9) Results :

Components and contribution of the Airspora and Composition of catches :

During this study apart from the dust particles and other microbes, the slides were screened only for the 63 types. Out of these the 58 are fungal spores and remaining are the xylem fragments, algal fragments, hyphal fragments, insect scales and unidentified group of fungal spores. A list of spores cought identified from the slides is given below which has been arranged alphabetically under each group.

A. Phycomycetes :

Oospores of Sclerospora Schroet

B. Ascomycetes :

1. Ascotricha Berkeley
2. Cannodium Mont.
3. Chaetomium Kunze ex. Fr.
4. Hypoxylon Bullex Fr.
5. Hysterium Tode ex. Fr.
6. Hysterographium Corda.
7. Leptosphaera Ces and De Not.
8. Meliola Fr.
9. Parodiella (Speg.) Theiss and Syd.
10. Patellaria Fr.
11. Pleospora Rabh.

12. Prinsheimia Schutz.

13. Sordaria Ces and de Not.

14. Sporonia de Not

15. Teichospora Fuckel

16. Xylaria Hill ex Grev.

C. Basidomycetes :

1. Puccinia pers.

2. Smut spores.

3. Uredospores of Rust.

D. Fenteromycetes :

1. Alternaria Nees.

2. Arthrobotryum Ces

3. Beltrania Penzig

4. Bipolaris Shoemaker

5. Bispora Corda

6. Botryodiplodia Sacc.

7. Botryotrichum Sacc and March.

8. Brachysporium Sacc.

9. Camposporium Harkness.

10. Catinula Lev.

11. Cercospora Fries.

12. Ceratosporium Schew.

13. Cladosporium Link and Fries.

14. Coniothyrium Corda

15. Curvularia Boedin

16. Cylindrocarpon wollen

17. Dendrographium Massee

18. Diplococcium Grove

19. Diplodia Fr.

20. Dipledina westend

21. Dichomera Cooke

22. Epicoccum Link ex. Walter(Wallr)

23. Haplosporella speg.

24. Helminthosporium Link ex. Fries

25. Hendersonia Berk

26. Melanconium Link

27. Microsonera Zimm.

28. Periconia Ben

29. Pithomyces Berk and Br.

30. Pseudotorula Subram

31. Phoma Sacc.

32. Selenosporium Corda.

33. Stagonospora Sacc.

34. Staphylotrichum Meyer.

35. Sphaeronema Sacc.

36. Tetraploa Berk and Br.

37. Torula (Pers) Link and Fries.

38. Xerodermyces Brokks and Hansford.

E. Other types :

1. Algal Fragments

2. Hyphal Fragments

3. Insect scales

4. Unidentified group

5. Xylem Fibers

Individual counts were taken only for 63 above mentioned types and identification was carried only up to their generic level. Their groupwise distribution is as follows.

Total number of components counted	= 63
1) Phycomycetes	= 1
2) Ascomycetes	= 16
3) Basidiomycetes	= 3
4) Deuteromycetes	= 38
5) Other types	= 5

10) Chief Constituents and their contribution to the Air spora in Number :

To indicate relative importance of the different components of the air spora the percentage contribution of different types to the total air spora was estimated from the catches during the period of investigation. These results are presented in Table I and Table II. The average monthly percentage contribution of each spore group is given in Table III A and Table III B and average monthly percentage contribution of each spore type is given in Table IV A, IV B.

In present investigation the smut spores (chlamydospores) stand first with a concentration of 17.202% to the total air spora. This is followed by Nigrospora 17.0%, Alternaria 11.69%, Curvularia 9.2% and Sclerospora 0.0spore

7.9%.

Components of the air spora of the library and their seasonal variation, percentage contributions, number of days throughout the investigation period and their mean concentration and monthly variation in total spore count with respect to rainfall and temp. are given in Table No. V and VI respectively.

During this investigation it was noted that there was no spore free period in the library in the total period of six months, i.e. from April to September. The peak period of the concentration of the spores is in the month of September which is the maturing period of the cultivated crops in the given area. The period of low spore concentration is in the rainy season, i.e., from June to August.

11) Characteristic features :

Following are the characteristic features observed for each spore type.

A. PHYCOMYCETES :

1) O.espores of Sclerospora Schroet.

The O.esporas of sclerospora are sperical and brown in colour. Each spore possess smooth thick wall 20.5 x 46.5 µ. These spores were collected throughout the investigation period. The maximum conc. (350 M^3) was in the month of August. These spores are mainly occured on the cultivated crop like

bajra and jawar forming downy mildew. There are cultivated fields of jowar and bajra near the trapping site. They contributed (7.972%) to the total air spora.

B. ASCOMYCETES :

1. Ascotricha Berkeley

This genus is closely related to the Chaetomium. Ascospores were not recorded but the perithecia which are 28.5 x 30 µ were observed. This spore type occured only in the month of september with concentration (15 M^3) while the percentage to the total air spora was (0.297).

2. Capnodium mont.

Pycnidia of the capnodium occured only in the month of May and June and contribute 0.0742% to the total number of air spora. They are 300-400 u in length and 20-25 µ in breadth. This fungus was collected from the leaves of Magnifera indica, Cassia Fimula, Hibiscus rosa sinensis, etc. around the college library.

3. Chaetomium Kunz ex. Fr.

The spores are dark, triangular to circular, unicellular. 19-20 x 9-10 µ. Highest concentration (14 M^3) was noted in month of september. Their contribution to the total air spora was (0.297%). They are allegenic in nature. These spores were collected from wooden material in the campus of the college in rainy season.

