IV RESULTS

IV RESULTS :-

1) COMPONENTS AND CONTRIBUTION OF THE AIR SPORA AND COMPOSITION OF CATCHES :-

During this investigation, apart from the dust particles and other microbes, the slides were screened only for 61 types. Out of these the 56 are fungal spores and remaining are xylem fragments, Algal fragments, Hyphal fragments, Insect scales and unidentified group of fungal spores. A list of spores caught and identified from the slides is given below which is arranged alphabetically under each group.

a) Fungi

i) Phycomycetes :

Oospores of Sclerospora Schroe

ii) Ascomycetes :

1. Chaetomium Kunze ex.Fr.
2. Hypoxylon Bullex Fr.
3. Hysterium Tode ex. Fr.
4. Hysterographium Corda
5. Leptosphaerea Ces and de Not
6. Meliola Fr.
7. Pleospora Rabh
8. Sporormia de Notaris
9. Xylaria Hill ex Grev

iii) Basidiomycetes

1. Puccinia pers
2. Smut spores
3. Uredospores of Rust

iv) Deuteromycetes :

1. Alternaria Nees
2. Arthrobotryum Ces
3. Bactridium Kunze ex Fr.
4. Basidiobotrys Hohnel
5. Beltrania Penzig
6. Bispora Corda
7. Botryodiplodia Sacc
8. Camposporium Harkness
9. Catinula Lev
10. Ceratosporium Schw.
11. Cladosporium Link and Fries
12. Clasterosporium Schw
13. Coniothyrium Corda
14. Curvularia Boedijn
15. Cylindrocarpon Woolen
16. Dactylosporium Harz
17. Dendrographium Masses
18. Dendryophiopsis Hughes
19. Dichomera Cooke

20. Diplodia Fr.
21. Diplodina Westend
22. Epicoccum Link-ex-wallr
23. Haplosporella Speg
24. Helminthosporium Link
25. Hendersonia Berk
26. Hirudinaria Ces
27. Nigrospora Zimm
28. Penicillium Link ex Fries
29. Phialophora Medlar
30. Phoma Sacc
31. Pithomyces Berk and Br.
32. Pseudobotrytis Krzem and Bedura
33. Pseudotorulla Subram
34. Scolecotrichum Kunz ex Fr.
35. Septoria Sacc
36. Stemmatosporium Corda
37. Sirodesmium de Not
38. Spegazzinia Sacc
39. Stagnospora Sacc
40. Stigmella Sacc and Syd
41. Tetraploa Berk and Br.
42. Torula (Pers) Link-ex-Fr.
43. Wordomyces Brooks and Hansford

b) Other Types :-

1. Algal fragments
2. Hyphal fragments
3. Insect scales
4. Unidentified group
5. Xylem fibers

Individual counts were taken only for 61 above mentioned types and the identification was done only up to generic level. Their group wise distribution is as follows -

Total number of components counted 61 (Sixty one).

1)	Phycomycetes	-	1
2)	Ascomycetes	-	9
3)	Basidiomycetes	-	3
4)	Deuteromycetes	-	43
5)	Other Types	-	5

			61

DESCRIPTION :-

2) Chief constituents and their contribution to the Air spora in numbers.

To indicate relative importance of the different components of the air spora, percentage contribution of the 61 different types to the total air spora were estimated from the catches during the period of investigation. These results are presented in Table No.I and II. The average monthly percentage contribution of each spore group are given in Table No.III-A and III-B and average monthly percentage contributing of each spore type are given in Table No.IV-A and IV-B.

Taking the numbers into consideration, the spores of smut, stand first with a concentration of 34.91% to the total air spora. This is followed by Alternaria with 9.884%, Uredospores with 9.473%, Nigrospora with 7.725% and Helminthosporium with 6.398%.

Components of the air spora of the library (S.G.M.College, Karad) and their seasonal variations, percentage contributions, number of days during the investigation period, mean concentration and monthly variations in total air spore counts with respect to rain fall and temperature are given in Table No.V and VI respectively.

The monthly variation in trace spores and variation in spore groups are given in Table No.VII and VIII. During the period of investigation it was observed that there was no spore free period in the library. The peak periods of the fungal spore concentrations are the month of May and June.

The period of lowest concentration of spores is the March and first week of April. Estimated percentage of different spores to the total air spora is shown in Table No.II.

Some of the characteristic features observed for each spore type are discussed groupwise, and arranged in alphabetical order.

3) Composition of the catches.

a) Fungi :-

i) Phycomycetes :-

1) Oospores of Sclerospora Schroet (Plate-III A : Fig. 1).

Oospores of Sclerospora are spherical, dark brown in colour and surrounded by thick wall 26.5 x 46.5 μ. These spores are collected through out the investigation period. The maximum concentration (2480/m^3) was in the month of June. These spores were collected from the plants of Bajra and Jawar, infected with downy mildew near the trapping site. They contributed 2.987% to the total air spora of the library.

Mane (1978) for the first time had reported the occurence of these spores in the air spora of Bajra field near Vaijapur (Aurangabad). Patil and Kulkarni (1981) reported 7.531% Oospores in air spora of hospital at Kolhapur in 1978. Kulkarni and Kulkarni (1985) recorded 26.334% concentration at Kolhapur. Patil and Kulkarni (1988) reported 10.02% of these spores from Nipani region.

Present investigation shows, less concentration of Oospores present at library as compared to the result of Kulkarni and Kulkarni and the results of Patil and Kulkarni's reports.

ii) Ascomycetes :-

1) Chatomium Kunze ex fr. (Plate-III A : Fig. 2).

The Ascospores are dark, circular to triangular, unicellular 19.20 x 9-10 μ. These were recorded throughout the investigation period. Highest concentration (445/m^3) was noted in the month of January. Their contribution to the total air spora was (0.711%). These spores were also collected from the grass and wooden boxes in the campus of library which get wet in rainy season.

Pady (1951) collected C.reflexum over Arctic area of Canada. Kramer et al (1960) reported 10 species of Chaetomium. Sreeramulu and Ramalingam (1966) reported Chaetomium sp. from

a pady field near Vishakhapatanam. Mishra and Kamal (1971) recorded Chaetomium globosum in winter only. Gaikwad (1974) reported 0.04% spores from Ahmadapur air spora. Mane (1978) reported 0.15% spores over Bajra field at Vaijapur. Frey and Duire (1962), Agrawal et al (1969) reported them as Allergenic.

Tilak and Patil (1981) reported 0.31% spores, while studying air spora of nine dwelling houses of allergenic patients at Aurangabad.during the year 1980-81. Shastri (1981) reported 0.17% spores to the total air spora. Patil and Kulkarni (1981) reported 0.108% spores to the total air spora at Kolhapur. Kulkarni (1985) at Kolhapur reported 0.079% to the total air spora. Patil and Kulkarni (1988) reported of these spores from Nipani region over tobacco field.

Present investigation shows slightly higher concentration of Chaetomium.

2) Hypoxylon Bullex Fr. (Plate-III A : Fig. 3)

Ascospores are univellular, elliptical fusiform to bean shaped, dark brown, nonseptate with a distinct colourless furrow, 25.26 x 4-5 μ . These spores were present in the air in the months of January, March, May and June. Highest concentration was recorded in the month of June (15/m^3). Its contribution to the total air spora was 0.020%.

Ingold and Marshall (1963), while studying the spore discharge, reported that, in some pyrenomycetes light has opposite effect and markedly inhibits discharge. This is practically true of H.fuscum (Pers ex Fr.). Hodgkiss and Harvey (1969) observed that, spore discharge takes place throughout the year in H.rubiginosum (Pers Fr.). In H.fragiformae (Pers ex Fr.) Kickx, spores were not discharged for 45 days during late February to early April. Spore discharge in both the species of Hypoxylon showed a positive co-relation with rainfall and humidity. According to them H.rubiginosum (Pers)Fr. and H.fagiformae (Pers.ex Fr.) Kickx an noctural species with maximum discharge shortly after midnight.

Mane (1978) reported (0.72%) concentration of these spores over Bajra fields at Vaijapur, Bhalke (1981) 1.22%, Shastri (1981) 0.27%, Kulkarni and Kulkarni (1985) reported (0.027%) of these spores. Patil and Kulkarni (1988) recorded 0.24% of spores from Nipani area, over a tobaco field.

Present investigation shows comparatively low concentration as compared to earlier investigators. In general it can be stated that the Hypoxylon spores are of rare occurance in the air spora.

3) Hysterium Tode ex Fr. (Plate-III A : Fig. 4).

Ascospores are brown, oblong to cylindrical 4 celled slightly constricted at the septum, 25-26 x 14-15 μ. The spores were found in the month of January, March, May and June. Maximum concentration was observed in June ($25/m^3$) and May ($10/m^3$). They contributed 0.020% to the total air spora. Tilak and Shrinivasulu (1967), Talde (1969), Kulkarni (1971). Tilak and Shrinivasulu (1971), Talde (1969) and Gaikwad (1974) have also reported the presence of these spores in the air spora of Aurangabad region. Pande (1976) at Nanded reported 0.54% to the total air spora over orange fields, Shastri (1981) reported 0.007% to the total air spora of the vegetable market. Patil and Kulkarni (1981) reported 0.012% to the total air spora of hospital at Kolhapur, Kulkarni and Kulkarni (1985) reported 0.071% to the total air spora of Kolhapur. Patil and Kulkarni (1988) recorded 0.32% of Hysterium over a tobacco field of Nipani. Present investigation shows same concentration of Hysterium so author agrees with above results.

4) Hysterographium Corda (Plate-III B : Fig. 5)

Ascospores large, dark, muriform, ovoid to oblong many celled, 30-35 x 0-11 μ with five to ten transerve septum. Sometime constricted at the centre and with one to three longitudinal septa in most segments, pale to pale brown

in colour. They occured from April to June, in investigation period. The highest concentration (120/m^3) was in June, and the percentage of the total air spora was 0.116%. Patil and Kulkarni (1981) reported 0.027% to the total air spora of hospital at Kolhapur, who made first generic record to this area. Kulkarni and Kulkarni (1985) reported 0.067% contribution to the total air spora at Kolhapur. Patil and Kulkarni (1988) recorded 0.15% spores from Nipani region over a tobacco field.

Present investigation agree with the earlier reports.

5) Leptosphaerea Ces and de Not

Ascospores somewhat fusiform, with two to many cross septa, yellowish to yellowish brown in colour, 12.2-14.4 x 4.1-4.9 μ. In total air spora, they contributed 0.007%. The maximum concentration (15/m^3) was recorded in the month of May.

