J. Phytol. Res. **20**(2) : 327-328, 2007

SEASONAL INCIDENCE OF ASPERGILLI IN A DEPLETIVE FOREST SOIL ECOSYSTEM IN SOUTH ORISSA

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The paper highlights the role of seasons, edaphic factors and surface vegetation on the incidence and abundance of Aspergilli in depletive forest of south Orissa.

Keywords : *Aspergillus;* Depletine forest; Soil ecosystem.

Aspergillus is one of the important genus of fungi in Indian soils, dominating both in the frequency and in relative density[1,2]. The present paper highlights the role of seasons, edaphic factors and surface vegetation on the incidence and abundance of Aspergilli in a depletive forest soil of south Orissa, India.

Three sites inside the tropical forest (19° 43'- 20° 18' N. Latitude and 84° 21'- 84° 50' E. Longitude) i.e., a forest patch with undisturbed dense vegetation (A), a denuded area (B) and a deforested –cum- cultivated site (C) at a distance of 1 Km from each other was selected for the study. Soil sampling was done at the monthly intervals and the micro fungi were isolated adopting standard procedures as described earlier[3]. 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-

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

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

The Investigation revealed that higher concentration of fungal population in general and Aspergilli in particular concurred with high moisture, low temperature and higher nutrient level at site A, followed by site C and site B, respectively (Table 1). This corroborates to the findings of RamaRao[4] and Behera and Mukherji[5]. All the three sites showed high fungal population during rains and winter (Aug. – Jan.) and low population during summer (Mar. – Jun.). But *Aspergillus* spp. did not exhibit seasonality. They appeared throughout the period of observation. Interestingly, the % contribution of Aspergilli in the deforested patch site (B) was more than the other two sites. This can be attributed to the wider ecological spectrum of the genus and low competition with other category of fungi.

A total of 2080 colonies, assigned to 74 taxa were isolated during the study period. The total number of isolates, genera and species from individual sites (Table 2) indicate that members of Aspergilli contribute more

Table 1. Edaphic factors and fungal population of study sites (Average of 13 months)

Site	Temperature (°C)	Moisture content (%)	pH	Total organic carbon (%)	Total Nitrogen %	Total Fungal population (10^3 g.d.w.)	Aspergilli population (10^3 g.d.w.)	% contribution of Aspergilli
A	33.7	11.4	6.7	0.947	0.118	127.62	35.10	27.5
B	36.2	8.19	7.06	0.253	0.106	68.43	21.60	31.6
C	34.7	8.9	6.7	0.328	0.106	97.49	26.40	27.1

g.d.w. = gram dry weight

than 10 % towards the species composition in each site.

Out of 21 species (Table 3) isolated from the three sites, forest soil harboured the highest number (18) while deforested patch, the lowest one (13). *A. niger* was recorded maximum times while contributing highest towards total population followed by *A. flavus, A. terreus* and *A. fumigatus* with little alterations in all the sites as reported from different parts of India [1,2,6]. Restricted appearance of *A. tamari* and *A. terricola* at site A and *A. japonicus* and *A. rugulosus* at site C were also observed.

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

Site	Total number of isolates	Total genera	Total species	*Aspergillus* species	% contribution
A	898	50	118	18	15.2
B	497	38	103	13	12.6
C	685	53	123	17	13.8
Total	2080	74	184	21	11.4

Table 3. Ranks of different Aspergilli based on their density of occurrence

Sl. No.	Name of the fungi	Frequency of Occurrence (%)			Relative density (%)			Rank		
		A	B	C	A	B	C	A	B	C
1	*Aspergillus niger*	100	100	100	8.1	8.4	7.4	1	1	1
2	*A. flavus*	84.6	69.2	76.9	3.6	2.2	3.0	2	4	3
3	*A.terreus*	61.5	61.5	76.9	2.5	2.4	4.0	3	2	2
4	*A.fumigatus*	61.5	46.1	46.1	2.3	2.0	1.7	4	5	5
5	*A.fonsecaceus*	61.5	46.1	53.8	2.2	1.6	1.7	5	7	6
6	*A. awamorii*	46.1	46.1	46.1	1.9	2.4	1.8	6	3	4
7	*A. carbonarius*	61.5	46.1	53.8	1.7	1.8	1.7	7	6	7
8	*A. nidulans*	61.5	-	38.4	1.6	-	1.1	8	-	10
9	*A. versicolor*	30.7	15.3	-	0.8	0.4	-	9	11	-
10	*A. fischeri*	23.0	23.0	23.0	0.7	0.6	0.4	10	10	13
11	*A. candidus*	23.0	15.3	-	0.6	0.4	-	11	12	-
12	*A. syduowii*	30.7	30.7	53.8	0.6	1.0	1.6	12	9	8
13	*A. humicola*	23.0	-	15.3	0.5	-	0.4	13	-	14
14	*A. luchuensis*	23.0	30.7	30.7	0.5	1.4	0.7	14	8	11
15	*A. sulphureus*	23.0	-	15.3	0.5	-	0.2	15	-	16
16	*A. tamari*	30.7	-	-	0.5	-	-	16	-	-
17	*A. flavipes*	23.0	-	15.3	0.4	-	0.4	17	-	15
18	*A. terrecola*	15.3	-	-	0.3	-	-	18	-	-
19	*A. japonicus*	-	-	30.7	-	-	0.5	-	-	12
20	*A. nieveus*	-	15.3	30.7	-	0.4	1.3	-	13	9
21	*A. rugulosus*	-	-	7.6	-	-	0.1	-	-	17

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 variety. It is evident from the present study that both soil factors and soil vegetation play a significant role in determining the incidence and abundance of Aspergilli in different seasons.

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