Pady (1951) collected C.reflexum over Arctic area of Canada. Karmer et al (1960) reported 10 sp. of Chaetomium from Kansas air.

Sreeramulu and Ramlingam (1966) reported Chaetomium sp. from pady field near Vishakhapattan. Mishra and Kamal (1971) recorded C.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. This is reported as allerginic.

4. Hypoxylon Bull ex. Fr.

The spores of Hypoxylon are unicellular, elliptical Fusiform to bean shaped dark brown in colour and non septate with a distinct colourless furrow. 25.26 x 4.5 µ. Highest concentration (27 M^3) was recorded in september. Their contribution to the total air spora.0.28%. In general it can be stated that the Hypoxylon spores are of rare occurence in the air spora.

Marshall and Ingold (1963) reported that in some Pyrenomyeates light has opposite effect and markedly inhibits discharge. This is particularly true of H. Fuscum (Pers. ex. Fr.) Fr. Hodkiss and Harvey (1969) observed that, spores discharge takes place throughout the year in H. rubiginosum (pers) Fr. In H. Friciformae (pers. ex. Fr.) Kick x. spores were not discharged for 45 days during late February to early April. Spores discharge in both the species of Hypoxylon showed a positive correlation with rain fall and humidity.

In general it can be stated that the Hypoxylon spores are of rare occurence in the air spora, both in tropical as well as temperate regions.

5. Hysterium Tode ex. Fr.

Spores brown, elliptical to cylindrical four celled slightly constricted at the septum, 25-26 x 14-15 µ. The spores were found throughout the investigation period. Maximum concentration was observed in the month of September (14 M^3). They contributed 0.254% to the total air spora.

Tilak and Srinivasulu (1967), Talde (1969), Kulkarni (1971), Tilak and Srinivasulu (1971), Talde (1974) and Gaikwad (1974) have also reported the presence of these spores in the air spora of Aurangabad region.

6. Hysterographium Corda.

They occurred throughout the six months. The highest concentration (7 M^3) was in the month of May and the percentage to the total air spora was (0.30^5). Ascospores irregularly biseriate, ellipsoidal, 30-35 x 9-11 µ with five to ten transverse septa. Sometime constricted at the centre and with one to three longitudinal septa on most segments, pale to pale brown in colour.

7. Lophosphaeria Ces and de not

Fusiform spores, with two to many cross septa,

yellowish to yellowish brown in colour. 27-18.15 x 7-7.5 µ. In total air spora they contributed 0.495%. The maximum concentration (6 M^3) was recorded in month of september. The fungus was collected from dead stems of unknown host around the campus.

These spores were recorded from the air spora by Meier (1935) in U.S.A., Pady et al. (1948), Pady (1951), in Canada and Pelunion (1951) in Montreal. Their occurence in air has been noted by Hamilton (1959). Kramer et al. (1959) (1960), Lacey (1962), Tilak and Sreenivasulu (1967), Agrawal and Shivapuri (1974), Gaikwad (1974), Pande (1976), and Mane (1978).

These spores are generally moisture regulated and nocturnal in discharge but sometimes the rain induces day time liberation. Present investigation indicates the close relationship between the humid conditions and the spore release. During dry period these spores are generally absent or rare. It can be thus concluded that they belong to the 'Wet spore group'.

8. Meliola Fr.

The ascospores are dark black in colour and five celled, sometime with hypopodiate mycelium. 20-28.5 x 10-12.5 µ. These spores are occured on all six months except July. Their contribution to the total number of air spora was 0.210%.

9. Parodiella (Speg.) Theiss and Syd.

The Ascospores are two celled, elliptical to biconvex,

with spirally covered striations towards the end, constricted at the septum 23 - 24.6 x 7.8 - 8.8 µ. These spores are only present in month of September. They contributed 0.0929% to the total air spora occuring on the leaves of Indigofera cordifolia Hyene. In the field this fungus was obtained on the same host.

Sreeramulu and Ramlingam (1966) reported parodiella spores from air-spore studies over the pady field at Vishakhapatanam. Kulkarni (1971) reported its occurence (0.51%) to the total air spora over sugarcane fields in all seasons. Tilak and Kulkarni (1972) recorded its percentage (0.14%) in the caves at Aurangabad while Talde (1974) recorded its percentage (0.11%) to the total air spora at Parabhani.

10. Patellaria Fries :

The Ascospores of Patellaria are fusiform - clavate, usually slightly curved. 33.45 x 8-10 µ hyaline to yellowish 7-11 septate. The highest concentration (26 M^3) was in the month of August with 0.371% to the total air spora. They were collected on dead twigs around the Library.

11. Pleospora Rebt.

These spores are yellow or brown in colour, with several cross septa and having one two more longitudinal septa 28.2 - 30.3 x 9-10 µ. Their contribution to the total air spora was 0.1362%. The maximum conc. (15 M^3) was recorded in the month of April. High humid conditions favoured the occurence

of the spores. These spores are allergenic in nature.

It appears that, they are universal in their distribution and have reported by Dye and Vernon (1952) from New - Zealand, Cartar (1934) and Richards (1956) in England, Pady (1957) Kramer et.al (1959), Kramer et.al (1960) in Kansas, Meredith (1962) in Jamica, Davies (1969) in Kuwait; Sreeramulu and Sheshavataram (1962), Sreeramulu and Ramlingam (1966) in Vishakhapatnam.