These spores were found only in May during investigation period. Sreeramulu and Ramalingam (1966), Tilak and Sreenivasulu (1967), Agrawal and Shivapuri (1974), Gaikwad (1974), Pande (1976), and Mane (1978). Patil and Kulkarni (1988) recorded 0.48% of Leptosphaerea spores over a tobacco field at Nipani area.

Present record shows trace appearance of these spores in library hall.

6) Meliola Fr.

Ascospores dark, black, 5 celled, 20-28.5 x 10-12.5 µ. These spores are occured in the month of March to June continuously. The maximum concentration was observed (80/m^3) in the month of March, and its contribution percentage is 0.076% to the total air spora.

Patil and Kulkarni (1981), Kulkarni and Kulkarni (1985) also recorded this fungus and found 0.002% and 0.099% contribution to the respective air spora of Kolhapur hospital and Kolhapur city. Patil and Kulkarni (1988) reported 0.24% spores from Nipani area. Present investigation shows less concentration of these spores than, previous work carried out by early investigators.

7) Pleospora Rabh → Rabenh.

Ascospores yellow to brown, with several cross septa and also with one or more longitudinal septa 28.2-30.3 x 9-10 µ. On comparison it was found that the spore type is similar to P.harbarum (Fr.) Rebh. It was found in the month of January to June continuousely with maximum concentration (170/m^3) in the month of January. Their contribution to the total air spora is 0.340%.

Dye and Varnon (1952) from New Zealand, Carter (1934) and Richards (1956) in England, Pady (1957), Kramer et al (1960) in Kansas, Meredith (1961) in Jamaica, Davies (1969)

in Kuwait, Sreeramulu and Ramalingam (1966) at Vishakhapatanam have reported pleospora from air, Tilak and Bhalke (1978), Bhalke (1981), Shastri (1981), Patil and Kulkarni (1981), Kulkarni and Kulkarni (1985) also recorded the concentration of this genus. Patil and Kulkarni (1988) reported the Pleospora (0.12%) to the total air spora, from Nipani area, over tobacco field.

8) Sporormia de Notaris

Ascospores are dark brown with three cross septa and showing a tendency to break up at the septa, surrounded by hyaline gelatinous sheath. 24-25 x 6-7 µm. It contributes 0.040% to the total air spora, and highest concentration ($30/m^3$) in the month of February.

The spores were collected by Pady (1951), Pollunin (1951), Pady and Kelly (1954), Kramer et al (1959) and Kramer and Pady (1960), Meredith (1962) in the air spora. Tilak and Shrinivasulu (1967, 1971) reported 1.12% and 3.09% spores to the total air spora of Aurangabad. Kulkarni (1971), reported its contribution 0.28% to the total air spora over sugarcane fields and vegetable fields. Tilak and Kulkarni (1972) reported 1.3% to the total air spora outside the caves at Aurangabad. Talde (1969) reported 0.72% spores to the total air spora at Parabhani. Gaikwad (1974) reported 0.20% spores to the total air spore from Ahmedpur. Pande (1976) reported 0.28% of spores at Nanded, Tilak and Patil

(1981) reported 0.04% at Aurangabad, Kulkarni and Kulkarni (1985) reported 0.071% of spores at Kolhapur. Patil and Kulkarni (1988) recorded 0.64% spores from Nipani area, over tobacco field.

The present results agree with some of the earlier reports.

9) Xylaria Hill ex Grev

Ascospores uniseriate, fusiform with one side flattened, 9-10 x 4.5-5 μ black to pale brown. They found throughout the investigation period. The highest concentration ($230/m^3$) was in the month of April. They contribute 0.295% to the total air spora. Fruiting bodies were collected around the library on dead twigs of unknown hosts after raining.

Patil and Kulkarni (1981) reported 0.135% contribution to the total air spora of hospital at Kolhapur. Kulkarni and Kulkarni (1985) reported 0.368% to the total air spora from Kolhapur. Patil and Kulkarni (1988) reported 0.72% of Xylaria spores from Nipani region over a tobacco field.

Present results, shows similarity with above mentioned records.

iii) Basidiomycetes :-

1) Puccinia pers (Plate-III B : Fig. 7).

During the period of investigations uredospores and

teleutospores of various rust fungi were trapped.

The teleutospores of this rust genus are two celled and stalked and were found only in the month of March. They contributed 0.002% to the total air spora of the library. These spores were collected on many plants and crops around the library.

Stakman et al (1923) during their flights at altitude upto 3300 meters reported the occurence of these teleutospores. Davies (1969) reported these spores from the atmosphere at Ahmedi, a new town in Kuwait.

Recently, Pande (1976) reported 0.03% teleutospores to the total air spora, over a Jawar field at Nanded. The Uredospores of the rusts, were also found which are periodic; 9.5-11 u in diameter. The occurence of these spores in the air is due to the infection of plants like Sorghum Vulgare (Jowar) Pennisetum typhoides (Bajara) and many other cereal plants around the trapping site. The highest concentration was recorded in the month of January with 3750/m^3 and having contribution 9.473% to the air spora.

Hirst (1953) and Hamilton (1959) showed that the peak period in the release of Uredospores seems to be noon. Pady et al (1965) recorded diurnal periodicity in the release of rust spores with the major peaks of leaf rust in the afternoon and the stem rust at mid-day. Sreeramulu and

Ramalingam (1966) recorded Uredospores of rust (0.03%) from air spora of pady fields at Vishakhapatanam. They observed no marked seasonal changes in their catches.

From Aurangabad, Tilak and Srinivasulu (1967) reported 0.57% Uredospores from the total catches. Tilak and Kulkarni (1978) studied diurnal periodicity of Uredospores and showed that they belong to the "day spora", group and daily maxima main peak at 12 hours, and a subsidary peak at 16.00 hours. Kulkarni (1971) reported 0.16% spores in the air spora over sugarcane fields. Gaikwad (1974) reported 1.05% contribution to the total air spora from Ahmadpur. Mane (1978) recorded 3.8% contribution of rust spores to the total air spora at Vaijapur over Bajara field. Patil and Kulkarni (1981) reported 1.84% and 0.06% contribution of Uredospores and Teleutospores respectively at Kolhapur. Kulkarni and Kulkarni (1985) reported 0.059% Teleutospores and 0.448% Uredospores from Kolhapur city. Patil and Kulkarni (1988) reported 4.70% Uredospores from Nipani region.

In present investigation, Teleutospore contributes 0.002% and Uredospore 9.473% to the total air spora. The concentration of Uredospores is much higher than other spore concentration.

In the present investigation, the general pattern of distribution and seasonal var ation of rust spores are

in conformity with the investigations carried out in India and elsewhere.

2) Smuts :- (Plate-III B : Fig. 6)

All kinds of Chlamydospores of various smuts, trapped during the period of investigation were grouped under same category. They are 9.5-11 μ.in diameter. They were present throughout the investigation period and contributes 34.914% to the total air spora found in the library. The maximum concentration was found (21170/m^3) in the month of June. The minimum concentration was (1195/m^3) found in May. The site, under investigation was surrounded by many plants like Hybrid, Jawar, Sugarcane, Wheat, Bajara, etc. which are susceptible to the smut.

Pady and Kapica (1960) working on the roof of a city building in Montreal, found smut spores in every month except December. Hirst (1957) observed that Chlamydospores of Ustilago reached peak in June and July. Pady (1957) recorded smut spores occuring throughout the year, with the peaks in the last week of June and first week of July due to harvesting in the state. Kramer et al (1959) reported 5.9% smut spores from the air spora of Kansas. Pady and Kramer (1960) recorded them throughout the year with maximum number in June and July, and lowest number in January to April. Lacey (1962) showed that the catches of spore of Ustilago

avenae (pers) Rostrap type was clearly correlated with the seasonal curves of grass pollen grains and both declined simultaneously in the last week of June. Meredith (1962) at Jamaica recorded 1.2% spores of Ustilago to the total air spora.

Rees (1964) observed that smut spores appeared more prevalent during dry, gusty, sunny periods, specially in afternoon. Adam (1964) reported the occurence of Ustilago spores only in the summer months. Mills (1967) noted that, there is no correlation between the high temperature and maximum dispersal of smut spores, but there was marked diurnal cycle. Sreeramulu (1962) concluded that, flowering coincides with the maximum dispersal of pathogen which occurred over a period of 10-20 days, and was mainly influenced by weather. Occurence of rainfall and high velocity during this period results in loss of spores from infected areas, thus reducing the period of smut dessimination. Kulkarni (1971) recorded 3.89% smut spores to the total air spora over sugarcane field at Aurangabad. Gaikwad (1974) at Ahmedpur recorded smut spores over Sorghum field, which contributed 7.23% to the total catches. Tilak and Kulkarni (1978) while studying the diurnal periodicity showed day pattern, reaching its maximum at 10.00 hours and 16.00 hours with the peak at 14.00 hours.

Lakhe (1980) from Udgir, reported 18.65% of these spores over vegetable field, Bhalke (1981), Shastri (1981) recorded these spores from Aurangabad. Patil and Kulkarni (1981) recorded 10.29% to the total air spora of Kolhapur. Bale (1984) recorded 24.05% to the total air spora at Osmanabad. Kulkarni and Kulkarni (1985) recorded 21.025% to the total air spora during aeromycological survey of Kolhapur. Patil and Kulkarni (1988) reported 12.17% smut spores from Nipani area, over a tobacco field.

In present investigation the smut spore concentration stands at highest place (34.914%) and agrees with the results of earlier workers mentioned above.

iv) Deuteromycetes :-

1) Alternaria Nees (Plate-III B : Fig. 8).

Conidia dark, typically with both cross and vertical septa variously shaped, obclavate to elliptical or ovoid, frequently borne acropetally in long chains less often borne singly and having an optical, single or branched appendatge of different sizes belonging to different species. 167-169 x 9-11 µ. These spores were recorded throughout the investigation period. They contributed 9.884% to the total air spora. Highest concentration (4105/m^3) was recorded in April. These spores are allergic in nature.

Stakman et al (1923) recorded numerous spores in chains upto 3300 meters. They were isolated by Browne (1930) from heights upto 2200 meters over a Aridlands of Southern Ari one. Meier et al (1935) reported them upto 5500 meters over U.S.A. region, Pady and Kelly (1954) reported 2.6% Alternaria spores from the flights over the North Atlantica. Hirst (1953) observed that Alternaria spores, are mostly removed by prolonged rains.

