CHAPTER III

OBSERVATIONS

OBSERVATIONS

The aerospora inside the library building was collected for the period of October 1993 to July 1994 by operating Rotorod air Sampler on every Friday from 4.00 to 5.00 p.m. The data collected indicates presence of 1,75,845/M^3 biopollutants in the air inside library building. They included fungal spores, fungal hyphae and insect parts. Among them fungal spores were the main constituents. They account for 99.425 per cent of the total biopollutants. The rest of the 0.523 per cent aerospora included the insect parts, pollen grains, and fungal hyphae (Table II).

The observations made indicate that air inside library was not free of biopollutants in any of the months of investigation. Their concentration was variable during different months. The air inside library building contained highest concentration of biopollutants in the month of January when they formed 45.568 per cent of the total aeropollutants. It was least in the month of April forming 0.753 per cent of the aeropollutants. As far as seasonal changes are considered, the biopollutants were in low concentration during summer, they increased during monsoon and reached to highest concentration during autumn (Table I Histogram ,No.I).

The chief biopollutants inside library building forming 99.478 per cent of the aerospora are referable to Ascomycetes, Basidiomycetes and Deuteromycetes fungi. The contribution of individual group is as follows.

Ascomycetes .....1.057 %/M^3

Basidiomycetes.....3.053 %/M^3

Deuteromycetes.....95.368 %/M^3

Thus , the aerospora in general is dominated by Deuteromycetes, Basidiomycetes and Ascomycetes respectively.

Deuteromycetes accounting 95.368% of the total aerospora formed the dominant group of fungi in the aeromycoflora in general. They are rich in the months of December to February and June-July, in the months of October, November, and March-April they are well represented while in the month of May they are comparatively poorly represented. (Table-II, Histogram-II).

Deuteromycetes forming the dominant group are most variable and represented by 25 genera . Though in varying quantity it is represented throughout the period of investigation by one or the other genera.The genus Cladosporium is the most dominant accounting for 86.908 per cent of the total population. Except the summer months (March-May) when it is totally absent and month of November when it is ocurring in minimum concentration, the genus contributes a major proportion to the aerospora. The genera Aspergillus (0.096%), Alternaria (1.05%), Arthrinium (0.096%), Bispora (0.048%), Corynespora (0.392%), Curvularia (1.006%), Drechslera (0.207%) , Exosporium (0.119%), Helminthosporium (0.369%), Nigrospora (1.398%), Pithomyces (0.679%), Spegazzinia (0.196%), Torula (0.358%), Tetraploa (0.071%) though in lower concentration are constantly associated with the aerospora inside library building. The other genera are inconsistantly occurring. In general the group is dominant throughout the year except-March and November 1994. When it decreases in percentage and in the month of May it is least represented. (Table -IV, Hist.-III).

The smut and uredospores representing the group Basidiomycetes fall next in abundance to Deuteromycetes in the total aerospora encountered in the present investigation. They forms 3.050 per cent of the total aerospora. They are better represented during October November and March and May while during late autumn and early summer they decrease in concentration. The smut spores are nearly constantly occuring while uredospores are absent in the month of December, March and May, within the aerospora investigated here (Table IV,Histogram No.III).

The Ascomycetes contributes 1.057 percent to the total aerospora inside library. It is represented by eight (8) genera of which Pleospora, Lophiostoma, Didymosphaera, though in lower quantities are nearly constantly occuring, while Bagnisiella, Chaetomium, Hysterium, Massaria, and Sordaria are inconsistantly occuring. (Table IV,Hist-III).

Among the other biopollutants forming 0.523 per cent of the total aerospora (Table IV.Histogram No.III) insect parts were recorded during the month of January-March and May-July 1994. Pollens were recorded in the month of February only .

The aerospora inside the library building was also studied by exposing culture plates containing Potato-Dextrose-Agar medium. In general Cladosporium, Aspergillus, Fusarium Penicillium, Mucor, colonies were in abudance while Alternaria, Torula, colonies were less abundant.

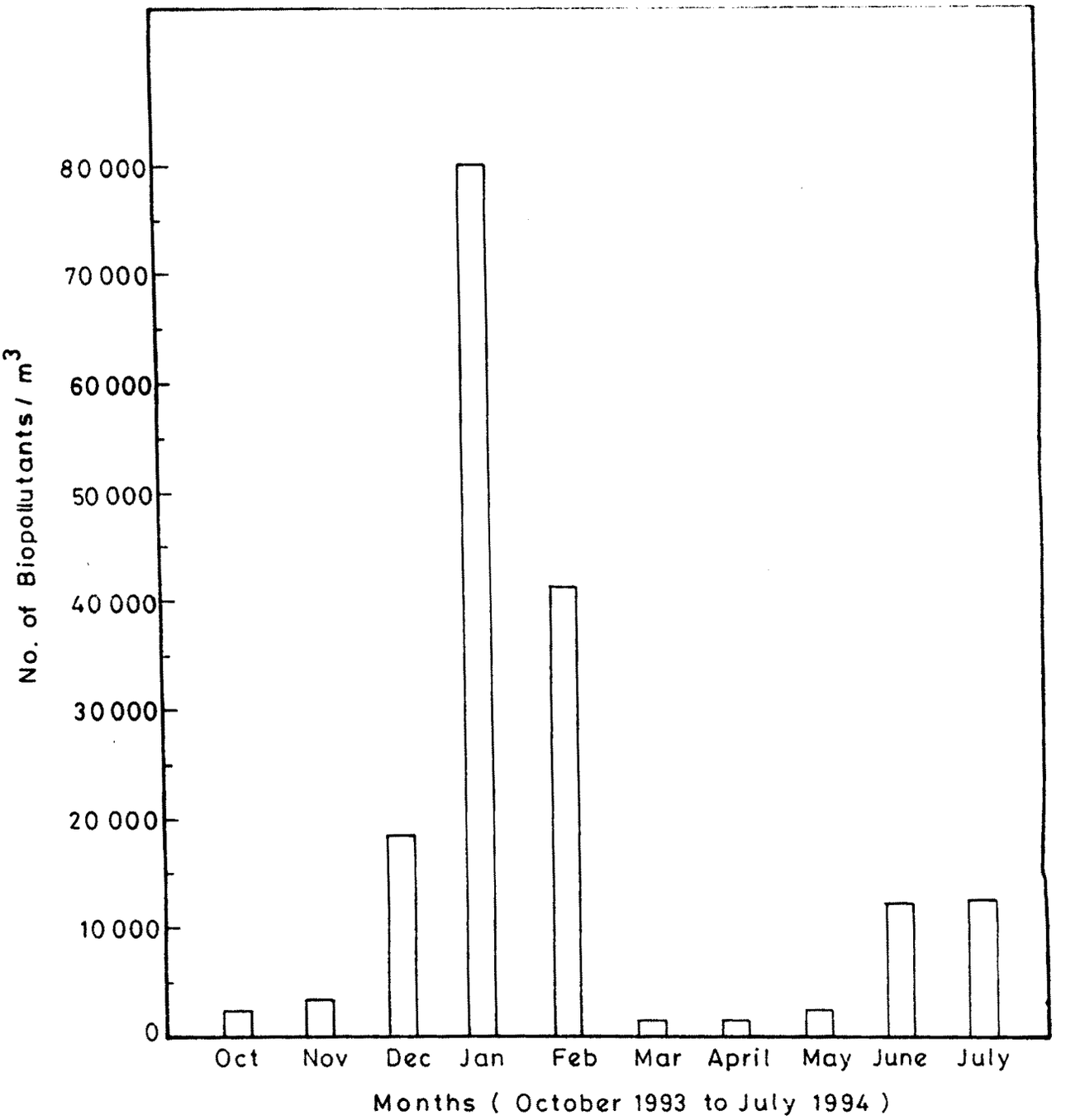
The paper showing signs of deterioration in the form of staining and some showing infection were also put on the culture media and the infection was studied. The common fungi recorded were Cladosporium, Aspergillus, Penicillium, and Torula.

