RESULTS

COMPOSITION AND CONTRIBUTION OF THE AIRSPORA

Composition of catches:-

During the investigation period, the slides were screened only for the 54 types of fungal spores, hyphal fragments, insect scales and parts, pollen grains and unidentified group of fungal spores. A list of spores caught and identified from the slides is given below; this has been arranged alphabetically under each group.

II) ZYGOMYCOTINA

1) *Cunninghamella* Matr.

2) *Sclerospora* (Oospores) Schroet.

II) ASCOMYCOTINA

1) *Bitrimonospora* Sivanesan, Talde and Tilak

2) *Chaetomium* kunz ex Fr.

3) *Emericella* Berk and Br.

4) *Hypoxylon* Bull ex Fr.

5) *Hysterium* Tode ex Fr.

6) *Leptosphaeria* Ces and de Not.

7) *Lophiostoma* Ces and de Not.

8) *Massaria* de Not.

9) *Melanospora* Corda.

10) *Pleomassaria* Speg.

11) *Pleospora* Rabh.

12) *Sporormia* de Not.

13) *Teichospora* Fuck.

14) *Valsaria* Ces and de Not.

III) BASIDIOMYCOTINA

1) Smut spores

2) Uredospores

IV) DEUTEROMYCOTINA

1) *Alternaria* Nees.

2) *Aspergillus* Micheli ex Link.

3) *Beltrania* Penzig.

4) *Beltraniella* Subram.

5) *Bispora* Corda.

6) *Botryodiplodia* Sacc.

7) *Brachysporium* Sacc.

8) *Cercospora* Fr.

9) *Chaetomella* Fuck.

10) *Cladosporium* Link.

11) *Cordana* preass.

12) *Corynespora* Guessow.

13) *Curvularia* Boed.

14) *Dictyoarthrinium* Hughes.

15) *Diplodia* Fr.

16) *Epicoccum* Link.

17) *Exosporium* Link.

18) *Fusariella* Sacc.

19) *Haplosporella* Speg.

20) *Helminthosporium* Link.

21) *Heterosporium* Klotzsch.

22) *Lacellinopsis* Subram.

23) *Memnoniella* Hohn.

24) *Nigrospora* Zimm.

25) *Oidium* Sacc.Link

26) *Periconia* Tode ex. Schw.

27) *Pestalotia* de Not.

28) *Phaeotrichoconis* Subram.

29) *Pithomyces* Berk.

30) *Sirodesmium* de Not.

31) *Spegazzinia* Sacc.

32) *Spicaria* Auct.

33) *Sporidesmium* Link.

34) *Tetraploa* Berk and Br.

35) *Trichoconis* Clements.

36) *Torula* (Pers.) Link.

V) OTHER TYPES

1) Hyphal fragments

2) Pollen grains

3) Insect scales and parts

4) Unidentified spores

Individual counts were taken only for 58 above mentioned types and the identification was done only up to generic level. Their group wise distribution is as follows –

Total No. of components counted – 58

1) Zygomycotina - 2

2) Ascomycotina - 14

3) Basidiomycotina - 2

4) Deuteromycotina - 36

5) Other types - 4

Chief constituents and their contribution to the airspora –

During the investigation period, 58 different types of biocomponents were observed to the total airspora. Out of these 54 named fungal spore types were observed and all were identified up to generic level. Catches which could not be included in any of above 54 types were counted under one group as "unidentified fungal spores". Hyphal fragments, Pollen grains and Insect parts and scales were also recorded. Their seasonal mean concentration and percentage contribution to the total airspora are given in Table- IV. 1.

Out of 54 types of spores, 2 belonged to Zygomycotina, 14 to Ascomycotina, 2 to Basidiomycotina and 36 to Deuteromycotina group. Mean concentration and percentage contribution of different biocomponents over wheat and groundnut fields are given in Table- IV. 2. To indicate the relative importance of different biocomponents of airspora, the Monthwise average percentage and monthly percentage contribution of 58 different biocomponents to the total number of airspora were estimated and presented in Table – IV.3. and Table – IV.4. respectively. The seasonal mean concentration and percentage contribution of each spore group and other group are given in Table –IV.5. Mean concentration and percentage contribution of each spore group and other group over wheat and groundnut fields are given in

Table –IV.6 and Table –IV.7 respectively. Monthly percentage contribution of each spore group and other group are given in Table –IV.8. Monthly variations in total spore count with respect to temperature, humidity and rainfall are given in Table IV.9.