Kramer and his co-workers (1959) reported 3.4% spores from the air. Later on in the same year, they reported that, this genus was found to be one of the main component of the air spora. It comprises 12.6% to the total colonies and 3.4% to the total air spores collected. These abundant was reported in the growing season. Meredith (1962) in Jamaica, recorded 0.31% spores from the air. Rapid liberation started from 8.00 hours and reached peak by 10.00 hours. Later, when reporting the violent release of spores in some fungi imperfectii (1963) has reported that violent spore discharge in Alternaria occurs after change from humid condition to dry. While studying spores dispersal in Alternaria porri (Ellis) Neerg, he (1966) found that in warm dry weather, without marked or violent changes in wind velocity, the Conidia displayed a characteristic and well defined periodicity. Peak concentration occured between

8.00 hours and 14.00 hours conidia were trapped between 20.00 hours and 6.00 hours. No conidia were trapped when there is almost continous rain on windy days, concentration increases with increasing wind velocity.

Rees (1964) in Brisbane, recorded 0.58% Alternaria spores from air. Zhukova and Kondrater (1964) while studying air spora of Moscow, reported that Alternaria spore percentage was sharply reduced in rainy season. Pathak and Pady (1965) reported that the spores of this genus were low in number during morning, and increased to a maximum at noon, decreased slightly during the afternoon, but again increased to a second peak at 6.00 p.m. Dransfield (1966) in Samaru, observed that the genus Alternaria was recorded only 6 times, despite of A. macrospora Zim, being a common parasite on the cotton in that region.

Turner (1966) collected 0.8% spores of this genus from the air of Hongkong. De Groot (1966) reported its occurence throughout the summer season. Derrick (1966) recorded them in large number from November to January. Sheehy and Huguelet (1967) found that the spores were contributed between 9 a.m. and 4 p.m. Occasionally extending to 1.00 p.m. with highest peak usually occurring between 1 p.m. and 4 p.m. Yousef Al Dorry (1967) reported its highest concentration in August Schenck (1968) in Florida reported their greatest number in

June. They were collected more abudently after rains, and number gradually decreased during extended dry periods. After the 5 to 7 rainless days spore number was reduced to 0.1% or less.

Rajan et al (1952) reported them from exposed petriplates at Kanpur. Sreeramulu (1958) reported them over the Mediterranean sea. Sreeramulu and Ramalingam (1963) obtained high number of spores in November. Tilak and Sreenivasulu (1967) reported two types of Alternaria spores one long (0.68%) and another short (9.74%). Bharat Rai (1969) reported A.humicola oudem and A.tennuis Nees., from the atmosphere round about Saccharam munia Roxb at Varanasi. Mishra and Shrivastava (1969) found that Coadosporium and and Alternaria appeared with the maximum percentage distributioh in both the fields. The population varied in different sampling periods in different months and was governed by atmospheric conditions and the plantage.

Shukla (1971) recorded A.humicola oudem and A.tennuis Nees spores from the air spora over Shorea robusta Gureth at Gorakhpur. Mishra and Kamal (1971) recorded A.humicola and A.tennuis only in winter. Kulkarni (1971), Gaikwad (1974), Tilak and Vishwe (1975) and Pande (1976) recorded these spores from air spora of Aurangabad region. Tilak and Kulkarni (1972) reported 1.40% and 4.10% Alternaria spores inside and outside the Aurangabad caves. Kumar and Gupta (1976) reported

A.alternaria and A.solani, over potato field at Agra city. Tilak and Bhalke (1978) reported 5.4% of Alternaria from air spora of Aurangabad. Mane (1978) also recorded these spores. Lakhe (1980) reported 7.15% contribution at Udgir. Dixit and Gupta (1980) reported Alternaria alternata from Phylloplane as well as from air spora over barley field by petriplate method.

Tilak and Patil (1981) reported 7.26% of Alternaria from nine dwelling houses of allergenic patients at Aurangabad. Patil and Kulkarni (1981) reported 6.699% Alternaria spores in the air spora of hospital at Kolhapur. Shastri (1981) recorded 7.77% at vegetable market. Patil and Vyawahare (1981) recorded 3.85% colonies in the air spora of Ganeshkhind area at Poona.

Subba Reddi and Jankibai (1982) reported 9% of Alternaria spores in air spora over the city of Vishakhapatanam. Chaubal and Kotmire (1983) reported 4.91% Alternaria spores in the air of Kolhapur. Anand and Agashe (1981) also reported these spores in the air of Bangalore city. Wadawani (1984) reported these at Lucknow. Kulkarni and Kulkarni (1985) reported 2.053% spores to the total air spora at Kolhapur. Patil and Kulkarni (1988) reported 18.70% spores from Nipani area. In this investigation, Alternaria contributes 9.884% to the total air spora.

The seasonal occurence of Alternaria spores obtained in the present investigation is in agreement with the earlier reports from India and elsewhere.

2) Arthrobotryum Ces :- (Plate-III C : Fig. 9).

Conidia hyaline to dark, 4 to 6 celled. Conidia produced in chains not in frequently. Subcylindrical or elongate obclavate, conidia dark brown somewhat cylindrical oblong 4 septate without transverse septa, thick walled 18-19.5 x 6.5-7 μ. These spores were recorded throughout the investigation period except January. The highest concentration was ($510/m^3$) in the month of June. Their percentage contribution was 0.418% to the total air spora. The fungus was observed on the dead bamboostems nearby the trapping site. Patil and Kulkarni (1988) reported 0.27% spores from Nipani area, over tobacco field.

Patil and Kulkarni (1981) at Kolhapur recorded 0.127% concentration to the total air spora. Kulkarni and Kulkarni (1985) at Kolhapur reported 0.091% concentration to the total air spora for the first time in the year 1976-77.

The present investigation shows close relationship with above results.

3) Bactridium Kunze ex Fr. (Plate-III C : Fig. 10)

Conidia apical, single, hyaline or containing yellow pigment very large cylindrical to long ellipsoid

30-34 x 8-10.5 μ. These spores occured throughout the investigation period. Their highest concentration (395/m^3) was in the month of June. It contributes 0.486% to the total air spora.

Patil and Kulkarni (1981) recorded 0.016% spores of this type to the total air spora of hospital at Kolhapur. Chaubal and Kotmire (1983) reported 0.45% to the total air spora of Kolhapur in 1981. Kulkarni and Kulkarni (1985) recorded 0.19% of spores to the total air spora of Kolhapur city and made a first generic record to the aerobiology in the year 1979. Patil and Kulkarni (1988) recorded 0.17% spores from Nipani area.

4) Basidiobotrys Hohnel :-

Conidia hyaline, fusoid, one celled 1-2 to 1-1.5 μ in diameter. They occured only in May,June during, investigation period and found at the highest concentration (30/m^3) in the month of May. It contributes 0.027% to the total air spora. Patil and Kulkarni (1981) reported 0.001% spores in the air spora of hospital at Kolhapur.

5) Beltrania Penzig (Plate-III C : Fig. 11).

Conidia are biconic, smooth, one celled, pale brown to brown with a subhyaline, 18-20.4 x 10-12 μ, rounded with scar or denticulate at the base, with a long conical

one celled hyaline to sub-hyaline septum at the apex. They contributed 0.287% to the total air spora and was attended highest concentration (345/m^3) in the month of March. These spores were found continuousely during investigation period except in the month of January.

Sreeramulu and Ramalingam (1963) have reported these spores over the fields at Vishakhapatanam. Tilak and Srinivasulu (1967), Kulkarni (1971) and Gaikwad (1974) have reported the occurence of these spores in Aurangabad region. Pande (1976) at Nanded reported 0.02% contribution to the total air spora. Mane (1978) reported 0.1% to the total air spora over Bajara fields at Vaijapur. Tilak and Bhalke (1978) reported 0.24% to the air spora at Aurangabad, Tilak and Patil (1981) reported 0.12% in nine houses of allergenic patients at Aurangabad. Patil and Kulkarni (1981) reported 0.033% spores in the air spora of hospital at Kolhapur. Chaubal and Kotmire (1983) recorded 0.06% spores at Kolhapur. Kulkarni and Kulkarni (1985) reported 0.015% contribution of spores to the total air spora at Kolhapur. Patil and Kulkarni (1988) reported 0.20% spores from tobacco field at Nipani area.

Present investigation shows some higher concentration of Beltrania spores and agree with earlier workers.

6) Bispora Corda

Conidia dark ablong, two celled or rarely three celled, with thick black septa, catanulate 6-11 x 5-8 μ. They occurred throughout the investigation period except in June, and attending at highest concentration (1035/m^3) in the month of January. They contributed 0.827% to the total air spora.

Rees (1964) in Brisbane, Turner (1966) in Hongkong, reported colonies of this fungus from exposed petriplates. Mane (1978) reported 0.12% to the total air spora over Bajra field at Vaijapur. Tilak and Bhalke (1978) recorded 0.12% contribution of spores to the total air spora at Aurangabad. Tilak and Patil (1981) recorded 0.24% spores to the total air spora at Aurangabad, Shastri (1981) at Aurangabad, Chaubal and Kotmire (1983) at Kolhapur have reported the occurence of these spores from the air at Kolhapur.

Kale (1983) reported 0.32% to the air spora over cotton field at Parli-Vaijanath. Bhagwan (1983) reported 0.33% spores to the total air spora at Nanded, Kulkarni and Kulkarni (1985) recorded 0.32% of spores to the total air spora, at Kolhapur city. Patil and Kulkarni (1988) recorded 0.41% spores from Nipani area over tobacco fields.

Present investigation shows slight higher concentration to the total air spora as compared to the earlier workers.

7) Botryodiplodia Sacc (Plate-III C & III-D ; Fig. 12 a & b).

Spores dark, two celled, ovoid to elongate 24-28 x 10-14 μ. These spores are found throughout the investigation period, attending the maximum concentration ($230/m^3$) in the month of January and encounted 0.345% to the total air spora.

Meredith (1961) reported conidia of B.theobroma Pat. from air spora of Jamaica. The average daily mean concentration throughout the year was only 8 spores per cubic meter. He further concluded that, this fungas is relatively infrequent in number, over the fields of Banana plantation. Kramer and his co-workers (1964) at Kansas, have reported one colony of Botryodiplodia.

Kulkarni (1971) at Aurangabad, reported 0.05% spores from the total air spora over a sugarcane field at Aurangabad. Pande (1976) have also reported 0.15% of these spores from the air spora over the orange field at Nanded.

Mane (1978) at Vaijapur recorded 0.02%, Tilak and Bhalke (1978) recorded 0.09% at Aurangabad, Tilak and Patil (1981) reported 0.27% of spores at nine dwelling houses of allergenic

patients, at Aurangabad. Patil and Kulkarni (1981) reported 0.137% of spores to the total air spora of hospital at Kolhapur. Kulkarni and Kulkarni (1985) recorded 2.410% spores at Kolhapur. Patil and Kulkarni (1988) reported 1.77% spores from Nipani over tobacco fields.