To study the allergic effects of the fungal spores persons visiting library or those working (their) in the library were interviewed. Nearly 30% people show positive reaction to allergic effects of these fungal spores. (Table No.V) Whenever these old papers were agitated, they show symptoms of allergy in the form of irritation or asthma.

Table No. I

Average monthly Temperature, Relative Humidity Rainfall and Percentage of Biopollutants inside Library Building During October- 1993 to July 1994

Month	Temperature °C	Relative humidity % (moisture)	Rainfall (mm)	% of biopollutants/m^3
October	30	90	224.8	1.219
November	30.19	85.7	5.4	1.959
December	30.78	85.54	19.00	10.526
January	32.1	86.5	-	45.568
February	31.94	76.78	-	23.807
March	37.12	74.16	-	1.063
April	34.86	78.16	53.8	0.753
May	37.18	85.00	59.8	1.330
June	29.54	92.3	383.8	6.869
July	28.04	87.03	261.4	6.906



Histogram No. 1 – MONTHWISE QUANTITATIVE REPRESENTATION OF BIOPOLLUTANTS.

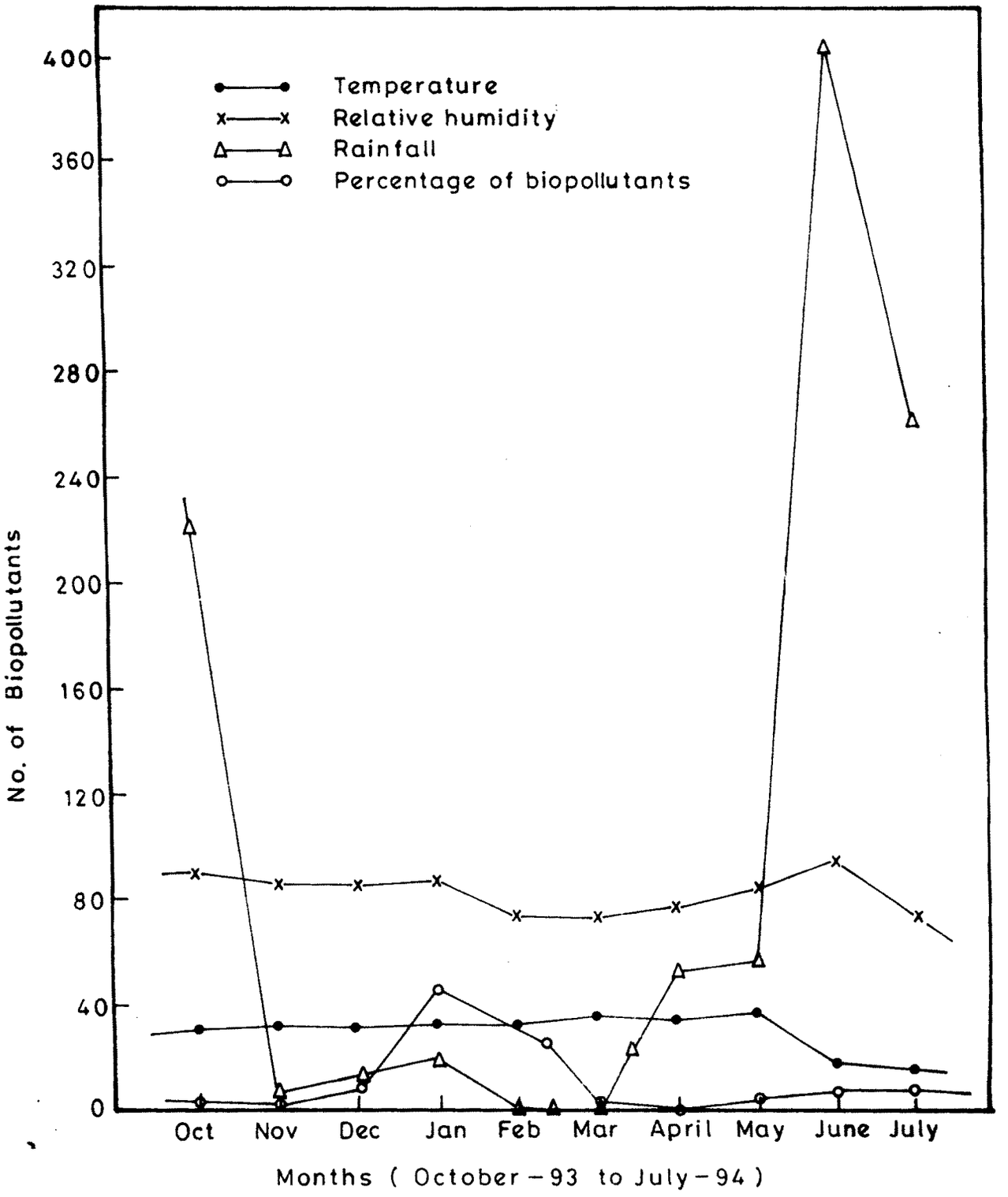
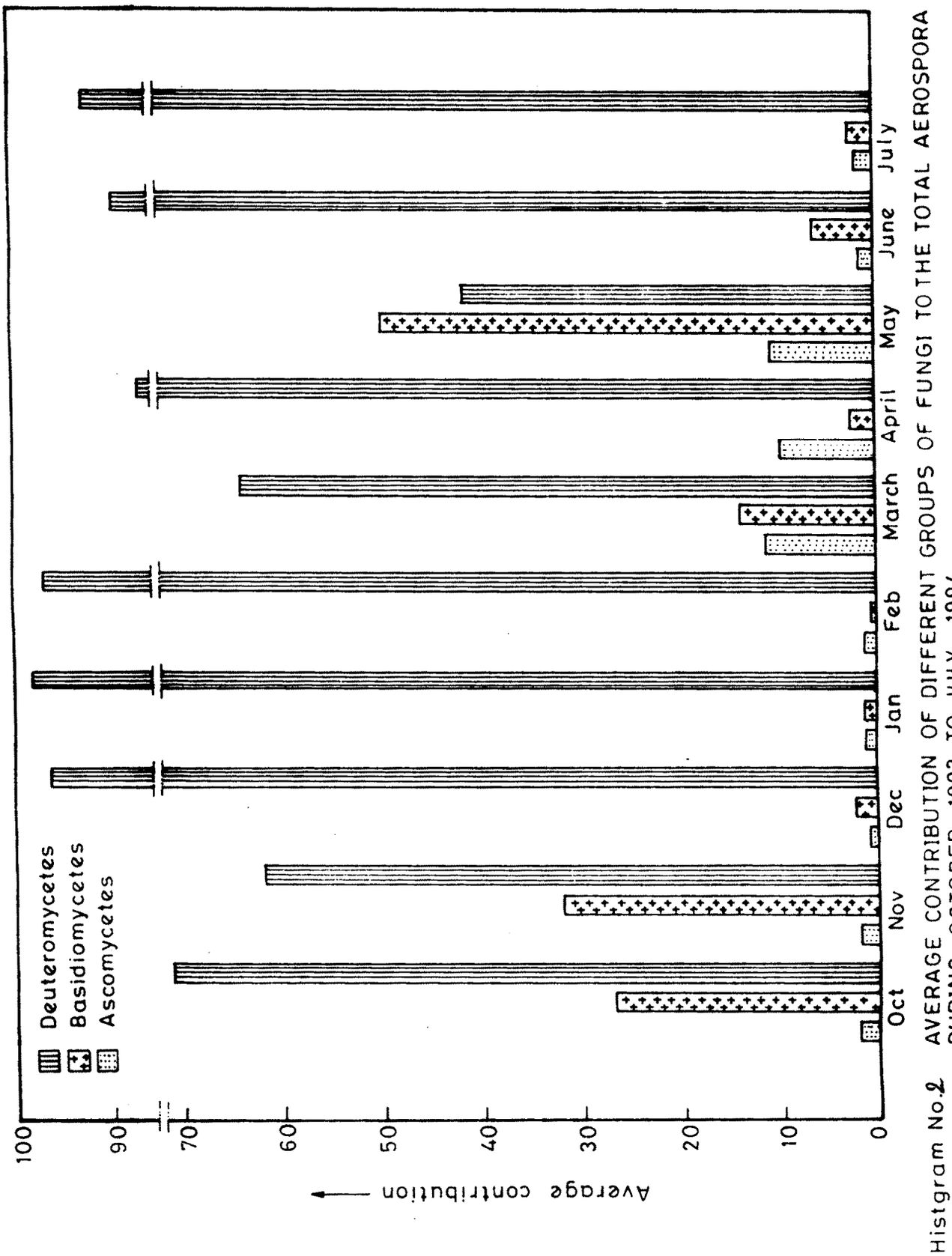


Fig. No. 2 – AVERAGE MONTHLY TEMPERATURE RELATIVE HUMIDITY RAINFALL AND PERCENTAGE OF BIOPOLLUTANTS.

Table II
Average Contribution of Different Groups of fungi to the Total Aerospora During October 1993 to July 1994

Groups	Total no.of Biopollutants	
	No/m³	%
Phycomycetes	-	-
Ascomycetes	1860	1.057
Basidiomycetes	5365	3.050
Deuteromycetes	167700	95.368
Insects	885	0.503
Pollen grains	35	0.022
Total	175845	