From 54 different fungal spores, the spores of *Nigrospora* shows highest concentration of 12.00% followed by Smut spores 11.742%, *Alternaria* 11.516%, *Cladosporium* 9.584% and Uredospores 6.214% to the total airspora. (Table- IV. 1)

Seasonal percentage Pie-chart of each spore group and other group to the total airspora during 1st November 2007 to 15th June 2008 are shown in [Fig. IV.1]. Percentage contribution of each spore group and other group over wheat and groundnut fields are shown in [Fig.IV.2] and [Fig. IV.3] respectively. Monthly variations in concentration of each spore group and other group are shown in [Fig.IV.4]. Monthly variations of temperature, humidity and rainfall are shown in [Fig.IV.5].

Monthly variations and seasonal variations in concentration of different biocomponents are represented in respective figures. [Fig. IV. 6 to Fig. IV. 33]

Some of the characteristic features observed for each spore are discussed below-

I] ZYGOMYCOTINA

1) *Cunninghamella* Matr. -

Spores oval to globose, one celled, thin walled, smooth or echinulate, hyaline less than 7µm. Mycelium white, non-septate, with enlarged tips bearing heads of conidia. Highest concentration (294 spores/m3 of air) 54.95% was recorded in the month of January [Table IV. 3]. They contributed 0.058% [Table IV. 1] to the total airspora. They show 0.049% and 0.069% contribution over wheat and groundnut fields respectively. [Table IV. 2]

Incidence of *Cunninghamella* spores has been studied by Tilak and Babu (1981) in Aurangabad. They reported 1.7% spores to the total airspora. Khilare (1996) reported occurrence of these spores to the airspora at Kolhapur. Suryawanshi (2002) reported on wheat field at Anadur, Osmanabad. Hogale (2008) reported 0.10% to the total airspora from Karad region.

2) *Sclerospora* (Oospores) Schroet – [PLATE- V Fig.6]

Oospores are one celled, rounded with yellowish brown in colour and surrounded by smooth thick wall 26.5 × 46.5µm. The spores were present throughout the period of investigation. The highest concentration (15264/ m3) 33.30% was recorded in the month of November [Table IV. 3]. Their contribution to the total airspora was 4.355% [Table IV. 1]. They show 4.164% and 4.515% contribution over wheat and groundnut fields respectively. [Table IV. 2]

Mane (1978) for the first time had reported the occurrence of these Oospores in the airspora over the bajara field near the Vaijapur (Aurangabad). Patil (1980) reported 7.531% these spores in the total airspora of the hospital at Kolhapur. Patil (1988) recorded these spores in airspora of Library at Karad. Khilare (1996), Kakade (2001), Deshmukh (2002) and Munde (2005) reported considerable concentration of this spore type in the airspora. Hogale (2008) recorded 4.73% spores to the total airspora from Karad region.

II] ASCOMYCOTINA

1) *Bitrimonospora* Sivanesan, Talde and Tilak - [PLATE- V Fig. 7]

Spores one celled, spherical, dark-brown to black with a very thick shining outer wall, 34-42 µm. These spores occasionally present in the airspora. In this investigation their contribution 0.088% to the total airspora. [Table IV.1]. They show 0.120% and 0.047% contribution over wheat and groundnut fields respectively. [Table IV. 2].

Tilak (1982) reported 0.02% these spores to the airspora at Aurangabad. Qudsia Begum (1997) reported the occurrence of these spores to the airspora over some vegetable fields of Marathwada region. Ambore (2003) also recorded the occurrence of these spores over wheat field at Kanchanwadi, Aurangabad and Hogale (2008) recorded 0.0645% to the total airspora from Karad region.