The contribution of the spores to the total air spora obtained during the present investigation, are in agreement with earlier reports.

8) Camposporium Harkness

Conidia apical, single, cylindrical with rounded ends, pale brown, several celled, apical cell frequently with one to three hyaline filiform appendages, 32-34 x 5-6.5 μ. These spores were trapped throughout the investigation period with highest concentration (165/m^3) was in the month of March. They contribute (0.345%) to the total air spora.

Patil and Kulkarni (1981) reported 0.003% spores from the air spora of hospital at Kolhapur.

9) Catinula Lev.

Conidia one celled, subhyline globose to oblong 4-9 to 2-4 μ. These spores were trapped in May and June only, during the investigation period. The maximum concentration was observed (15/m^3) in the month of May. They contribute 0.015% to the total air spora.

Patil and Kulkarni (1981) reported 0.385% spores from the air spora of hospital at Kolhapur.

10) Ceratosporium Schw.

Conidiophores consisting of a short cylindrical cell, and conidia consisting of two or three straight or curved arms (horns) tappering upward, several celled, dark and saprophytic on wood or bark.

These spores were collected only inthe months of January and February. The heighest concentration was recorded in the month of January ($35/m^3$) and contribution to the total air spora was 0.025% .

11) Cladosporium Link and Fries

Conidia sub-hyaline to dark brown, 1 to 2 celled, variable in shape and size, ovoid to cylindrical and irregular, sometimes typically lemon shaped 14-24.8 x 4-7 μ. Conidiophore are dark, branched, conidiophores variously branched near the apex or middle portion, clustred or single. The spores were recorded throughout the investigation period. The highest concentration ($1915/m^3$) was observed in the month of April. It contributes 3.009% to the total air spora. This fungus was collected from decaying leaves, stems and other parts of various plants around the library. The occurence of Cladosporium spores in the air had been reported in large number by various workers from the different regions

of the world. Stakmen et al (1923) reported these spores from upper air spora at altitude up to 3300 meters.

From South East Asiatic region it has been described as the dominent component from Japan (Hara and Durhaman 1939, Turner 1966); Australia (Frey and Durie 1962, Rees 1964); Kuwait (Davies 1969); and India (Sreeramulu 1962, Sreeramulu and Ramalingam 1963, 1964, 1966). The dominance The dominance of this genus has also been reported from Israel (Barkai-Golan 1961) and some European countries like Denmark (Samse Jensen and Flensbirg 1950); England (Ainsworth 1952, Gregory and Hirst 1957, Gregory 1954, Harvey 1967, Hirst 1957, Lacey 1962, Pawsey and Heath 1964); Sweeden (Nilsby 1949) and Wales (Hyde and Williams 1953). It has also been reported from Canada (Pady and Kapica 1956); Panama (Taylor and Mc Fadden 1962); Africa (Dransfield 1966), Jamaica, West Indies (Meredith 1962) and various states of America (Bernstein and Feinberg 1942, Durhaman 1938, Harsch and Allen 1945, Kramer et al 1959, Pady 1957, Vinje and Vinje 1955).

Studies of Hirst (1953) show that the pollen and spores of Cladosporium were removed from the air due to prolonged rain. Hamilton (1959) found an appreciable decrease in their number during rains but Ainsworth (1952), Hirst (1953) and Gregory (1954) demonstrated a transient increase in

concentration of these spores when the rain starts. Pady (1957) found that, the spores were present throughout the year comprising bulk of spores in summer. Kramer et al (1959) recorded the seasonal occurence, being most abundent from May to middle of October. Tich Saul and Waggoner (1962) found that the rain has duel effects on concentration of these spores Adam (1964) reported 39% spores from the total catches but seasonal incidence was from June to September.

Dransfield (1966) while studying the air spora of Samaru, (N.Nigeria) recorded Cladosporium (36.8%) comprised 5% fungi isolated in dry season, but fall down between 10-30%, when isolated during the rainy season. The fluctuations in the number of Cladosporium and Curvularia in the air spora were closely related to the amount of rain fall and to the availability of suitable vegetation. Harvey (1970) found that large number of spores were released in wet air than in dry while the number released in humid air were generally intermediate between those of dry and wet samples.

In India Sreeramulu (1962) noted that., though spores were present throughout the year, its high concentration encounters in the December. Further Sreeramulu and Ramalingam (1964) found that spore like Cladosporium which are washed off by first showers of the rain take some time

to recover their concentration to previous pre rain levels. Sreeramulu and Ramalingam (1966) have recorded that in the catches of the spores of Cladosporium two peaks occured in a year, which coincides with the availability of dead stem decaying vegetables in the fields.

Tilak and Srinivasulu (1967) have not recorded the spores of Cladosporium from August to November from the air spora of Aurangabad, which is considered to be unusual. Mishra and Srivastava (1969) found that the population of Cladosporium spores varied at different sampling period, in different months, and was governed by atmospheric conditions and age of the plant. Mishra and Kamal (1971) have reported that the spores of Cladosporium dominate in the winter, while absent in the summer and rainy season. Tilak and Kulkarni (1972) reported 60.42% and 62.40% Cladosporium inside and outside the Aurangabad caves respectively from August to October in the year 1968.

Agarwal and Shivpuri (1974) recorded these spores from Delhi air spora while dealing with the role of fungal spores in etiology of respiratory allergic disorders. Gaikwad (1974), Tilak and Vishwe (1975) and Pande (1976) also reported these spores from the air.

In 1978, Mane reported 28.20% concentration of these spores at Vaijapur. Tilak and Bhalke (1978) recorded 31.21%

concentration to the total air spora at Aurangabad and included this spore under aeroallergenic types. Patil and Vyavahare (1981), from Poona, recorded Cladosporium spores. Tilak and Patil (1981) recorded 24.10% spores of Cladosporium in highest concentration in the air spora of nine dwelling houses of allergenic patients, at Aurangabad. Patil and Kulkarni (1981) reported 36.322% of these spores in hospital at Kolhapur. Subba Reddi and Jankibai (1982) recorded 29% spores from Vishakhapatanam. Kale (1983) reported 28.49% spores over cotton field at Parli Vijanath, Bhagwan (1983) recorded 27.69% spores at Nanded, Kulkarni and Kulkarni (1985) recorded 26.821% spores from Kolhapur city. Patil and Kulkarni (1988) recorded 8.27% spores over tobacco field at Nipani.

Present investigation, shows decrease in concentration as compared with the earlier records.

12) Clasterosporium Schw

Conidia dark to pale brown three to several celled, ovoid to long. Cylindrical some what narrower at the ends 53-55 x 6-9 µm. These spores were found throughout the investigation period. The highest concentration (985/m^3) was in the month of April. It contributes 1.445% to the total air spora.

Patil and Kulkarni (1981) recorded 0.011% spores to the total air spora of hospital at Kolhapur and made a new generic

record to the air spora. Chaubal and Kotmire (1983) reported 0.93% spores from the air of Kolhapur. Kulkarni and Kulkarni (1985) recorded 0.059% spores at Kolhapur city. Patil and Kulkarni (1988) recorded 0.47% spores from Nipani area. Present investigation shows higher concentration, than recorded by earlier workers.

13) Coniothyrium Corda

Conidia small, dark one celled, ovoid or ellipsoid, 3-4.5 µ.in diameter. They were recorded only in May and June, attending the highest concentration ($30/m^3$) in the month of March. They contribute only 0.015% to the total air spora.

Patil and Kulkarni (1981) recorded 3.829% spores of this fungus to the total air spora of hospital at Kolhapur. Chaubal and Kotmire (1983) recorded 3.28% from Kolhapur, Kulkarni and Kulkarni (1985) reported 2.27% spores from Kolhapur city. Patil and Kulkarni (1988) recorded 2.32% spores from Nipani area.

The present results are parallel with the results of above authors.

14) Curvularia Boedijn (Plate-III D ; Fig. 13).

Conidia dark, and cells lighter 3 to 5 celled, more or less fusiform typically bent or curved with one to two central cells enlarged two types of spores were found, one 19.32 x

7.5-17.5 μ and another 23-25 x 10-11.5 μ. These spores were found throughout the investigation period and attending maximum concentration (2525/m^3) in the month of April. They contributes 5.908% to the total air spora. The fungus was collected as a common Saprophytic on decaying parts of various plants around the sampling site.

Rajan et al (1952) reported Curvularia spores from air spora of Kanpur. Pady (1957), Sreeramulu (1958) from Mediterranean region. Kramer and his co-workers (1959, 1960), Pady and Wiley (1962), Sreeramulu (1961), from cattle shed, Pathak and Pady (1965), Turner (1966), Chaubal and Deodikar (1964), Shukla (1971), Tilak and Srinivasulu (1967), Davies (1969), Bharat Rai (1969). Rees (1964) in Brisbane recorded 0.47% spores from the total air spora which were more frequent during the day time. Dransfield (1966) in N.Nigeria recorded 25.1% spores from total catches.

Sreeramulu and Ramalingam (1962) reported that spores of this fungus appeared during day time with their daily peak at 11.00 hours. Although they occured throughout the period of investigations, slightly higher number was obtained in September and October. In another report (1963) they found that comparatively high number of Curvularia spores were caught during the November and showed gradual decrease during

December and January. Their concentration was more between 10.00 and 18.00 hours. Further while reporting the air spora of Pady fields, they (1966) found no marked seasonal changes in the catches, and exhibited "Day Time Double Maxima" , Tilak and Srinivasulu (1967) reported highest concentration from August to November at Aurangabad.

Mishra and Kamal (1971) reported seven species of Curvularia from Gorakhpur, which were present in winter, while C.lunata was in summer and rainy season. Pande (1976) reported these spores from Nanded air spora. Mane (1978) reported from Vaijapur, over Bajra fields. Tilak and Bhalke (1978), Verma (1979), Patil and Vyawahare (1981). Tilak and Patil (1981), Patil and Kulkarni (1981), Subba Reddi and Jankibai (1982), Bhagwan (1983), Kale (1983), Khot (1985), Kulkarni and Kulkarni (1985) and Patil and Kulkarni (1988) have reported its occurence in the air spora from different place.

The results obtained in present investigation are in agreement with earlier reports in India and elsewhere.

15) Cylindrocarpon Woolen

Conidia slimy, generally not in chains, two types are observed, microconidia are always present hyaline and straight or curved, cylindral to fusoid but with rounded ends. Mostly it is soil fungus, occasionally parasitic. These spores were found only in May and June, having the highest concentration ($65/m^3$) in June. These spores contributes 0.037% to the total air spora.

16) Dactylosporium Harz

Conidia brown to subhyaline, ovoid sometimes inequilateral with cross and longitudinal or oblique septa, 24.5-26 x 12.5-14 µ. The highest concentration (50/m^3) was in the month of March, and contributes 0.052% to the total air spora.