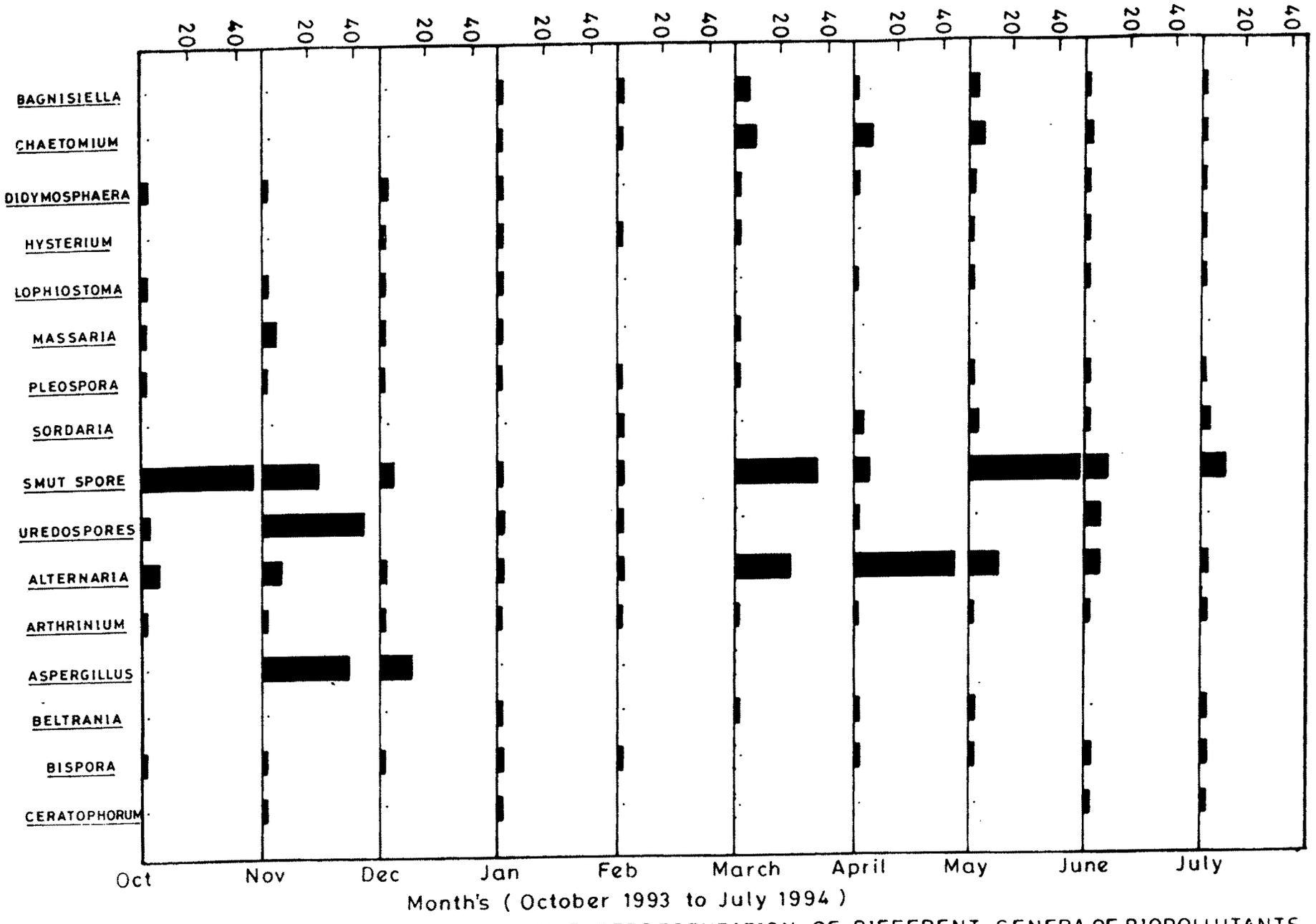
Histgram No.2 AVERAGE CONTRIBUTION OF DIFFERENT GROUPS OF FUNGI TO THE TOTAL AEROSPORA DURING OCTOBER-1993 TO JULY-1994.

Table -III : Average Number and Percentage Contribution of Different Groups of Fungi to the Total Aerospora During October 1993 to July 1994.

Groups	MONTHS																			
	October		November		December		January		February		March		April		May		June		July	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No.	%	No.	%	No.	%
Phycomycetes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ascomycetes	20	0.934	85	2.474	90	0.486	235	0.293	170	0.406	200	10.695	120	9.056	235	10.044	290	2.40	415	3.417
Basidiomycetes	595	27.738	1170	34.062	250	1.351	330	0.414	65	0.155	300	16.044	50	3.775	1150	49.145	955	7.905	500	4.116
Deuteromycetes	1530	71.328	2180	63.464	18170	98.163	79350	99.025	41060	98.076	1265	67.647	1155	87.169	950	40.298	11825	98.610	11215	92.344
Insects	-	-	-	-	-	-	215	0.268	535	1.277	105	5.614	-	-	05	0.213	10	0.008	15	0.123
Pollen grains	-	-	-	-	-	-	-	-	35	0.086	-	-	-	-	-	-	-	-	-	-
Total	2145		3435		18510		80130		41865		1870		1325		2340		12080		12145	

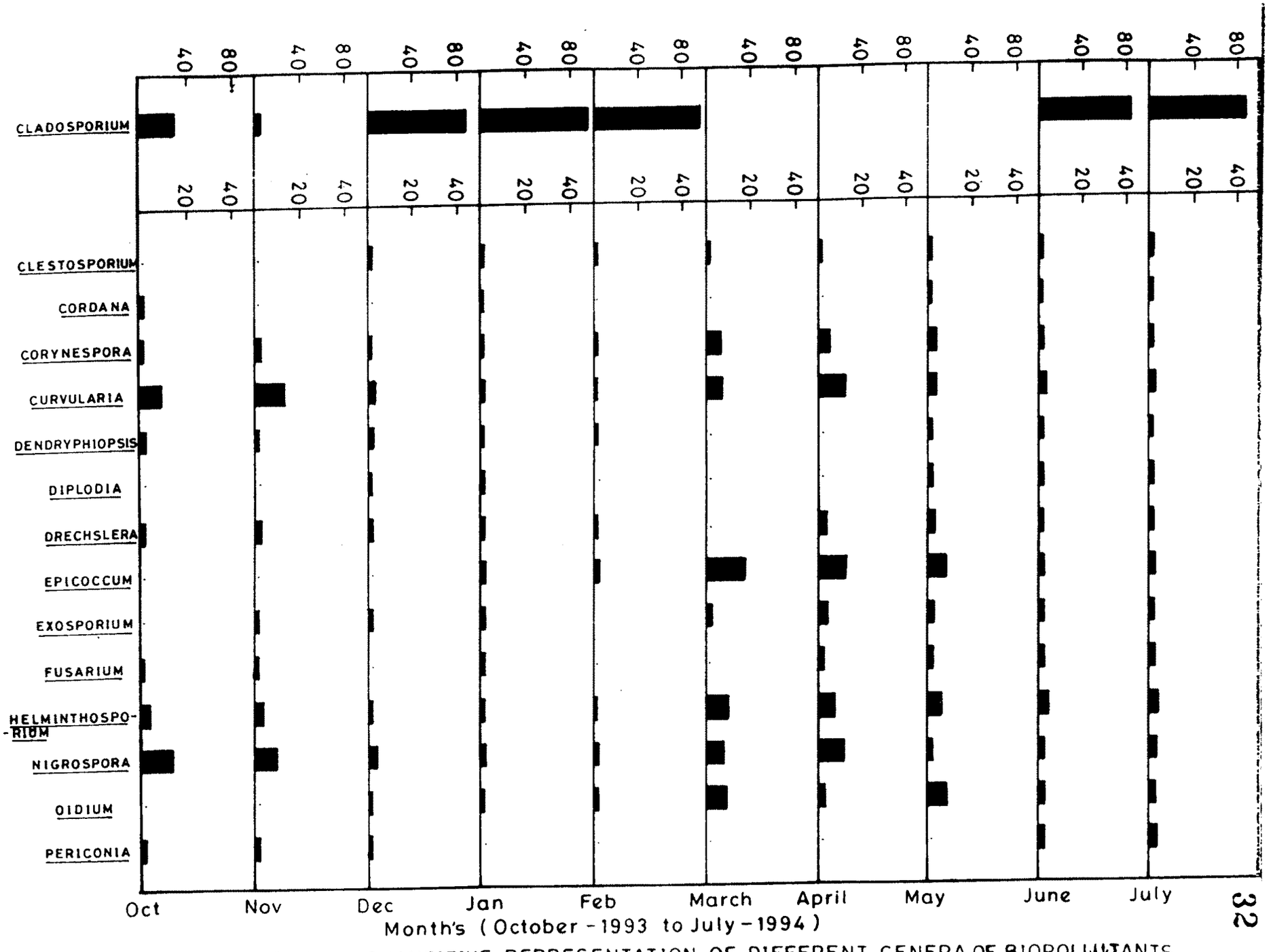
Table-IV : Average contribution of Different Genera of Fungi to the Aerospora During Oct.1993 to July 1994