2) *Chaetomium* kunz ex Fr. - [PLATE- V Fig. 8]

The spores are one celled; lemon shaped, dark olive brown or greenish black, tapering at both the ends, elliptic, some time circular to triangular 10-11×9-10 µm. The spores were caught throughout the period of investigation. Highest concentration observed in the month of June was (602/ m3) 30.70 % [Table IV.3]. They contributed

0.201% to the total airspora [Table IV. 1]. They show 0.182% and 0.220% contribution over wheat and groundnut fields respectively. [Table IV. 2]

Deshmukh (1989) reported 0.01 % of *Chaetomium* spores over groundnut crop at Parli-Vaijanath for kharif and rabbi season. Deshpande (1992) reported 0.50% contribution over sunflower field at Ambejogai. Sewalikar (1995) reported 0.72% contribution of these spores to the total airspora over wheat field at Aurangabad. Pardeshi (1995) reported 1.22% contribution to the total airspora over sunflower field at Jalgaon. Ambore (2003) and Khedkar (2005) noted occurrence of this spore type over wheat field at Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed respectively. Hogale (2008) reported 0.21% to the total airspora from Karad region.

3) *Emericella* Berk and Br. -

Spores one celled, stellate or lenticular smooth walled with two equitorial crests, equitorial crests pleated, purple red in colour, 3- 4 x 3.5- 4 µm. It is co- perfect stage of Aspergillus, very rarely trapped from air. They show very low concentration in the atmosphere. They contributed 0.013% to the total airspora [Table IV. 1]. They were recorded only on wheat field showing 0.022% contribution to the total airspora [Table IV. 2]

Mishra and Kamal (1971) recorded occurrence of *Emericella* in winter season from Gorakhpur. Agarwal and Shivpuri (1974) reported its occurrence in airspora from Delhi.

4) *Hypoxylon* Bull ex Fr. - [PLATE- V Fig. 9]

Spores one celled, elliptic to bean shaped, fusiform, dark brown, non septate with distinct colourless furrow on one side, 10-16×6-7µm. Maximum concentration (73/m3) 38.42% was recorded in June [Table IV.3]. Their contribution to the total airspora was 0.020% [Table IV.1]. They show 0.019% and 0.021% contribution over wheat and groundnut fields respectively. [Table IV. 2]

Bapat (1991), Sewalikar (1995) and Nagia (1994) recorded 0.21%, 0.33% and 0.13% spores to the total airspora at Aurangabad and Mumbai respectively. Miss Qudsia (1997) and Deshmukh (2000) reported 1.07% and 0.95% spores over vegetable field at Aurangabad and sunflower field at Jalgaon respectively. Ambore (2003) and Khedkar (2005) noted occurrence of this spore type over wheat field at

Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed respectively. Hogale (2008) noted 0.04% to the total airspora from Karad region.

5) *Hysterium* Tode ex Fr. - [PLATE- V Fig.10]

Spores 3 septate, brown, elliptical, cylindrical, slightly constricted at septa, measuring16-21×5-6µm. Their percentage contribution to the total airspora was 0.316% [Table IV.1]. They show 0.325% and 0.298% contribution over wheat and groundnut fields respectively. [Table IV. 2]. The highest concentration of these spores was in the month of December (1125/ m3) 31.41% [Table IV. 3].

Tilak and Srinivasulu (1967) first time reported the occurrence of these spores from the airspora at Aurangabad. Talde (1969) and Kulkarni (1971) reported these spores from the airspora at Parbhani and Aurangabad respectively. Pande (1976) and Shastri (1981) reported 0.45% and 0.007% contribution to the total airspora over orange field at Nanded and over vegetable field at Aurangabad respectively. Bapat (1991) recorded 0.12% contribution of these spores to the total airspora over forest nursery at Aurangabad. Deshpande (1992) reported 0.53% and 0.49% contribution to the total airspora over sunflower field and groundnut field at Ambejogai. Nagia (1994) reported 0.13% contribution of spores to the total airspora over the sunflower field at Mumbai. Sewalikar (1995) reported 0.33% contribution over maize field at Aurangabad.