Patil and Kulkarni (1981) reported these spores (0.006%) from the air spora of hospital at Kolhapur.

17) Dendrographium Masses (Plate-III D : Fig. 14).

Conidia cylindrical to oblong, mostly 4 celled, dark, apical in short acropetalous chains cylindrical ovoid 15.5-17 x 4-4.5 µ. These spores occured throughout the investigation period. The highest concentration (215/m^3) was observed in the month of May and their percentage contribution was 0.252% to the total air spora.

Patil and Kulkarni (1981) reported these spores (0.235%) from the air spora of hospital at Kolhapur. Bhagwan (1983) reported 0.02% spores to the total air spora at Nanded, Kulkarni and Kulkarni (1985) reported 0.11% spores to the total air spora at Kolhapur and made a first generic record to the air spora in year 1976-77. Patil and Kulkarni (1988) recorded 0.20% spores over a tobacco field at Nipani.

The present results are parallel with the results of above authors.

18) Dendryophiopsis Hughes (Plate-III D : Fig. 15)

Conidia dark, 4 or more celled cylindrical, straight or slightly curved, 15-16.5 x 4.5-5 μ. The highest concentration (195/m^3) was obtained in the month of March. These spores were found throughout the investigation period, and contributes the 0.307% to the total air spora.

Tilak and Bhalke (1978) reported these spores in mean concentration of (0.01%) from 1967-1977 in Marathawada region. Patil and Kulkarni (1981) reported these spores (0.016%) from the air spora of hospital at Kolhapur. The occurrence and their distribution obtained the present investigation are in agreement with the reports of earlier workers.

19) Dichomera Cooke

Conidia dark, globose, ovoid or ellipsoid, several celled, with oblique septa, 11-13.5 x 8-11.μ These spores were recorded in highest concentration (75/m^3) in the month of May, and contributes 0.043% to the total air spora. Patil and Kulkarni (1981) reported these spores (0.054%) to the total air spora of hospital at Kolhapur.

20) Diplodia Fr.

Conidia dark brown, 2 celled, ellipsoid or ovoid, slightly constricted at the septum, 12-15 x 3.5-7 μ. Highest concentration of these spores were (215/m^3) found in the month of January. The spores of this genus were found throughout the investigation period which contributes 0.373% to the total air

spora. Panzer et al (1957) observed that, these spores were having night time peak. Kramer et al (1959) reported these spores from Kansas air spora. Kramer and Pady (1960) also reported these spores from same locality.

Gaikwad (1974) reported 0.23% spores from Ahmedpur. Pande (1976) reported 0.83% spores to the total air spora at Nanded. Tilak and Bhalke (1978) reported 0.6% spores from Aurangabad and included under plant pathogenic type. Patil and Kulkarni (1981) recorded 0.047% spores from the air spora of hospital at Kolhapur, Bhagwan (1983) reported 0.74% spores from Nanded. Kale (1983) recorded 0.23% spores from Parali-Vaijanath, Khot (1985) recorded 0.68% spores from Ambejogai, Kulkarni and Kulkarni (1985) reported 0.162% spores from Kolhapur. Patil and Kulkarni (1988) recorded 0.64% spores from Nipani.

21) Diplodina Westend

Conidia hyaline 2 celled, ovoid or ellipsoid, 17-18.5 x 3-3.5 μ. These spores were occured throughout the investigation period and the highest concentration (565/m^3) was recorded in the month of February. They contributes 0.925% to the total air spora.

Patil and Kulkarni (1981) recorded 0.040% spores to the total air spora of hospital at Kolhapur and made a

new generic record to the air spora during the year. Khot (1985) recorded 0.32% spores from Ambejogai, Kulkarni and Kulkarni (1985) reported 0.031% spores from Kolhapur.

Present investigation shows higher percentage of Diplodina spores as compared with above results

22) Epicoccum Link ex Wallr (Plate-III E : Fig. 16 a & b).

Conidia dark, uni or multicellular, globose 7-9 μ in diameter. They were found throughout the investigarion period and had attended the highest concentration (2740/m^3) in the month of April. They contribute 5.419% to the total air spora.

Meier et al (1933) reported Epicoccum from the air during flights over the United States from 150 meters to 5500 meters.

Dye Vernon (1952) have found it to be the third commonest genus after Cladosporium and Stemphylium in New Zealand. From Australia it was also third in series following Cladosporium and Alternaria, according to Frey and Durrie 1962.

Sreeramulu (1958) reported it from Mediterranean sea-air. Kramer and his co-workers (1959,1960,1964) have recorded 106, 59 and 281 colonies respectively, from the exposed petriplates in Kansas region. Other reports on the occurrence of this genus are by Lacey (1962), Derrick (1966), Sreeramulu and Ramalingam (1966), Davies (1969) and Mishra and Srivastava (1970).

Rees (1964) reported 0.46% spores from Brisbane air spora and 12.5% colonies from the total colonies obtained. Dransfield (1966) from Samaru (N.Nigeria) recorded 5.77% of Epicoccum from the air. In England, Sreeramulu (1958), Pawsey and Heath (1964) have demonstrated that during mowing of grass, when spore trapping was in progress, the number of Epicoccum spores and Cladosporium spores have increased. Gregory (1973) suggested that this apparent decrepancy may be due to local environmental conditions. Tilak and Bhalke (1978) reported 0.25% spores at Aurangabad, Mane (1978) reported 0.25% at Vaijapur.

Shastri (1981) and Bhalke (1981) recorded 0.40% and 0.36% of spores at Aurangabad respectively. Patil and Vyawahare (1981) recorded 1.60% of spores from the air spora of Ganeshkhind at Poona, Tilak and Patil (1981) reported 0.51%, at Aurangabad, Patil and Kulkarni (1981) recorded 1.018% spores from hospital at Kolhapur, Kale (1983) reported

0.41% of spores over cotton field at Parli-Vaijanath, Khot (1985) at Ambejogai reported 0.19% spores over vegetable field. Kulkarni and Kulkarni (1985) reported 0.281% spores to the total air spora over Kolhapur city.

Patil and Kulkarni (1988) reported 0.41% spores, over a tobacco field at Nipani.

Present investigation shows higher concentration of Epicoccum .

23) Haplosporella Speg. (Plate-III E : Fig. 17).

Conidio large, dark, one celled, ovoid or oblong, 23.5-25 x 11.5-12.5 μ. These spores were recorded throughout the investigation period and were at the highest concentration ($550/m^3$) in the month of April. They contributes 1.004% to the total air spora. These spores were collected on the twigs of Acacia arabica, Azadirachta indica, Lantana camera and on the different parts of unidentified host plants around the investigation site. Tilak and Bhalke (1978) reported these spores in mean percentage (0.6) from Marathwada region during 1967-1977.

Mane (1978) reported 0.56% of these spores to the total air spora over Bajra field at Vaijapur. Tilak and Bhalke (1978) reported 0.60% spores from Aurangabad, Patil and Vyawahare (1981) reported it occurrence from the air spora of Ganeshkhind at Poona, Shastri (1981), Patil and Kulkarni

(1981), Kale (1983) reported its occurance from various places. Khot (1985) reported 0.39% of spores from Ambejogai, and showed a"Double Day Maxima".

Patil and Kulkarni (1988) recorded 0.69% spores of Haplosprella at Nipani area, over a tobacco field.

Present investigation shows higher concentration of these spores as compared with the earlier reports.

24) Helminthosporium Link (Plate-III E & F : Fig. 18 a & b).

Conidia dark or light brown 3-4 celled, cylindrical to ellipsoidal, sometimes slightly curved or bent with rounded ends, 72-74 x 17-18.5 µm. These spores were collected throughout the investigation period. They contributes 6.398% to the total air spora. The concentration was at the highest peak (2820/m^3) in the month of June. The fungus was collected from the leaves of sugarcane, wheat, rice, and other decaying unknown plant materials.

Stakman et al (1923) and Meier et al (1933) have recorded spores of Helminthosporium up to 3300 and 5500 meters respectively from upper air spora. Pady (1957) recorded the occasionally on exposed slides. Later on he (1959), reported that these spores show definite hourly variations mostly during afternoon, with occasional peak at night. Kramer et al. (1959) recorded 0.3% spores from Kansas. Kramer et al.(1960) reported that appearance of these spores was more frequent

during growing season. No spores were obtained in winter season.

Dransfield (1966) in Samaru, reported 0.85% Helminthosporium spores from the air. It showed pronounced peak between September and November. Turner (1966) has reported 0.2% of these spores. Meredith (1966) from Nebraska reported their low concentration throughout October and November while conidia of H.turcicium pass, exhibited regular and well defined diurnal periodicity. Rapid liberation of conidia started at 8 a.m., reached peak at noon and decreased during afternoon and evening, few conidia were trapped at night except during storms. Sheehy and Huguelet (1967) at Fargo found that daily peak for H.Sativam Pammel, king and Beakke, occured between 1 and 4 p.m. where as that of H.tritici rependis Died encountered between 8 a.m. and 3 p.m. daily. The highest peak was recorded in July. Berger (1970) found that, nearly 50% of the trapped spores where caught from 8 a.m. to noon. The spores were formed at night and released in the morning when the humidity rapidly decreased.

Sreeramulu (1958) reported these spores over the Mediterrnean sea. Padmanabhan et al (1952) recorded the spores of H.Oryzae Breda de Haan over rice field during the growing season. Sreeramulu and Ramlingam (1963) noticed higher concentration in the afternoon. Rees (1964) in Brisbane,

collected them more frequently during day time.

Tilak and Srinivasulu (1967) from Aurangabad, reported long type (9.62%) and shor type (9.74%) s ores of Helminthosporium from total catches. Agarwal et al (1969) reported these spores as allergenic in nature during their studies of air spora of Delhi. Bharat Rai (1969) reported H.anamalum Gilman and Aboot, from the petriplates exposed with different media round about platns of Saccharam munja Roxb from Banaras.

Shukla (1971) isolated Helminthosporium spores from the petriplates exposed in the forest. Kulkarni (1971) reported 2.83% Helminthosporium spores from the total air spora of Aurangabad. Agarwal and Shivpuri (1974) reported H.anamalum from the air spora of Delhi. Gaikwad (1974) reported 9.34% of these spores from the total air spora at Nanded.