Name of Biopollutants	M O N T H S									
	October	November	December	January	February	March	April	May	June	Jul
Bagnisiella	-	-	-	0.099	0.131	4.278	0.754	1.923	0.372	0.49
Chaetomium	-	-	-	0.093	0.167	4.545	4.150	3.632	0.993	0.74
Di dymosphaera	0.233	0.145	0.108	0.006	-	0.534	-	0.427	0.041	0.0
Hysterium	-	-	0.054	0.012	0.023	0.267	-	0.641	0.041	0.24
Lophiostoma	0.233	0.145	0.108	0.018	-	-	0.886	0.641	0.041	0.1
Massaria	0.233	2.037	0.108	0.012	-	0.267	-	-	-	-
Pleospora	0.233	0.145	0.108	0.149	0.035	0.802	-	0.641	0.041	0.0
Sordaria	-	-	-	-	0.047	-	2.264	2.136	0.869	1.6
Smut spores	26.806	12.227	1.350	0.018	-	16.042	2.641	49.145	4.428	4.1
Uredospores	0.932	21.834	-	0.393	0.155	-	0.132	-	3.476	-
Alternaria	3.729	4.657	0.999	0.430	0.418	13.101	23.773	5.982	0.579	1.1
Arthrinium	0.233	0.291	0.162	0.049	0.023	0.267	0.754	0.641	0.082	0.4
Aspergillus	-	17.467	5.402	-	-	-	-	-	-	-
Beltrania	-	-	-	0.043	-	0.802	0.377	0.213	-	0.2
Bispora	0.699	0.436	0.054	0.018	0.071	-	1.886	0.854	0.041	0.2
Ceratophorum	-	0.145	-	0.006	-	-	-	-	0.041	0.0
Cladosporium	29.137	2.911	82.928	95.781	95.545	-	-	-	82.781	82.
Clestosporium	-	-	0.108	0.056	0.035	0.534	0.754	0.213	0.124	0.1
Cordana	0.233	-	-	0.006	-	-	-	0.427	0.041	0.0
Corynespora	0.799	2.328	0.324	0.081	0.298	4.812	3.396	2.350	0.579	0.8
Curvularia	6.293	11.790	2.079	0.418	0.286	4.812	10.566	1.923	0.538	0.8
Dendryphiopsis	0.233	0.291	0.281	0.018	0.011	-	-	0.427	0.041	0.1
Diplodia	-	-	0.054	0.018	-	-	-	0.213	0.282	0.1
Drechslera	0.233	1.310	0.405	0.074	0.059	-	1.886	1.701	0.165	0.4
Epicoccum	-	- -	-	0.143	0.214	17.379	11.698	8.547	0.951	1..
Exosporium	-	0.436	0.216	0.049	-	0.267	2.264	0.241	0.124	0.4
Fusarium	0.233	0.145	-	0.006	-	-	0.377	0.427	0.441	0.1
Helminthosporium	1.631	1.018	0.405	0.093	0.143	5.347	3.773	3.846	0.372	0.6
Nigrospora	16.550	10.334	2.298	0.848	0.501	8.823	12.075	1.923	1.655	0.2
Oidium	-	-	0.135	0.112	0.310	4.278	2.264	5.128	0.289	0.6
Periconia	0.466	0.145	0.054	-	-	-	-	-	0.041	0.0
Pithomyces	6.993	6.841	1.134	0.393	0.047	3.475	2.641	1.068	0.372	0.7
Spegazzinia	0.466	0.291	0.324	0.205	0.011	0.534	1.132	0.427	0.124	0.3
Sporidesmium	-	0.145	-	-	-	-	3.018	0.854	0.082	0.2
Tetraploa	-	0.291	0.108	0.018	0.023	0.267	0.754	0.641	0.082	0.2
Torula	3.496	2.183	1.891	0.149	0.071	2.941	3.773	2.136	0.372	0.7
Insects	-	-	-	0.268	1.277	2.614	-	0.213	0.082	0.1
Pollengrains	-	-	-	-	-	-	-	-	-	