Pardeshi (1995) reported 0.60% and 1.12% contribution of this spore type to the total airspora over sunflower field at Jalgaon. Patel (2002) reported 0.28% and 0.34% contribution over vegetable field at Nashik. Ambore (2003) and Khedkar (2005) also noted occurrence of this spore type over wheat field at Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed respectively. Hogale (2008) recorded 0.13% to the total airspora from Karad region.

6) *Leptosphaeria* Ces and de Not. - [PLATE- V Fig. 11]

Spores somewhat elliptic to fusiform with two to many cross septa yellowish to yellowish brown, observed 12-14.5×4.1-4.9µm. Spores occurs throughout the investigation period. The maximum concentration (1523/m3) 29.85% was reported in the month of May [Table IV.3]. They contributed 0.576% to the total airspora [Table IV.1]. They show 0.571% and 0.573% contribution over wheat and groundnut fields respectively. [Table IV. 2]

Their occurrence in air has been noted by Pande (1976), Mane (1978), Lakhe (1980), Shastri (1981), Babu (1983), Pillai (1983) and Kale (1983), Khot (1985), Bhate (1986), Ramchander Rao (1987), Modak (1989), Bapat (1991), Deshpande (1992), Nagia (1994) and Pardeshi (1995) during their studies from different parts of Maharashtra. Sewalikar (1995) reported 0.26% contribution over maize field at Aurangabad. Qudsia Begum (1997) reported 1.2% and Deshmukh (2000) reported 0.23% contribution to the total airspora at Aurangabad and Jalgaon respectively.

Patel (2002) reported 2.0% and 1.6% contribution of this spore type from Nashik over vegetable field. Khedkar (2005) also recorded the occurrence of this spore over jowar and bajara field at Kada, Beed. Chavan (2006) reported the occurrence of these spores over paddy field at Raigad. Hogale (2008) reported from Karad 0.23% contribution to total airspora.

7) *Lophiostoma* Ces de Not. -

Spores fusiform, olive brown 5-7 septate, slightly constricted as septa. 18-22 x 6-7 µm. They contributed 0.013% to the total airspora [Table IV.1]. They were recorded only on groundnut field showing 0.029% contribution to the total airspora [Table IV. 2].

Kulkarni (1971) for the first time reported 0.002% spores from Aurangabad. Pardeshi (1995) reported 0.08% contribution to the total airspora over sunflower field at Jalgaon. Deshmukh (2000) and Patel (2002) reported 0.65% and 0.21% to the total airspora over sunflower field at Jalgaon and vegetable fields at Nashik.

8) *Massaria* de Not. - [PLATE- VI Fig. 12]

Ascospores large, transversaly septate, hyaline with gelatinous sheath, narrowly elliptic, strongly constricted, 30-37 x 8-9 µm. These are miscellaneous type of ascospores, very rarely present in the atmosphere. In this investigation they were recorded in November and December only. They contributed 0.013% to the total airspora [Table IV.1]. They were recorded only on wheat field showing 0.024% contribution to the total airspora. [Table IV. 2]

Tilak (1989) reported these spores only in November showing 0.01% to the total airspora from Aurangabad. Aher S.K., Thite S.V. and Pande B.N. (2004) reported occurrence of this spore while studying Aerobiology and epidemiology of certain diseases of groundnut from Aurangabad.

9) *Melanospora* Corda. -

Spores one celled, oval, discoid often in equilateral with prominent germ pores at both the ends, brown to blackish green, 13-22×7µm, and present throughout the investigation period, contributing 0.078% to the total airspora [Table IV.1]. The maximum concentration (434/m3) 43.06% was reported in the month of November [Table IV. 3]. They show 0.092% and 0.060% contribution over wheat and groundnut fields respectively. [Table IV. 2]

Tilak (1989) reported 0.06% to the airspora at Aurangabad. Ambore (2003) also reported the occurrence of these spores over wheat field at Kanchanwadi, Aurangabad. Hogale (2008) recorded 0.1154% spores from Karad region.