Mane (1978) from Vaijapur, recorded the occurence of these spore type. Tilak and Bhalke (1978) recorded 3.15% of these spore type from Aurangabad, Patil and Vyawahare (1981) recorded 1.05% of spores from Ganeshkhind, at Poona. Tilak and Patil (1981) recorded 1.79% of spores from dwelling house of allergenic patients at Aurangabad. Patil and Kulkarni (1981) recorded 2.80% spores to the total air spora

of hospital at Kolhapur, Kale (1983) reported 3.51% of spores from cotton field at Parli-Vaijanath, Bhagwan (1983) recorded 2.90% of spores from Nanded. Khot (1985) recorded 6.65% of these spores from Ambejogai, Kulkarni and Kulkarni (1985) reported 1.546% of spores from Kolhapur city. Patil and Kulkarni (1988) reported 1.92% spores over a tobacco field at Nipani.

The occurence, their distribution, obtained in the present investigation are in agreement with the reports of some of the earlier worker in India and abroad.

25) Hendersonia Berk

Conidia dark, several celled, elongate to fusoid 14-16 x 6-7 µ. These spores were found throughout the investigation period and reach at highest concentration ($85/m^3$) in the month of March. They contributes 0.085% to the total air spora.

Tilak and Bhalke (1978) reported these spores in mean percentage (0.04) from Marathwada region during 1967-77. Mane (1978) reported 0.03% of these spores over Bajara field at Vaijapur.

Patil and Kulkarni (1981) reported 0.038% spores to the total air spora of hospital at Kolhapur.

The results of the present investigation fall in line with those recorded by the above authors.

26) Hirudinaria Ces

Conidia consisting of two straight arms tapering at the end, multicellular dark 60-90 x 5-6 u at the base and 1.5-2.5 μ at the apex. They were found at 0.025% contribution to the total air spora with highest peak of concentration (25/m^3) in the month of January.

Kulkarni (1971) reported, these spores from Aurangabad air spora. Mane (1978) also reported them from Vaijapur over Bajara fields. Tilak and Bhalke (1978) recorded 0.01% spores from Aurangabad. Patil and Kulkarni (1981) recorded 0.003% of spores from hospital at Kolhapur. Chaubal and Kotmire (1983) reported 0.01% of spores from Kolhapur. Bhagwan (1983) reported 0.02% of spores from Nanded. Kulkarni and Kulkarni (1985) recorded 0.019% to the total air spora from Kolhapur city. Patil and Kulkarni (1988) recorded 0.29% spores from Nipani area.

Present investigation shows close relationship with the results of earlier workers.

27) Nigrospora Zimm (Plate-III F : Fig. 19).

Conidia black one celled, globose to somewhat flattened 13-23 x 11-23 μ. These spores occurred throughout the investigation period, and reach at highest concentration (4155/m^3) in the month of June. They contribute 7.725% to the total air spora. These spores were collected from

decaying leaves of Bajara, Jawar, Sugarcane, Maize, Rice etc. around the sampling site. Panzer et al (1957) referred these spores as "Day Spora" with maxima between 8.00 hours and 17.00 hours.

Pady (1957) from Kansas, recorded the spores occasionally on the exposed slides. Meredith (1961) from Jamaica found that the fungus exhibited a well defined periodicity with peak concentration occurring near 8.00 hours. The variation in number of spores appears to be related to rainfall and humidity, highest catches were obtained predominantly during dry weather. He (1962) has further recorded that their first appearance was shortly offer 6.00 hours and reaches the peak before 9.00 hours and then showed rapid fall. He has recorded 0.97% spores from the total air spora. Rees (1964) at Brisbane recorded 0.18% spores from the total air spora. He has also reported that during morning of sunny humid conditions, there was high concentration of Nigrospora was found.

Turner (1966) at Hongkong, isolated Nigrospora spores four times, out of ten isolates. Dransfield (1966) at Samaru (N.Nigeria) isolated 4.3% colonies from the total isolates it showed no seasonal periodicity. Webster (1952) and Hirst (1953) studied the spore discharge mechanism and showed that dry conditions favouring it.

Sreeramulu (1958) reported them over the mediterranean sea. He (1961) while studying the air spora of the cattle shed, reported them in very low concentration. Sreeramulu and Seshavataram (1962) found a sharp diurnal periodicity with a very narrow peak occurring at 10.00 hours. They were present a large numbers till the middle of October constituting an important element of the air spora. In November and December their concentrations were very low. Sreeramulu and Ramalingam (1963) reported their daily peak at 8.00 hours. Sreeramulu and Ramalingam (1966) found that it showed sharp peak at 8.00 hours with rapid fall after the Peak hour. Peaks of Nigrospora recurred at an early hour in the fore noon, in the hot season, but they appeared at a later hour in the rainy and cold season from Vishakhapatanam.

Mishra and Srivastava (1970) from Gorakhpur, recorded the occurrence of N.sphaerica (Sacc.) Mason from the air spora. Kulkarni (1971) reported 5.45% of these spores from total air spora over a sugarcane fields at Aurangabad. Mishra and Kamal (1971) recorded N.sphaeria (Sacc.) Mason in winter and rainy season. Agarwal and Shivpuri (1974) reported the same from Delhi air spora. Gaikwad (1974) reported 4.93% of these spores from Ahmadapur. Pande (1976) reported 5.16% of spores from Nanded air spora, Mane (1978) reported 3.41% of

from Bajara field at Vaijapur.

Tilak and Bhalke (1978) reported 4.3% spores at Aurangabad. Tilak and Patil (1981) recorded 3.48% spores at Aurangabad. Patil and Vyawahare (1981) recorded 1.98% spores from Ganeshkhind, at Poona. Patil and Kulkarni (1981) reported 10.527% spores as the second hignest to the total air spora of hospital at Kolhapur. Subba Reddi and Janakibai (1982) reported 10% spores from Vishakhapatanam. Kale (1983) recorded 2.43% spores over cotton field at Parli-Vaijanath. Bhagwan (1983) reported 3.67% spores from Nanded. Kulkarni and Kulkarni (1985) reported 1.284% spores from Kolhapur city. Khot (1985) recorded 0.93% spores from the air spora of Ambejogai. Patil and Kulkarni (1988) recorded 1.53% of these spores from Nipani area over a tobacco field.

The results of the present investigation are in agreement with the reports of earlier workers.

28) Penicillium Link ex Fries

Conidiophores arising from the mycelium singly or less often in synnemata, branched near the apex. Penicillate ending in phialides, conidia (phialospores) hyaline or brightly coloured in mass 1 celled, mostly globose or ovoid in dry basipetal chains, 4-5.5 x 2.5-3.5 µ. These spores were recorded only in the month of March, with 0.012% to the total air spora.

Tilak and Bhalke (1978) reported these spores in mean percentage (0.51%) from Marathwada region during 1967 to 1977. Mane (1978) also reported 1.01% of these spores over Bajara field at Vaijapur. Patil and Kulkarni (1981) reported 0.016% spores to the total air spora of hospital at Kolhapur.

The present investigation shows very less concentration of Penicillium in library hall.

29) Phialophora Medlar (Plate-III F : Fig. 20)

Conidia subhyaline to dark, 1 celled, globose to ovoid, 32-40 x 4-4.5 μ. Their highest concentration (1590/m^3) was found in the month of June. Contributing the percentage up to 1.216% to the total air spora. These spores were found throughout the investigation period except the starting period of investigation in the month of January.

Patil and Kulkarni (1981) recorded 0.006% spores to the total air spora of hospital at Kolhapur.

30) Phoma Desm

Only the pycnidia were trapped which are 11-13 μ in diameter. Their highest concentration (315/m^3) was observed in the month May, and contributes 0.058% to the total air spora.

Paddy (1951), Pady and Kapica (1956), Kramer et al (1959, 1960, 1964), Richards (1956), Hyde and Williams (1949),

Dransfield (1966) have reported its occurance at different places. In India, Sreeramulu and Ramalingam (1966), Bharat Rai (1969) also reported this fungus in air. Kulkarni (1971) recorded 0.38% of Phoma from Sugarcane field at Aurangabad. Chitale and Bajaj (1973) reported its occurrance at Nagpur, Agarwal and Shivpuri (1974) recorded this genus from Delhi air spora.

Tilak and Bhalke (1978) reported these spores in mean percentage (0.04%) from Marathwada region during 1967-77. Patil and Vyawahare (1981) reported 1.98% colonies from Ganeshkhind at Pune. Patil and Kulkarni (1981) recorded 0.208% spores to the total air spora of hospital at Kolhapur.

Bhagwan (1983) reported 0.05% spores from the air spora of Nanded. Kulkarni and Kulkarni (1985) recorded 0.060% spores from Kolhapur city. Patil and Kulkarni (1988) recorded 0.13% spores to the total air spora at Nipani.

31) Pithomyces Berk & Br. (Plate-III F : Fig. 21).

Conidia brown or dark brown with end cells often pale in colour, doliform, mostly broadly elliptical, oblong to pyriform or irregular, many celled transversely and vertically septate, 21-27 x 10-17 μ. The spores were recorded throughout the investigation period attending at highest peak of concentration (575/m^3) in the month of April, and contributes 0.933% to the total air spora.

These spores were collected on dry leaves of grasses, Maize, Sugarcane around the sampling site.

Meredith (1962) from Jamaica, recorded 0.17% spores from the air. On dry days the maxima occurred between 9.00 hours and 16.00 hours, but the peak was often ill defined. On many dry days no spores were trapped. The peaks were of short duration and concentration rapidly decreased to the values existing before the rain. Rees (1964) from Brisbane reported 0.17% spores from volumetric composition of the air spora. Gregory and Lacey (1963) from Harpenden, reported the occurrence of the Pithomyces Chartarum (Berk & Curt) Ellis and showed that it was not a new comer but indigenous in that region.

Tilak and Srinivasulu (1967) reported 0.37% spores from air spora of Aurangabad. Bharat Rai (1969) from Banaras recorded the spores from the atmosphere round about Saccharam munia Roxb, plantation. Kulkarni (1971) recorded 0.62% Pithomyces spores over the Sugarcane fields. Gaikwad (1974) reported 0.46% to the total air spora at Ahmedapur. Pande (1976) recorded 8% spores over the orange field from Nanded. Mane (1978) reported 1.11% spores to the total air spora over Bajara field at Vaijapur, Tilak and Bhalke (1978) recorded 1.00% spores from Aurangabad. Patil and Vyawahare (1981) recorded 1.63 colonies of this spores from Ganeshkhind

at Poona. Tilak and Patil (1981) recorded 1.17% spores from dwelling houses of allergenic patients at Aurangabad. Patil and Kulkarni (1981) recorded 1.924% spores from hospital at Kolhapur . Bhagwan (1983) recorded 1.90% spores from Nanded. Kale (1983) recorded 1.4% spores from Parali-Vaijanath. Kulkarni and Kulkarni (1985) recorded 1.895% from Kolhapur city. Khot (1985) recorded 0.22% spores from Ambejogai. Patil and Kulkarni (1988) 1.22% spores from Nipani.