As per present investigation, it appears that the spores occur in wet period which confirms with the results of Kramer et.al (1960) and Sreeramulu and Seshavataram (1962).

12. Sporormia de Notaris

The spores are dark brown with three cross septa and having a tendency to breakup at the septum, surrounded by a hayline gelatinous sheath, 24-25 x 6-7 µ. Their contribution to the total number of air spora was 0.092%. Maximum concentration (13 N^3) occured in month of September.

The spores were collected by Pady et.al (1948b, Pady (1951), Pelunin (1951), Pady and Kelly (1954) from upper air spora Pady (1957), Kramer et.al (1959), Kramer et.al(1960) from Kansas, Meredith (1962) from Jamaica reported 0.08% spores to the total catches.

Tilak and Srinivasulu (1967,1971) reported 1.12% and 3.08% spores to the total 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% spores to the total air spora outside the caves at Aurangabad; Talde (1974) reported 0.72% spores to the total air spora at Parbhany. Gaikwad (1974) reported 0.20% spores to the total air spora from Ahmadapur. This fungus is coprophilous.

13. Teichospora Fuckel.

The ascospores uniseriate, usually, slightly elevate 16-18 x 6.9 µ with nearly about seven transverse septa and with one or two longitudinal septa. Yellow brown to pale brown. Highest concentration (56 M^3) was in the month of May and their contribution was 0.712% to the total air spora. Tilak and Bhalke (1979) reported Teichospora spores during 1967 to 1977 in mean concentration of 0.08% to the total air spora.

14. Xylaria Hill ex Grev.

Ascospores uniseriate, fusiform, with one side flattened 9-10 x 4.5-5 µ, black to pale brown. They occured throughout the period. Highest concentration (84 M^3) was in the month of August, when rainy season persists. They contribute 1.777% to the total air spora. Fruiting bodies were collected around the Library on dead twigs of different host during rainy season. Tilak and Bhalke (1979) reported Xylaria spores during 1967 to 1977 but with mean percentage (0.05) to the total air spora in the Marathwada region.

15. Prinsmhemia Schuts.

Spores 3.5 transverse septate, with one vertical septum in each cell, hyaline 27-36 x 11.2 - 17.4 µ. On comparison it was found to be P.alianthii Rao and Tilak. The fungus was collected on Alianthus excela Roxb from neighbouring fields. Their contribution to the total air spora was 0.0066%. The maximum concentration (14 M^3) recorded in the month of September. Tilak and Srinivasulu (1967) reported the spores of P.synedentus. Kapoor and Gill, for the first time in the air spora of Aurangabad contributing 0.42% from the total air spora. Mane (1978) reported spores of P.alianthii. Tilak and Rao, contributing 0.53% over bajra field of Vaijapur.

16. Sordaria Ces and de Not.

During present investigation only perithecia of this genus were recorded and ascospores were not found. The perithecia are dark brown to black with a neck and 125 x 40-45 µ in diameter. Their contribution to the total air spora was 0.0185%. This spore type occured only in the month of September with concentration (3 M^3).

The ascospores of this genus were reported from air by Hamilton (1959), Meredith (1962), Kramer et.al (1953) and Davies (1969b). Kulkarni (1971) recorded 0.28% spores from Aurangabad air spora. The fungus is coprophilous occuring in rainy season.

C. Class - BASIDIOMYCETES

1) Puccinia Pers.

The teliospores of this rust genus are two celled and stalked and were found only in the month of April. They contributed 0.0557% to the total air spora of the library. These spores were collected from the cultivated plants like jowar, wheat and many other such plants, around the college.

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

Recently Pande (1976) has also reported 0.63 % spores from CSH-1 Hybrid jowar field at Nanded.

The Urediospores of this rusts were also found which are periodic 9.5 - 11 μ in diameter but occure in both seasons. The occurence of these spores in the air is due to the infected plants like Sorghum vulgare (Jowar), Pennisetum typhoides (Bajra), wheat (Triticum vulgare) and many other cereal plants around the trapping site. The highest concentration was occured in the month of September (377 M^3). They contributed 4.475 %to the total air spora.

In Kansas, Pady (1954) noted that in series of slide exposers, with the slit air sampler, rust spores were found in large number in months of June, July and September. Hirst (1953) and Hamilton (1959) showed that the peak period in the

release of the Urediospores seems to be noon. Pady et.al (1965) recorded diurnal periodicity in the release of rust spores with the major peak of leaf rust in the afternoon and the stem rust at mid-day.

Sreeramulu and Ramlingam (1966) recorded urediospores of rust (0.03 %) from air spora of pady fields of Vishakhapatanam. They observed no marked seasonal changes in their catches. From Aurangabad Tilak and Sreenivasulu (1967) reported 0.57 % urediospores from the total catches. Tilak and Kulkarni (1978) studied diurnal periodicity of uredospores and showed that they belongs to the "day spora" group as daily maxima, main peak at 12 hrs. and subsidary peak at 16 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) reported 3.0 % contribution of rust spores to the total catches at Vaijapur over Bajra field.

In the present investigation, the general pattern of distribution and seasonal variation of rust spores in the air agree in conformity with the investigation carried out in India and elsewhere.

