	*A. terreus*	100	100	100	100	2.87	2.76	7.53	3.88	5	5	2	3
22	*A. terricola*	-	-	33.3	16.6	-	-	0.66	0.29	-	-	6	16
23	*A.ustus*	-	-	20.8	12.5	-	-	0.44	0.29	-	-	13	17
24	*A. variecolor*	20.8	33.3	29.1	25.0	0.36	1.0	0.55	0.34	8	6	11	15
25	*A. versicolor*	8.3	-	-	-	0.1	-	-	-	14	-	-	-

A - Surface soil without vegetation; A_1 - Sub surface soil without vegetation
B - Surface soil inside plantation; B_1 - Sub surface soil inside plantation

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