The results of the present investigations are in agreement with some of the earlier authors in respect of percentage contribution.

32) Pseudobotrytis Krzem and Bedura

Conidia dark 1 or 2 celled ovoid to oblong 15.3-25.5 x 3.2-3.5 µ. These spores were trapped in the month of April, their percentage was 0.02% to the total air spora.

Patil and Kulkarni (1981) reported 0.001% spores to the total air spora of hospital at Kolhapur.

33) Pseudotorula Subram (Plate-III G : Fig. 22).

Spores brown,multicellular, long slender 12.5-24.4 x 5.7-9 µ. These spores were found only in the month of April and May. The highest concentration

($55/m^3$) was observed in the month of May and these spores contributes 0.049% to the total air spora. These spores were collected on dead decaying twigs of unknown plants, near by the investigation site.

Kramer et al (1964) recorded one colony on exposed petriplates from Kansas air. Turner (1966) at Hongkong isolated Pseudotorula colonies but their occurrence was very rare.

Kulkarni (1971) recorded 7.08% of these spores from the total air spora of Aurangabad. Gaikwad (1974) observed 0.13% contribution of these spores to the total air spora. Pande (1976) reported 0.17% to the total air spora at Nanded. Mane (1978) observed 1.04% spores from Vaijapur. Tilak and Bhalke (1978) recorded 1.2% of these spores from Aurangabad, Patil and Vyawahare (1981) reported 0.23% colonies from Ganeshkhind at Poona. Patil and Kulkarni (1981) recorded 0.016% spores from hospital at Kolhapur. Bhagwan (1983) recorded 0.17% from Nanded, Kale (1983) recorded 0.10% spores over cotton field at Parali-Vaijanath.

Kulkarni and Kulkarni (1985) from Kolhapur city recorded 0.079% spores. Khot (1985) recorded 0.34% spores from Ambejogai. Patil and Kulkarni (1988) reported 0.11% spores from Nipani area.

Present investigation shows similar results with previous investigators.

34) Scolecotrichum Kunz ex Fr.

Conidia dark, two celled, ovoid or oblong, often pointed 17-18.5 x 4.5-7.5 μ. They were found throughout the investigation period except in the month of April. They were found at the highest concentration (135/m^3) in the month of January. These spores contributes 0.209% to the total air spora.

Patil and Kulkarni (1981) recorded 9.014% spores from air spora of hospital at Kolhapur.

35) Septoria Sacc

Conidia hyaline, narrow elongate to filiform, several septate, 50-62 x 2-2.5 μ. They were occurred only in the month of May, which contributes 0.006% to the total air spora. These spores were collected on the leaves of Cynodon dactylon, and Ficus religiosa around the sampling site.

Patil and Kulkarni (1981) reported 0.001% spores to the total air spora of hospital at Kolhapur and made a first record of this genus to the air spora in 1978. Patil and Kulkarni (1988) reported 0.09% spores from tobacco field at Nipani.

Present investigation shows very close relationship of results, with previous results.

36) Seimatosporium Corda

Spores are three celled, end cells are pigmented, hyaline 0-1 apical cellular, simple or branched appendages, one basal exogenous, cellular, simple or branched, appendages lacking cytoplasm. These spores were trapped only in the month of May and June. The concentration was ($5/m^3$) in May and June and their percentage contribution was 0.006 to the total air spora.

37) Sirodesmium de Not

Conidia dark, elongate, septate, some times with longitudinal septa borne in simple chains. Conidia are 12-13.5 x 8-9.5 μ. These spores were trapped in the second half of investigation period. The maximum concentration of these spores ($20/m^3$) in the month of April. These spores contributes 0.017% to the total air spora collected. The fungus was collected on dead stems of unknown host.

Tilak and Bhalke (1978) observed these spores in mean percentage (0.3%) from Marathwada region during 1967-77. Mane (1978) reported 0.28% of these spores over the Bajara field at Vaijapur. Tilak and Bhalke (1978) recorded 0.30% spores from Aurangabad. Patil and Kulkarni (1981) recorded

this genus in October, November and December only with to the total air spora of hospital at Kolhapur.

Kale (1983) recorded 0.36% spores to the total air spora at Parli-Vaijanath. Patil and Kulkarni (1988) reported 0.21% spores from Nipani region, over a tobacco field.

38) Spegazzinia Sacc. (Plate-III G : Fig. 23).

Conidia dark and are of two types, 4 celled with spiny wall 26.5-26.9 μ in diameter and 4 celled with smooth walls 7-10 u. These spores are observed and found throughout the investigation period except January, and attended at the highest concentration ($45/m^3$) in the month of May. They contributes 0.076% to the total air spora.

Kramer and his coworkers (1959, 1960, 1964) have reported their rare occurrence from the Kansas air spora. Rees (1964) from Brisbane reported 0.06% smooth walled spores from the air more regularly in autumn and spring.

Sreeramulu and Ramalingam (1963) from the Vishakhapatanam, reported that they were sporadic and few, except in the month of January, November and December, when comparatively high numbers were caught. Further (1966) that reported Spegazzinia sundra subrum and S.tessarthra (Berk and Curt) Sacc. over pady fields. Agarwal et al (1969) trapped these spores from Delhi air spora. Kulkarni (1971) reported

0.12% conidia of Spegazzinia over Sugarcane field at Aurangabad. Reddy (1974) studied the circadian periodicity of the spores S.deigtionii and have reported their appearance between 8.00 to 22.00 hours with peak at 12.00 hours. Pande (1976) reported 0.19% of these spores over orange fields. Gaikwad (1974) recorded 0.02% spores from Ahmedpur. Tilak and Bhalke (1978) recorded 0.25% spores from Aurangabad. Patil and Kulkarni (1981) recorded 0.231% spores from hospital at Kolhapur.

Bhagwan (1983) reported 0.01% spores at Nanded. Kale (1983) reported 0.02% spores from Parali-Vaijanath over cotton fields. Khot (1985) recorded 0.10% contribution to the total air spora of Ambejogai, Kulkarni and Kulkarni (1985) recorded 0.091% spores to the total air spora of Kolhapur city. Patil and Kulkarni (1988) reported 0.44% spores from Nipani area.

In the present investigation the results obtained are in the agreement with the results of previous workers.

39) Stagnospora Sacc

Pycnidia dark, separate, superficial or rumpent globose, ostiolate, conidiophores short, conidia hyaline, typically three or more celled, cylindrical to elliptical parasitic or saprophytic on leaves and stems. These spores were collected throughout the investigation period. The

highest concentration was recorded in the month of June (145/m^3) in the air and its contribution to the total air spora was 0.11%

40) Stigmella Sacc and Syd

Conidia dictyosporous, dark, single, apical globose or elliptical or cylindrical to ovoid, cells triangular in the shape 19-21 x 5-9 µ. These spores were recorded only in the month of January with concentration as 10/m^3 and contributing only 0.006% to the total air spora. This indicate its rare occurence in the air.

Patil and Kulkarni (1981) recorded 0.002% spores from air spora of hospital at Kolhapur. Bhagwan (1983) recorded 0.15% spores from Nanded, over sugarcane field. Patil and Kulkarni (1988) reported 0.06% from Nipani area.

Present investigations are quite parallel with the results of previous workers.

41) Tetraploa Berk and Br. (Plate-III G : Fig. 24).

Conidia with 3 to 4 septate appendages smooth or rough brown 20-22 x 13-14.5 µ. These spores were trapped in all the months of investigation period except February. The highest concentration (35/m^3) was in the month of March. These spores contributes 0.070% to the total air spora.

Cunningham (1873) in course of his studies on air spora of presidency jain in Calcutta, recorded the occurrence of spore of Tetraploa in the air. Meredith (1962) had recorded 0.12% spores from air spora of Jamaica. Rees (1964) in Brisbane recorded less than 1% colonies from exposed petriplates. Sreeramulu and Sheshavataram (1962) reported them from air with average peak concentration of $10/m^3$ at 13.00 hours. Sreeramulu and Ramalingam (1962) observed the regular occurence of these spores in the air. They were periodically absent from the air during night time and even during the day time maximum concentration obtained between 10.00 to 16.00 hours. Spores were caught chiefly in the month of April, July, October and December. They also reported the high incidence because of agricultural operations and the occurrence of rain fall.

Sreeramulu and Ramalingam (1966) from Vishakhaptanam found that the spores exhibits "Day time double Maxima". Tilak and Srinivasulu (1967) reported their occurrence from the air spora of Aurangabad. Ingold (1963) suggested that radiate form with the appendages helps in anchorage by getting the spora entangled with a suitable substratum.

The other reports are of Kulkarni (1971), Gaikwad (1974) Pande (1976) and Mane (1978), Tilak and Bhalke (1978) reported 0.12% spores from Aurangabad. Shastri (1981)

also recorded these spores, from Maize field at Aurangabad. Patil and Kulkarni (1981) recorded 0.286% spores from hospital at Kolhapur. Chaubal and Kotmire (1983) recorded 1.04% spores from Kolhapur. Kale (1983) recorded 0.30% spores from Parali-Vaijanath over cotton field. Bhagwan (1983) recorded 0.32% spores over sugarcane field at Nanded. Khot (1985) shows 0.04% of spores at Ambejogai. Kulkarni and Kulkarni (1985) recorded 0.113% spores at Kolhapur city. Patil and Kulkarni (1988) reported 0.36% of spores from Nipani area, over a tobacco field.

The results of the present investigations are agree with the reports of some of the earlier reports.

42) Torula (pers) Link-ex-Fries (Plate III G. Fig.25)

Conidia dark, markedly, and slightly echinulate. Present in simple or branced unbroken chains up to 80 x 6.5 µ. Usually breaking into unicellular or multicellular pieces. These spores were caught throughout the investigation period, and in the month of January, it reaches to peak concentration ($250/m^3$), rendering 0.257% contribution to the total air spora. This fungus was collected on dry, and decaying plant parts nearby the investigation site.

Sreeramulu (1958) recorded the occurrence of Torula herborum (pers), Link from the Mediterranean sea. Hamilton (1959), Lacey (1962), Kramer and Willey (1963), Sreeramulu

and Ramalingam (1963), Rees (1964), Dransfield (1966), Turner (1966) and Sreeramulu and Ramalingam (1966) also reported the presence of these spores during their investigation. Rees (1964) in Brisbane, has reported 0.08% spores from the total air spora. Kulkarni (1971) reported 6.007% of Torula herborum (pers) from Aurangabad.