2. Smuts :

The Chlamydospores of various smuts trapped during the period of investigation all or of one kind i.e. they are 9.5 - 11 µ in diameter. They were present throughout the

investigation period. They contributed (17.202 %) to the total air spora. Maximum number(689 N^3) was recorded in the month of May while minimum in June (285 N^3). Occurence and incidence of these spores seems to be related with rains. During the rain the concentration get reduced, while it is increased after the rains. The site under investigation was surrounded by many plants like Jowar, Bajra, Sugarcane, wheat etc. which are susceptible to the smut. These spores are allergenic in nature.

Pady and Kapica (1954) working on the roof of 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 peak in the last week of June and 1st week of July due to harvesting in the State.

Kramer et.al (1959) reported 5.9 % smut spore 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 and April. Lacey (1962) showed that the spores of Ustilago were clearly correlated with the seasonal curves of grass pollen grains and both declained simultenously in the last week of June. Meredith (1962) at Jamica recorded 1.2 % spores of Ustilago to the total air spora. Rees (1964) observed that smut spores appeared more prevalent

during dry, gusty, and sunny period, specially early in the afternoon. Adam (1964) reported the occurence of the spores of Ustilago only in summer months. Millis (1967) noted that there is no correlation between high temperature and maxima dispersal of spores but there was marked diurnal cycle.

Sreeramulu (1962) concluded that flowering, coincides with the maximum dispersal of pathogen which occured over a period of 10-20 days and was influenced by weather. Occurence of rainfall and high velocity during this period results in loss (more rapid and associated with thunder storm) of spores from infected ears, thus reducing the period of smut dessiemination. Kulkarni (1971) at Aurangabad recorded 3.89 % smut spores over sugarcane field. 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 the maxima at 10 hrs and 16 hrs with the peak at 14 hrs.

The occurence and seasonal periodicity of smut spores in the present investigation agree with the earlier reports.

D. Class - DEUTEROMYCETES :

1. Alternaria Nees.

Conidia dark, typically with both cross and vertical spets, variously shaped, obclavate to elliptical or ovoid, Frquently borne acropetally in long chains, less often borne

singly and having an optical, single or branched appendage of different sizes belonging to different species. 167-169 x 9-11 µ. The spores were recorded throughout the year. They contributed (11.699 %) to the total air spora. Highest concentration (386 M^3) was recorded in May. This spore is allergic in nature.

Karmer and his coworkers (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 components of the air spora. It comprises 12.6 % to the total colonies and 3.4% of the total spores collected. Their abundance was reported in the growing season.

Turner (1966) collected 0.8% spores of this genus from the Hongkong. De Groot (1966) reported its occurence throughout the summer. Rajan and Others (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 Srinivasulu (1967) reported two types of Alternaria spores one long (0.68 %) and another short (9.74 %) Mishra and Shrivastav (1969) found that the population of Alternaria varies in different sampling periods in different months and was governed by atmospheric conditions and the Plantage.

Mishra and Kamal (1971) recorded A.humicola and A.tenuissig only in winter. Kulkarni (1971), Gaikwad (1974),

Tilak and Vishwe (1975) and Pande (1976) recorded these spores from air spora of Aurangabad region.

The seasonal occurence of Alternaria spores obtained in the present investigation is in agreement with the earlier reports from india and else-where.

2. Anthrobotryum Cos :

Conidia hyaline to dark; 3-4 celled produced in Chains. Saprophytic on wood. Conidia dark brown, some what cylindrial 18-19.5 x 6.5-7 µ. These spores were collected on the dead stems of bamboos and leaves of various plants near the college campus. The highest concentration was in the month of september. Their percentage contribution was (0.0433) to the total air spora.

3. Beltrania Penzia :

Conidia biconic, smooth, one-celled, brown with polar middle band, 18-20.4 x 10-12 µ, rounded with scar or denticulate at the base, with a long conical, one celled hyaline to subhyaline septum at the apex. They contributed (0.0557 %) to the total air spora.

Sreeramulu and Ramlingam (1963) have reported this spore type over the fields at Vishakhapatanam. Tilak and Srinivasulu (1967); Kulkarni (1971), and Gaikwad (1974) have reported the occurence of these spores in Aurangabad region. Pane (1976) at Nanded, reported 0.2 % contribution to the

total air spora. Mane (1978) reported 0.1 % to the total air spora over Bajra Fields at Vaijapur.

4. Bipolaris Shoemaker :

Conidia brown in colour, several celled, Fusoid, Straight or Curved. 128-129 x 95-11.5 µ. The highest concentration (8 M^3) was in the month of August and the percentage contribution to the total air spora was (0.0619). These spores were collected on the dead and rottened Fruits around the campus.

5. Biospora Corda :

Conidia dark, Oblong, two celled or less often three celled, with thick black septa, cotinulate, 6-11 x 5-8 µ. They contributed (0.4209 %) to the total air spora. Highest concentration occured in the month of July(37 M^3). Rees (1964) in Brisbane and Turner (1966) in Hong-Kong reported colonies of Fungus from exposed Petriplates. Mane (1978) reported 0.12 % spores to the total air spora over Bajara field at Vaijapur.

6. Botryodiplodia Sacc :

Spores dark, two celled at maturity. Ovoid to elongate. 24-48 x 10-15 µ. The highest concentration occured in the month of September (10 M^3) and encounted 0.198 %to the total air spora.

Meredith (1961) from jamaica, reported conidia of B.theobromae pat. from air spora. The average daily mean concentration throughout the year was only 8 spore per cubic meter. He concluded that this fungus is relatively frequent in number over the fields of banana plantation.