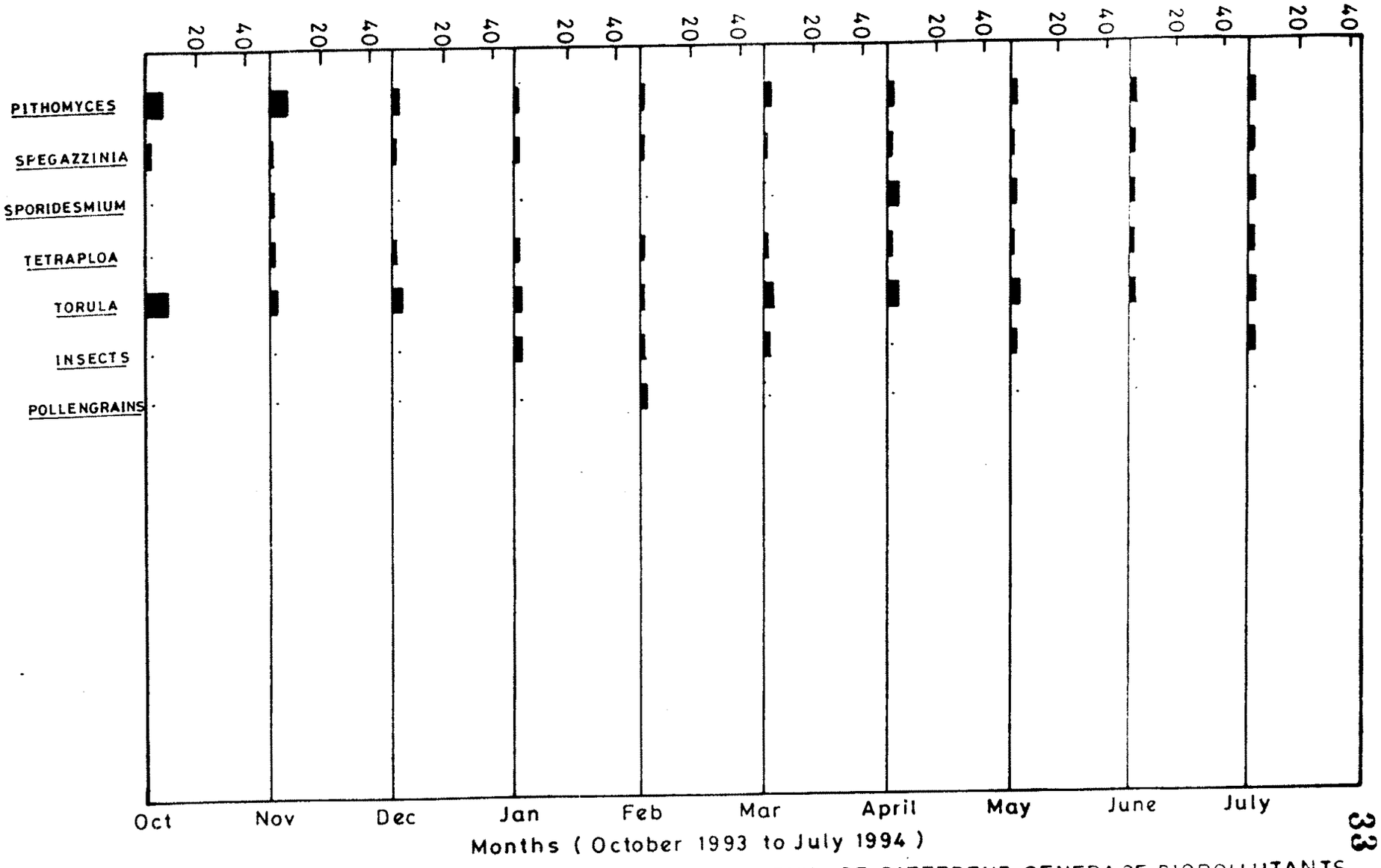


Histogram No. 3 : MONTHLY QUANTITATIVE REPRESENTATION OF DIFFERENT GENERA OF BIOPOLLUTANTS

Conti ----



Histogram No. 3 : MONTHLY QUANTITIVE REPRESENTATION OF DIFFERENT GENERA OF BIOPOLLUTANTS. Conti -



Histogram No. 3 : MONTHLY QUANTITATIVE REPRESENTATION OF DIFFERENT GENERA OF BIOPOLLUTANTS AND OTHER TYPE.

Table -V
Average percentage of Cellulose destroying fungi inside Library building for a period of Oct. 1993 to July 1994.

Name of gernera		Season		
		Autumn Oct.- Jan.	Summer Feb.-May	Monsoon June-July
1	Chaetomium	0.0235	3.124	0.867
2	Alternaria	2.454	10.819	0.845
3	Cladosporium	52.690	23.886	82.560
4	Epicoccum	0.036	9.462	1.093
5	Fusarium	0.096	0.201	0.102
6	Sporidesmium	0.362	0.968	0.165
7	Torula	1.929	2.230	0.577

Table VI
Monthwise record of persons showing allergic reactions from October 1993 to July 1994

Sr.No.	Months	No.of persons interviewed	No.of persons showing allaergic reaction	Type of allergy	Percentage of biopollutant	Dominant Biopollutant recorded
1	October to November 1993	25	05	Asthama Irri-tation	3.173	Smut sopore Cladospoprium Nigrospora Alternaria
2	Febru-ary	25	15	Asthama	23.187	Cladosporium
3	May	25	03	Irrita-tion	1.34	Smut spore Alternaria
4	June to July 1994	25	07	Asthama Irri-tation	13.778	Smut spore Cladosporium Uredospore

EXPLANATION OF PLATE -II

Biopollutants inside library building of
Shivaji University, Kolhapur

1 Chaetomium kunz.ex. Fr.
(250 x)

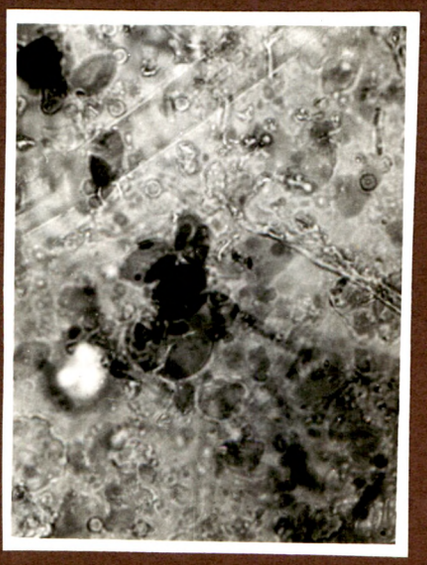
2 Didymosphaera Fuck
(250 x)

3 Hysterium Tode ex Fr.
(400 x)

4 Sordaria Ces and de Not
(400 x)

PLATE - II

1



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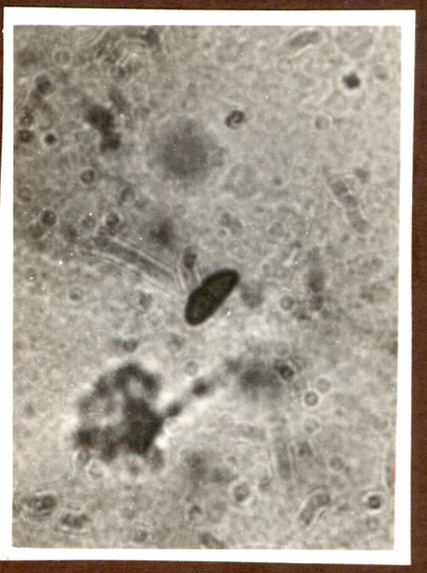