Mishra and Kamal (1971) reported these spores from air spora of Gorakhpur. Tilak and Vishwe (1975) reported 2.15% of these spores from Aurangabad. Gaikwad (1974) 0.286% spores from Ahmedpur. Pande (1976) reported them at Nanded, over orange field, Tilak and Bhalke (1978) reported 1.8% spores from Aurangabad, Tilak and Patil (1981) recorded 0.95% spores from dwelling houses of allergenic patients at Aurangabad. Patil and Kulkarni (1981) reported 1.076% spores from hospital at Kolhapur.

Bhagwan (1983) recorded 0.99% spores from Nanded. Kale (1983) recorded 0.60% spores from Parali-Vaijanath. Khot (1985) reported 0.87% spores from Ambejogai. Kulkarni and Kulkarni (1985) reported 0.432% spores from Kolhapur city, Patil and Kulkarni (1988) reported 0.58% spores from Nipani area.

Present investigation shows decrease in concentration as compared with the earlier investigators.

43) Wordomyces Brooks and Hansford.

Conidia are one celled brown to black ovoid to ellipsoid produced at apices of branches 23-24.5 x 12.5-13 μ. These spores were found throughout the investigation period. The highest concentration (135/m^3) was in the month of May. They contribute 0.174% to the total air spora.

Patil and Kulkarni (1981) reported 0.032% spores to the total air spora of hospital at Kolhapur and made a new generic record first time to aeromycology. Kulkarni and Kulkarni (1985) reported 0.51% spores from Kolhapur city. Patil and Kulkarni (1988) reported 1.22% spores from Nipani.

Present investigation have also agreement with the previous record.

b) Other types

1) Algal fragments (Plate III H Fig. 26)

Most of the algal fragments trapped during the period of investigation, were cyanophycean member. The highest concentration (50/m^3) was observed in the month of June. These fragments contributes 0.113% to the total air spora.

Ramalingam (1971) reported such algal fragments (0.1%) over Mysore city. Mittal et al (1974) studied the effects of different meteorological factors on the algal spores and algal fragments occurring in Delhi atmosphere. Marathe and

Reddi (1978) investigated the algal air spora at Nagpur city, with the help of exposed petriplates. Patil and Kulkarni (1981) reported 0.099% algal fragments from the air spora of hospital at Kolhapur. Kale (1983) recorded 0.22% algal componants from Parali-Vaijanath. Kulkarni and Kulkarni (1985) recorded 0.11% algal fragments from Kolhapur city. Patil and Kulkarni (1988) reported 0.42% algal fragments from Nipani area.

2) Hyphal fragments (Plate III H, Fig. 27)

Hyphal fragments are of all types, short, long, simple, branched, coloured hyaline, were counted under this group. During this present investigation, the highest concentration ($140/m^3$) was observed in the month of March. These fragments contributes 0.257% to the total air spora found in the library. These hyphal fragments were found throughout the investigation period.

Pady and Gregory (1963) reported that, some hyphal fragments are aviable from colonies. They also suggested that, care has to be taken, while counting these colonies, because of occurrence of viable hyphal fragments. These fragments.should be included in studies of air borne fungal population. Rees (1964) from Brisbane recorded 1.4% hyphal fragments. The maximum concentration followed the prolific autumn crop of fungi on decaying vegetation. They were often

associated with plant debries especially during gusty period.

Pathak and Pady (1965) from Kansas, recorded them as a common contributants of the air spora and were abundent in August and September. Dansfield (1966) recorded from Samaru (N.Nigeria), 6.57% of sterile mycelia. Harvey (1970) from Cordiff recorded the concentration of hyphal fragments in the air spora is low ($10/m^3$) except during the peak in the month of July, August and September when daily average concentration rose up to $30/m^3$. Diurnal periodicity was well defined during the peak months with maximum concentration occurring most frequently at 14.00 hours and 18.00 hours.

Hyphal fragments have been reported in the air over the pacific ocean (Newman 1948), Mediterranean sea (Sreeramulu 1958), Canadian arctic region (Pady and Kapica 1953), Atlantic ocean (Pady and Kapica 1955), Canada (Pady and Kapica 1956), England (Hamilton 1959), (Lacey 1962), (Last 1956) and U.S.A.(Pady 1957, 1959), Pady and Kramer (1960).

According to Pady (1957) occasionally fairly large number of these fragments were found in winter without any seasonal peak. Pady (1959) reported that, they showed definite hour to hour variations with peak upto $50/ft^3$ occuring mostly in the afternoon. Pady and Kramer (1960) found that diurnal periodicity peaks in June and September

were in the afternoon with the minor peak in the night. But in May, July and August, reversed seems to be true. Presence of abundance of viable fungal filaments in the air may be due to the process of sexual repooduction.

Lacey (1962) found that mycelial fragments usually consists or broken pieces of Cladosporium in atmosphere. Sreeramulu and Ramalingam (1966) found that they exhibited "Day Time Double Maxima". They recurred at an earlier hour in forenoon in the hot season, but they appeared at later hour in the rainy season. Tilak and Srinivasulu (1967) recorded 3.22% fungal hyphae from the air spora of Aurangabad. The daily average concentration of hyphal fragments is also reported by the following workers -

Talade (1969) from Parabhani 12.2% ,
Kulkarni (1971) from Aurangabad 5.1%,
Gaikwad (1974) from Ahmedpur 12.65%,
Pande (1976) from Nanded 4.69,
Mane (1978) from Vaijapur 1.77%

Sreeramulu (1961) while studying the air spora inside the cattle shed, reported high concentration between 16.00 hours with daily maxima at 18.00 hours.

Tilak and Patil (1981) from Aurangabad, recorded 11.36%, Patil and Kulkarni (1981) from hospital at Kolhapur recorded 3.06% fragments, Kale (1983) recorded 4.06% spores from

Nanded. Kulkarni and Kulkarni (1985) reported 0.82% fragments from Kolhapur city. Khot (1985) recorded 6.13% hyphal fragments from Ambejogai. Patil and Kulkarni (1988) reported 1.10% hyphal fragments from Nipani over tobacco field.

Present investigation shows decrease in hyphal concentration as compared with other workers.

3) Insect scales (Plate III H Fig.28)

In the present investigations "insect parts" include scales setae, wings, legs and insect as a whole. Their maximum concentration was observed in the month of March ($200/m^3$). They contributes 0.302% to the total air spora. sometimes complete insects were deposited during and after heavy showers, when the humidity was very high. It was also noted that their occurrence was mainly nocturnal, and associated with high humidity and velocity.

Rees (1964) at Brisbane, reported 0.34% insect scales from the total air spora. He treated complete insects and group of scales as a single unit. Chaubal and Deodikar (1964) at Poona, reported organic parts of insects as wings, legs, antennae, from the air in December, January, March and June. Inorganic deposites like dust particles and crystales also encounted. Sreeramulu and Ramalingam (1966) from Vishakhapatanam reported eggs, hairs, and scales from the air spora over pady fields.

Tilak and Srinivasulu (1967) reported 1.05% insect scales from Aurangabad, Talde (1969) from Parabhani reported 0.76%, Kulkarni (1971) from Aurangabad reported 3.35%, Gaikwad (1974) from Ahmedpur reported 3.42%, Pande (1976) from Nanded 1.48%, Mane (1978) reported 2.51% insect scales from Vaijapur.

Tilak and Bhalke (1978) emphasised the role of humidity, temperature, age of the crop and vetetation in the high incidence of insect parts in the air spora of Aurangabad. Tilak and Patil (1981) reported 3.60% insect scales from the air spora of dwelling houses at Aurangabad. Patil and Kulkarni (1981) recorded 1.25% scales from the air spora of hospital at Kolhapur.

Shastri (1981) recorded 2.66% scales from Aurangabad. Bhagwan (1983) reported 2.24% scales at Nanded. Kale (1983) reported 2.58% from Parali-Vaijanath, Khot (1985) reported 1.38% scales from Ambejogai. Kulkarni and Kulkarni (1985) reported 0.55% scales from Kolhapur city. Patil and Kulkarni (1988) reported 2.16% scales from Nipani area, over a tobacco field.

[Present results are in agreement with the reports of earlier workers.] — How what is your new contribution?

4) Unidentified group

One of the objectives of this study was to record the total number of air spores. Practically all of them which were caught on the slides were counted and identified except such spores which cannot be identified and classified because of their unsuitable orientation on the adhesive surface or because they are partially obscured by debries or other particles, are included in this group. The composition and concentration of this heterogenous changes group from month to month, and found to be at highest concentration (580/m^3) in the month of March. This group contributes 1.155% to the total air spora.

Gregory and Hirst (1957) from England reported this type of group as unclassified type in which they placed rare formal like conidia of "Entemophoraceae" sordia of Lichens, spores of Bryophytes and Pteridophytes and other spores. They have further commended that "the fact, that group was most common during the wet weather in August merely emphasises how little is known of many featureless components of the damp air spora".

Sreeramulu and Sheshavataram (1962), Shrinivasulu (1967) have also reported unidentified group separetely during their investigations. Following are the other reports regarding this group found at different air spora.

Rees (1964) from Brisbane reported 5.2%, Tilak and Srinivasulu (1967) from Aurangabad 10.83% , Kularni (1971) (1971) from Aurangabad reported 3.0%, Gaikwad (1974) from Ahmedpur reported 9.71%, Pande (1976) from Nanded reported 0.13% and Mane (1978) from Vaijapur reported 1.09%, Tilak and Patil (1981) reported 8.66% unidentified spores from dwelling houses at Aurangabad.

Patil and Kulkarni (1981), reported 0.44% spores from hospital at Kolhapur. Kale (1983) from Parali-Vaijanath. Khot (1985) from Ambejogai, recorded 3.13% and 3.69% spores respectively. Kulkarni and Kulkarni (1985) recorded 0.64% spores from Kolhapur city. Patil and Kulkarni (1988) reported 0.59% spores from Nipani.

5) Xylem fibers (Plate III H Fig. 29).

The xylem fibers, sclerenchyma, Parenchyma and Collenchyma cells were recorded in a large number in the month of March and May with concentration as ($45/m^3$). They contributes 0.088% to the total air spora. Ramalingam (1971) reported 3.1% xylem fibers over mysore city.

Gaikwad (1974) reported 0.326% plant cells, xylem fibers in the air spora of Ahmedpur. Pande (1976) air spora of orange field at Nanded. Patil and Kulkarni (1981) reported 0.053% xylem fibers to the air spora of hospital at Kolhapur. Bhagwan (1983) from Nanded reported 0.90%

xylem fibers, Kulkarni and Kulkarni (1985) reported 0.180% xylem fibers to the total air spora of Kolhapur city. Patil and Kulkarni (1988) reported 0.44% plant cells from Nipani.

Present investigation also have agreement with result of earlier workers.