Kulkarni (1971) at Aurangabad reported sporadic occurence of the Botryodiplodia in the air spora over sugarcane field. Pande (1976) has also reported these spres from the airspora over orange field at Nanded.

The auther's results are in confirmity with the reports mentioned above.

7. Botrytrichum Sacc and March :

Conidia (aleuriospores) 1-celled brown, borne singly, globose, 17-19.5 µ in diameter. These spores occured throughout the six months. The highest concentration (63 M^3) was in the month of September. Their presence was 1.343 % to the total air spora. These spores were collected on dead twigs, on cardboards and wet papers during the period of investigation.

8. Camposporium Markness :

Conidia (aleurispores) apical, aingal, cylindrical with rounded ends, pale brown, several celled, apical cell. Frequently with 1 to 3 hyaline, filiform appendages (32-34 to 5-6.5 µ). These spore were trapped only in month of April and May. Their contribution was 0.43 % to the total air spora.

9. Cetinula Lev :

Conidia 1 celled, subhyaline without bristles, cylindrical or ellipsoid 4-9 x 2-4 µ. The highest concentration was in the month of September (9 N^3) while the percentage contribution was 0.0619 to the total air spora.

10. Cercospora Fres :

Conidia hyaline or dark filiform, several celled, occurence was mainly due to the cultivation of the hosts like Arachys hypogea, Acasia arabica etc., around this area. These spores occured only in the month of April (5 N^3). These spores contributed 0.0309 % to the total air spora.

Richard (1956) in England, reported these spores from the air. Pady (1957) reported this spore type in very low concentration from kansas air. Kramer et.al (1959) recorded 1% Cercospora spores from the air. Kramer et.al (1960) observed the first appearence of these spores was in April.

Kulkarni (1971) reported 0.15 % conidia to the total air spora over sugarcane field at Aurangabad. Pane (1976) reported 0.33 % spores to the total air spora over orange field at Nanded. Sreeramulu and Sheshavataram (1962) reported that, this type showed a diurnal periodicity with a narrow peak centered at 9 hrs. Tilak and Srinivasulu (1967) reported the occurence of Cercospora from the air spora of Aurangabad.

11. Cladosporium Link :

Conidia dark 1 or 2 celled variable in shape and size ovoid to cylindrical and irregular sometime typically lemon shaped. 14-24.8 x 4-7 µ. Conidia phores dark, branched variously, near the apex or middle portion, clustered or single. They contributed 3.033 % to the total air spora. The highest concentration of these spore were recorded in month of September (265 M^3). This fungus was collected from decaying leaves, stems, and other parts of various plants around the Library. These spores are allergenic in nature.

Stakman et.al (1923) reported these spores from upper air spora at altitude upto 3.300 meters.

Hirst (1953) showed 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.

Agrawal and Shivpuri (1974) recorded these spores from Delhi air spora while dealing with the role of fungal spores in etiology of respiratory allergic disorders. Hyde and Adam (1960), Gaikwad (1974), Tilak and Vishwa (1975) and Pande (1976) also reported these spores from the air.

12. Coniothyrum Corda :

Conidia small, dark, 1-celled, ovoid or ellipsoid, 3-4.5 µ in diameter. Their highest concentration (80 M^3) was in the month of September, while they contribute 0.724 % to the total air spora. These spores were collected on dry rose stems around the college campus.

13. Curvularia Boed :

Conidia dark, ovoid to obovoid, unequally 3 or more celled, attached to the apical cell of the conidiosphore by a short narrow cell 19-32 to 7-17.5 µ. Highest concentration (402 M^3) was recorded in the month of August. They contributed 9.24 % to the total air spora. It has been collected from dry leaves and stems of Arachys hypogea Bougainvillea sp. etc. around the sampling site. These spores are allergenic in nature.

Rajan et.al (1952) reported curvularia spores from air spora at Kanpur. Other reports are of Pady (1957), Sreeramulu (1958), from mediterranean region Kramer and his coworkers (1959, 1960, 1963). Pady and Kiley (1962), Sreeramulu (1961) from a cattle shed, Pathak and Pady (1965), Turner (1966), Chaubal and Deodikar (1964), Tilak and Srinivasulu (1967), Davies (1967) Bharat Rai (1969) and Shukla (1971); Dransfield (1966) in N.Nigeria recorded 25.1 % spores from total catches. It showed that there is rapid rise at the beginning of rainy season.

Sreeramulu and Ramlingam (1962) reported that, spores of this fungus appeared during day time with their daily peak at 11 hrs. Although they occur throughout the year, slightly highest number was obtained in September and October and their concentration was more between 10-18 hrs. Tilak and Srinivasulu (1967) have reported Curvularia with highest concentration from August to November from air spora of Aurangabad. The author's results are in conformity with the reports mentioned above.

14. Dendrographium Masses :

Conidia mostly 4 celled, dark apical, cylindrical, ovoid, 15.5 - 17 x 4 - 4.5 µ. Commonly occur throughout the investigation period. The highest concentration (8 M^3) was in the month of August and their percentage was 0.0168 % to the total air spora. These spores were collected on the dead twigs of unknown hosts around the college.

15. Diplococcium Grove :

Conidia (prespores) mostly 2 celled short, brown in colour, in acropetalous chains. 13-14.5 x 6.5 - 7.5 µ. Their highest concentration (32 M^3) was in the month of September, and they contributed (0.458 %) to the total air spora. These spores were collected on the wood and bark around the college campus.