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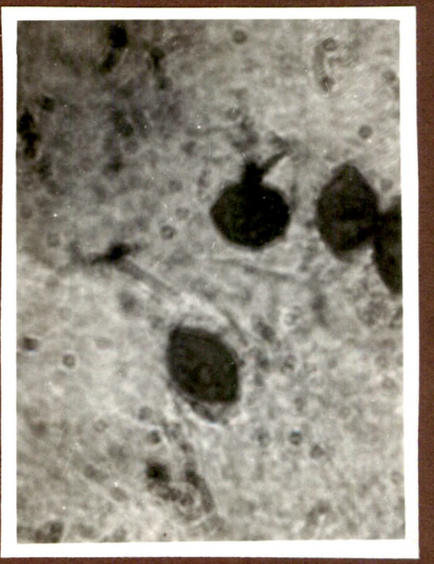


EXPLANATION OF PLATE -III

Bipollutants inside the library
building of Shivaji University, Kolhapur

1 Smut Spores
(400 x)

2 Alternaria Nees
(400 x)

3 Arthrinium Kurz ex. Fr.
(400 x)

4 Aspergillus Michel. ex.Link.
(400 x)

Sphaerophragmium.

EXPLANATION OF PLATE-IV

Bipollutants inside the library
building of Shivaji University, Kolhapur

1 Beltrania Penzing.
(400 x)

2 Cladosporium Link
(400 x)

3 Corynespora Guessow
(400 x)

4 Curvularia Boed
(400 x)

EXPLANATION OF PLATE-V

Biopollutants inside the library
building of Shivaji University, Kolhapur

1 Drechslera 1 to 0
(400 x)

2 Epicoccum Link.
(400 x)

3 Fusarium Link.
(400 x)

4 Helminthosporium Link.
(400 x)

EXPLANATION OF PLATE-VII

Biopollutants inside the library
building of Shivaji University, Kolhapur

1 Nigrospora zimm.
(400 x)

2 Oidium Sacc. Link.
(400 x)

3 Pithomyces Berk
(400 x)

4 Spegazzinia Sacc.
(400 x)

EXPLANATION OF PLATE -VI

Biopollutants inside the library
building of Shivaji University, Kolhapur

1 Sporidesmium Link.
(400 x)

2 Tetraploa Berk and Br.
(400 x)

3 Torula (pets) Link
(400 x)

4 Insects
(400 x)

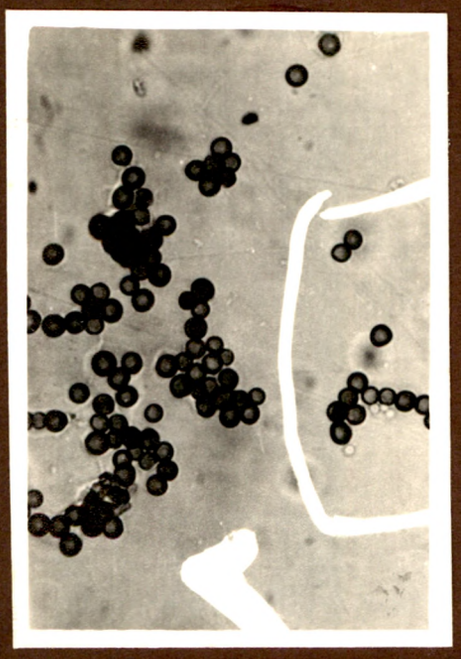
EXPLANATION OF PLATE-VIII

Biopollutants inside library of
Shivaji University, Kolhapur

Paper piece infected by
Cladosporium

PLATE – III

1



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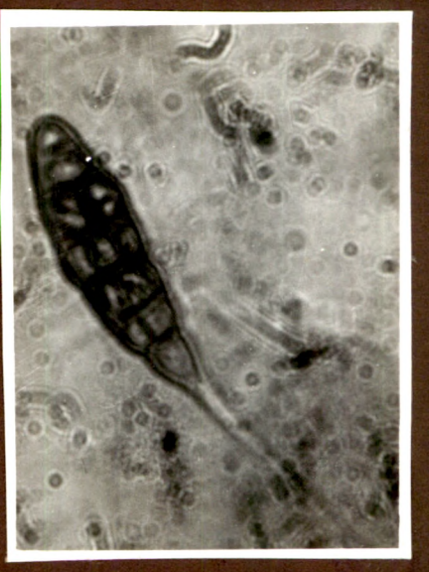

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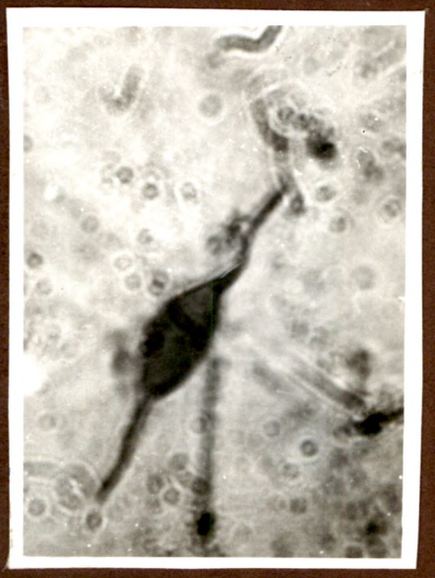

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PLATE - IV

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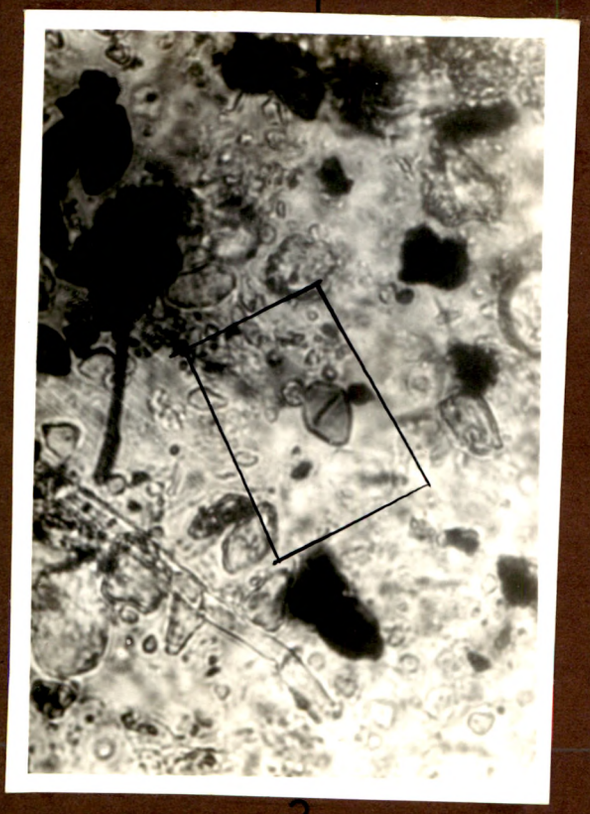

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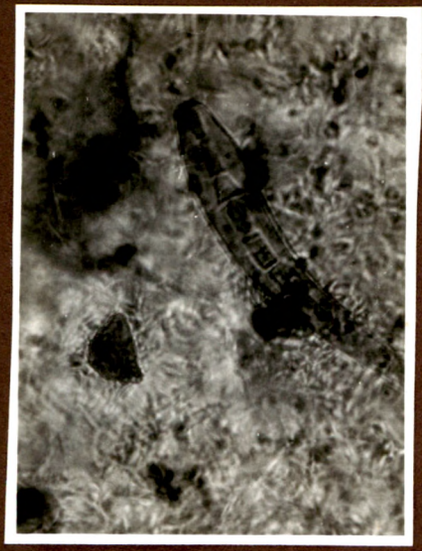

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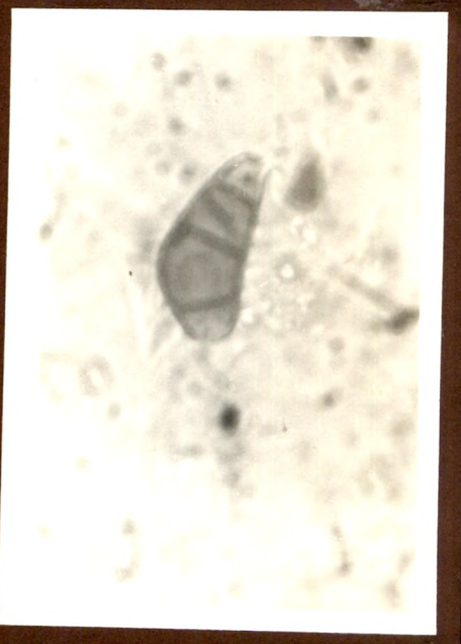

PLATE - V

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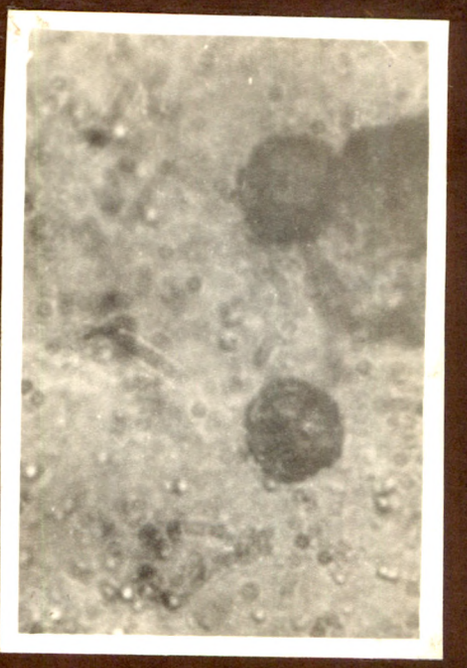

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PLATE - VI

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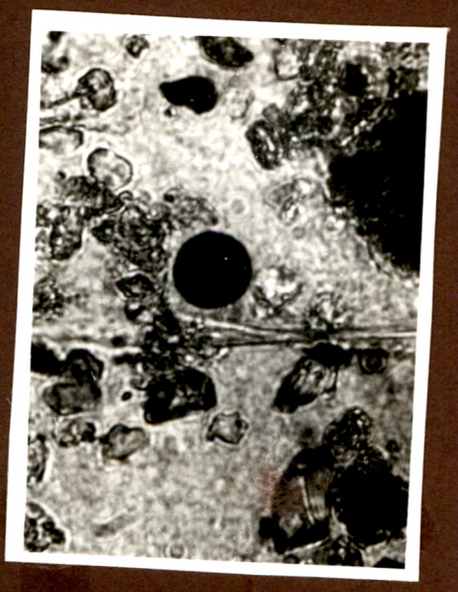

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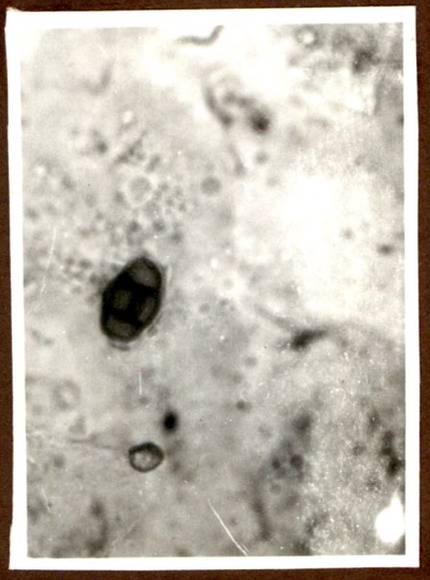

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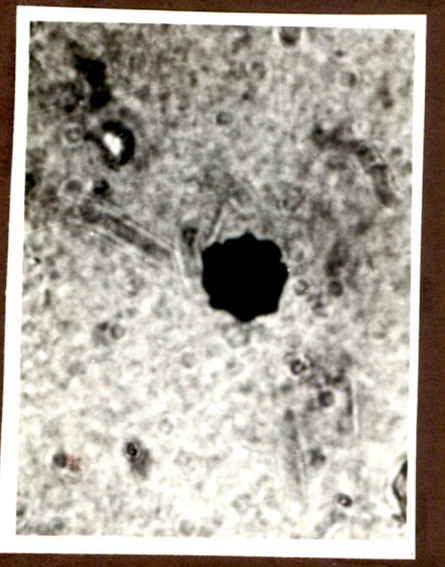

PLATE - VII

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PLATE - VIII