16. Diplodia Fr. :

Conidia dark brown, 2-celled, ellipsoid or ovoid, 12-15 x 3.5-7). High concentration (17 M^3) was obtained in the month

of May. They contributed 0.192 % to the total air spora. These spores were collected from the unknown hosts around the campus.

Panner et.al (1957) observed that these spores have night time peaks. Kramer et.al (1960) also reported these spores from same locality.

Gaikwad (1974) reported 0.23 % spores from Ahmadpur, Panda (1976) reported 0.83 % spores to the total air spora.

According to Reddy (1968) the cause of dry & rot of citrus in Andhra Pradesh is due to infection of Diplodia sp.

17. Diplodina Westend :

Conidia hyaline, 2-celled ovoid or ellipsoid, 17-18.5 x 3-3.5 µ. These spores occured throughout the six months. The highest concentration (13 M^3) was in the month of April. Their contribution was 0.284 % to the total air spora. These were collected on the dead twigs around the college.

18. Epicoccum Link ex Nalir :

Conidia dark, 1 celled or several celled, globose, 7-9 µ in diameter. Their contribution to the total air spora was 2.061 %. Highest concentration (125 M^3) occured in May.

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

Sreeramulu (1958) reported it from Mediterranean sea-air.

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. Gregory (1973) suggested their discrepancy due to local environmental conditions.

19. Nephrosporella Speg :

Conidia large, dark 1 celled, ovoid, or oblong, 23.5-25 x 11.5 - 12.5 µ. These spores were recorded only in the month of May. While their percentage was 0.0247 to the total air spora. These spores were collected on the twigs of the Acacia arabica, Azadirachyta indica, Lantana camara, Annona squamosa and Vinca rosea around the college.

Tilak and Bhalke (1978) reported these spores in mean percentage (0.6) from Marathwada region during 1967-1977. Mane (1978) reported 0.76 % of these spores to the total air spora over Bajra field at Vaijapur.

20. Helminthosporium Link :

Conidia dark 3-4 celled, cylindrical or ellipsoidal, sometimes slightly curved or bent with rounded ends. 72-74 x 17-18.5 µ. These spores occur throughout the investigation period. The highest concentration was recorded (212 M^3) in August. These spores were collected from dead leaves of plants as well as from the petals of Bougainvillea and Dahlia flowers. These spores are allergenic in nature. They contributed 5.42%

to the total air spora. Kramer et.al (1960) reported that appearance of these spores was more frequent during growing season. No spores were obtained in the winter months.

Sreeramulu and Sheshavataram (1962) have recorded that the maximum conidia of H.oryzae were found during afternoon. Sreeramulu and Ramalingam (1963) noticed higher concentration in the afternoon.

Tilak and Srinivasulu (1967) from Aurangabad reported long type (9.62 %) and short type (9.74 %) spores of Helminthosporium from total catches. Agrawal, Shivpuri and Mukerji (1969) reported these spores as allergic in nature during their studies of air spora of Delhi.

Mulkarni (1971) reported 2.83 % Helminthosporium spores from the total air spora of Aurangabad. Agrawal and Shivpuri reported Helminthosporium anomalum from air spora at Delhi. Gaikwad (1974) reported 9.34 % of these spores from the total air spora at Nanded.

The seasonal occurence and their distribution obtained in the present investigation are in agreement with the reports of earlier workers.

22. Hendersonia Berk :

Conidia dark, several celled elongate to fusoid. 14-16 x 6-7 µ. Their percentage contribution to the total air spora was (0.31%). These spores were collected on dead stems of Andropogon sorghum L. around the college campus. 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 Bajra field at & Vaijapur.

23. Nigrospora Zimm :

Conidia dark, 1 celled, globose to somewhat flattened, 13.23 x 11-23 µ. These spores occured throughout the period of investigations. They contributed 17.004 % to the total air spora. The highest concentration (843 M^3) was in the month of August and lowest (261 M^3) in June. These spores were collected from decaying leaves of Bajra, Jawar, sugarcane, and decying stems of Triticum vulgare around the college, which are the susceptible hosts.

Cammack (1955) reported these spores more frequently in the dry season in S.Nigeria. Panner et.al (1957) referred these spores as "Day-spora" with maximum between 8 hrs and 17 hrs. Meredith (1961) from Jamica found the variation in the number of these spores due to their relation with humidity and rainfall highest catches were obtained during dry weather.

Mishra and Shrivastav (1970) from Gorakhpur, recorded the occurence of N.Sphaerica (Sacc.) Mason, from the air spora. Kulkarni (1971) reported 5.45 % of these spores from the total air spora of Aurangabad. Agrawal and Shivpuri (1973) reported the same from Delhi air. Gaikwad (1974) reported 4.93 % of these spores from total air spora over orange field at Nanded.

Mane (1978) reported 3.41 % spores to the total air spora over Bajra field at Vaijapur.

The results of present investigation are in agreement with those of the earlier workers. It can also be concluded that the fungus is quite common in the tropical regions both as parasite and saprophyte on cereals, grasses, sugarcane, etc. and thus forms major constitution of air spora.

24. Pithomyces Berk and Br. :

Conidia coloured, doliform, most 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 period of investigation. Their concentrations to the total air spora was 2.847 %. The highest concentration (147 M^3) was recorded in the month of september. This fungus was collected on the dead leaves of grasses.

Meredith (1962) from Jamaica recorded 0.17 % spores from the air on dry days. The maxima occured both 9 and 16 hrs.

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 Saccharum minia Roxb. plantation Kulkarni (1971) recorded 0.62%. Pithomyces spores over the sugarcane fields. Gaikwad (1974) reported the contribution of these spores (0.46 %) to the total air spora at Ahmadapur. Pande (1976) recorded 8 % spores over

the orange field from Nanded. Mane (1978) reported 1.11% spores to the total air spora over Bajra field at Vaijapur.

25. Pseudotorulla Subram.

Spores brown, multicellular, long, slender, 12.5 - 24.4 x 5.7 - 9 µ. These spores occured only in the months of July and August. They contributed 0.105% to the total air spora. The highest concentration (13 M^3) was recorded in August. This fungus was collected from decaying stems of different unknown plants around the campus.

Kramer (1964) reported one colony on exposed petri plates from Kansas air. Kulkarni (1971) reported 7.08% of these spores from the total air spora of Aurangabad. Gaikwad (1974) observed 0.13% contribution of these spore to the total air spora.

The occurence of these spores in the present investigation appears to be lower than earlier reports.

26. Phoma Sacc.

Only the pycnidia were trapped which are 11-13 x 11-13 µ in diameter. Their highest concentration (19 M^3) was in the month of September and they contributed 0.0185% to the total air spora. The spores of this fungus are allergenic in nature. These pycnidia were collected on the dead fruits of citrus sp. Capsicum annum etc. around the library.

Tilak and Bhalke (1978) reported these spores in mean percentage (0.04) from Mahathawada region during 1967-1977.

27. Seimatosporium Corda.

Three median cells, pigmented end cells hyaline 0-1 apical, cellular, simple or branched appendages, 1 basal exogenous, cellular, simple or branched appendages lacking cytoplasm. These were trapped only in the month of April and May and their percentage was 0.0247 to total air spora.

28. Stagnospora Sacc.

Pycnidia dark, separate, superficial or rumpent globose ostiolate, conidiophores short, conidi hyaline, typically 3 or more celled, cylindrical to elliphical, parasitic or saprophytic on leaves and stems. These spore were trapped only in the month of April and May. They contributed 0.0309% to the total air spora.

29. Spegazzinia Sac.

Conidia dark and of two kinds 4 celled with spiny wall, 26.5 - 26.9 µ in diameter. These are recorded throughout the period of investigation. The highest concentration was in the month of september i.e. (40 M^3). Their contribution to the total air spora was 0.4952%.

Kermer and his co-workers (1959, 1960, 1963, 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 Ramlingam (1963) from Vishakhapatanam, reported that they were sporadic and few except in the months of January, November and December. Agrawal and Shivapuri and Mukerji (1969) trapped these spores from Delhi air spora. Kulkarni (1971) reported 0.12% Conidia of Spegazzinia over sugarcane field around Aurangabad. Pande (1976) reported 0.19% these spores overerange fields.

30. Tetraploa Berk and Br.

Conidia with 3 to 4 septate appendages, smooth or rough, brown 20-22 x 13-14.5 µ. These spores were trapped in all months. The highest concentration (17 M^3) was recorded in September. Their contribution to the total air spora 0.53%. The fungus was collected on dead fruits of Chlorodendrom plant and decaying leaves near the trapping site.

Cunningham (1873) in course of his studies on air spora of presidency jail in Calcutta, recorded the occurence of these spores in the air. Meredith (1962) reported 0.12% spores from the air spora of Jamaica.

Sreeramulu and Sheshavataram (1962) reported them from air with average peak concentration of (10 M^3) at 13 hrs.

Sreeramulu and Ramlingam (1962) reported that these spores were caught chiefly in the month of April, July, October and December. Their presence in these months is associated with agricultural operations carried out in the fields and the occurence of the rainfall.

Tilak and Srinivasulu (1967)reported their occurence from the air spora of Aurangabad.

The other reports of tetraplea spores are those of Kulkarni (1971), Gaikwad (1974), Pande (1976) and Mane (1978).

31. Torula Pers.

Conidia dark, borne directly on mycelium, present in simple or branched erect unbroken chains upto 80 x 6.5 µ and usually breaking into unicellular or multicellular pieces. These spores were caught throughout the period of investigation. Higher concentration was in the month of September. It belongs to "wet spore group" and contributed 0.55% to the total air spora. The fungus was collected on various decaying plant parts from the campus.

Sreeramulu (1958) reported the occurence of the Torula herbarum (Pers) Link. from the mediterianean sea. Other reports are of Hamilton (1959), Lacey (1962), Kramer and Willey (1963), Sreeramulu and Ramlingam (1963), Rees (1964), Pransfield (1966), Turner (1966) and Sreeramulu and Ramalingam (1966).

Rees (1964) in Brisbane, has reported 0.08% spores from the total air spora.

Kulkarni (1971) reported 6.07% Torula herbarum (Pers.) Link from Aurangabad. Mishra and Kamal (1971) reported spores of Torula allii from air spora of Gorakhpur. Tilak and Vishwe (1975) reported 2.15% spores to the total air spora, from Aurangabad.

32. Wardomyces Brooks and Hansford.

Conidia (aleuriospores) 1-celled, brown to black avoid to ellipsoid, produced singly at apices of branches 23-24.5 x 12.5 x 13 µ. Their highest concentration (6 M^3) was in the month of August while percentage contribution was 0.074 to the total air spora.

33. Brachysporium Sacc.

Conidiophores, brown, pale at apex, errect, solitory or in small culsters simple septate, conidia (sympodulospores) dark, avoid to obovoid unequally 3-4 celled, basal cell and apical cell may be non-pigmented, attached to apical cell of conidiophore by a slender pedicel part of which remains attached to the fallen conidium. This fungus was collected from the dead woods and barks of the unknown host around the college campus. They were recorded only in the month of September with percentage contribution (0.01%) to the total air spora.

34. Periconia Bon.

Conidiophores dark, tall, upright streut, simple, somewhat enlarged at apex which bears a loos head of conidia (blastospores) dark 1 celled, globose in dry chains, arising from globose sporogenous cells. This fungus was collected from the dead stems of the unknown hosts around the college campus. They were recorded only in one month i.e. September with percentage contribution .01% to the total air spora.

35. Staphylotrichum Meyer

Mycelium hyline to lightly pigmented, conidiopheres erect, tall dark brown but paler above, branched irregularly in upper portion, conidia (aleuriospore) globose, 1-celled, thick wall, light brown, apical and singal on branches, seprophytic on dead parts of the plants around the college campus. They contribute 0.061% to the total catches and recorded only in September.

36. Melanconium Link.

A-cervuli subepidermal or subcortical, conic or discoid, black, conidiophores simple, conidia dark, 1-celled, avoid to ellipsoid or oblong, parasitic or saprophytic on material of dead twigs. They contributed 0.43% to the total air spora.

B. OTHER TYPES

Algal Fragments :

Most of the algal fragments trapped during the

period of investigation were belongs to class cyanophyceae. The highest concentration (81 M^3) was in the month of April, while lowest in August and September. The percentage of these fragments is (90.835) to the total air spora.

Ramalingam (1971) reported such fragments (0.1%) over Mysore city.

Hyphal fragments :

There are different types of Hyphal fragments through out the investigation of which some were simple, branched, coloured, hyaline, were counted under this group.

Pady and Gregory (1963) reported that some hyphal fragments are viable and form colonies. They also suggested that care has to be exercised in using colony counts, because of occurence of viable hyphal fragments. Rees (1964) from Brisbane recorded 1.4% hyphal fragments. The maximum concentration followed the prolific autumn crop of fungi on decaying summer 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 abundant in August and September. From Samaru (N.Nigeria) Dransfield (1966) recorded 6.75% of sterile mycelia. Harvey (1970) from Cardiff reported that, concentration of hyphal fragments on air spora is low (100 M^3) except during the

peak months of July, August and september when daily average of concentration goes upto (30 M^3). Diurnal periodicity was well defined during the peak months with maximum concentration occuring most frequently at 14 hrs. and 18 hrs.

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), East (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 and Kramer (1960) found that diurnal periodicity peak in June and September were in the afternoon with minor peak at night. He further states that presence of abundance of viable fungal filaments in the air may be due to the process of sexual reproduction. Lacey (1962) found that the mycelial fragments usually consist of broken pieces of Cladosporium in atmosphere.

Sreeramulu and Ramlingam (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.

Sreeramulu (1961) while studying the air spora inside the cattle shed, reported high concentration between 16 hrs. and 20 hrs. with daily maxima at 18 hours.

During present investigation mostly dematiaceous hyphae were recorded most of the hyphal fragments were thick walled and were broken. They occured throughout the year. Maximum concentration (118 M^3) was in the month of August. Their conuribution to the total air spora was 3.528%.

Insect scales :

Their maximum concentration is mainly restricted to the winter and summer season. Most of them were Archids. Besides, this insect scales, hairs, wings, legs and antennae were also encounted. It was also noted that their occurence was mainly nectural, associated with high humidity and velocity. Their contribution to the total air spora was (3.002%).

Choubal and Deodikar (1964) from Poona, reported that the organic parts such as insect wings, legs, antennae etc. from the air in December, January, March and June. Inorganic deposits were also incounted. Tilak and Srinivasulu (1967) reported 1.05% insect scales from the air spora, of Aurangabad. Talde (1969) from Parbhani

reported 0.76%, Kulkarni (1971) at Aurangabad 3.35%, Gaikwad (1974) from Ahmadapur 3.42%, Mane (1978) from Vaijapur 2.51% insect scales from the total air spora.

Present result is more or less similar to reports of earlier workers.

Unidentified Group :

There are number of fungal spores present in the air which could not be identified and classified due to their unsuitable orientation on the adhesive surface, are included in this group. The composition and concentration of this heterogenous group changes considerably from season to season. Their contribution to the total air spora was 0.2847%.

Gregory and Hirst (1957) from England, reported this type of group as unclassified types in which they placed rare forms like conidia of "entermopharaceae" soridia and lichens, spores of Bryophytes and pteriophytes and other spores.

Sreeramulu and Sheshavataram (1962), Srinivasulu (1967) have also reported unidentified group separately during their investigations. Following are the reports of the unclassified spores to the total air spora.

Rees (1964) from Brisbane 5.2%, Tilak and

Srinivasulu (1967) from Aurangabad, 10.83%, Kulkarni (1971) from Aurangabad 3%, Gaikwad (1974) from Ahmedapur 9.71%, Pande (1976) from Nanded 0.13% and Mane (1978) from Vaijapur 1.09%.

Xylem Fibers :

The xylem Fibers, Sclerenchyma, parenchyma and collenchyma cells were recorded in large number in the month of September in (29 M^3) concentration. They contributed 0.2734% to the total air spora. Ramlingam (1971) reported 3.1% xylem Fibers over Mysore city.