10) *Pleomassaria* Speg. - [PLATE- VI Fig. 13]

Spores are fusiform to clavate, with 5 to 8 transverse septa, in the border segments, golden brown sheath with hyaline gelatinous coat and 50-60 × 15-22 µm. In this investigation these spores contributed 0.042% to total airspora [Table IV.1]. They show 0.030% and 0.056% contribution over wheat and groundnut fields respectively. [Table IV. 2]. Maximum concentration (172/m3) 52.92% was reported in the month of December. [Table IV.3].

Shastri (1981) recorded 0.005% to the total airspora over vegetable market at Aurangabad. Mrs. Kale (1983) recorded 0.02% and highest concentration was 196/m3 in June at Parli-Vaijanath over cotton field. Khot (1985) recorded 0.14% this spore type at Ambejogai over vegetable field. Bhate (1986) at Aurangabad and Minhaj (1988) at Nanded recorded 0.61 % and 0.22% of this spore type respectively to the total airspora. Bapat (1991) and Pardeshi (1995) also found occurrence of this spore type during their studies at Aurangabad and Jalgaon. Qudsia Begum (1997) recorded 0.17% to the total airspora over vegetable field at Aurangabad. Hogale (2008) recorded 0.0041% to the total airspora from Karad region.

11) *Pleospora* Rabh. - [PLATE- VI Fig. 14]

Spores oblong to fusiform, yellow to yellowish brown, with several cross septa and one or more longitudinal septa in most or all of the segments.30-35 x 12-16µm. Spores trapped throughout the investigation period. Their contribution to the total airspora was 0.054% [Table IV.1]. They show 0.051% and 0.058%

contribution over wheat and groundnut fields respectively. [Table IV. 2]. The highest concentration (148/m3) 28.85% was reported in the month of June [Table IV.3].

Their occurrence was also reported by Ramlingam (1966) at Vishakhapatnam, Kulkarni (1971) at Aurangabad, Talde (1969) at Parbhani, Gaikwad (1974) at Ahmedpur. Pande (1976) and Lakhe (1980) reported 0.03% and 0.04% contribution to the total airspora at Nanded and Udgir respectively. Bhalke (1981), Shastri (1981) Pillai (1983) recorded these spores at Aurangabad.

M.Babu (1983) reported these spores over sunflower field at Osmanabad. Khot (1985) noted 0.14% contribution at Ambejogai. Bhate (1986), Bapat (1991), Nagia (1994), Pardeshi (1995) and Qudsia (1997) also recorded these spores during their aeromycological investigations. Patel (2002) recorded 0.62% contribution over vegetable fields at Nashik.

12) *Sporormia* de Not. - [PLATE- VI Fig. 15]

Spores dark brown with three cross septa and showing a tendency to breakup at the septum, surrounded by hyaline gelatinous sheath 28-40×7-9µm. Their contribution to the total number of airspora was 0.066% [Table IV.1]. They show 0.069% and 0.061% contribution over wheat and groundnut fields respectively. [Table IV. 2]. The maximum concentration (345/m3) 45.34% was reported in the month of December. [Table IV.3].

Tilak and Kulkarni (1980) reported 1.3% spores to the total airspora outside the caves at Aurangabad. Gaikwad (1974) recorded 0.32% spores over hybrid jowar fields at Ahmedpur. Patil (1980) reported 0.013% spores to the total airspora of hospital at Kolhapur. Bhate (1986), Patil (1988), Bapat (1991), Nagia (1994), Khilare (1996), Miss Qudsia (1997) and Deshmukh (2000) recorded these spores during their studies. Patel (2002) and Hogale (2008) reported 1.54% and 0.04% to the total airspora during their studies at Nashik and Karad respectively.

13) *Teichospora* Fuck. - [PLATE- VI Fig. 16]

Spores oblong, fusiform and slightly yellow to brown, up to 7 transverse septa and 1-2 longitudinal septa in the most of the segments, constricted at the middle septum, 16-25 × 8-11µm. They occurred throughout the investigation period. Maximum concentration (1012/m3) 33.05% was in the month of June [Table IV.3] and their contribution was 0.360% to the total airspora [Table IV.1]. They show

0.368% and 0.344% contribution over wheat and groundnut fields respectively. [Table IV. 2].

Gaikwad (1974) reported 0.08% over *Sorghum* field at Ahmedpur. Lakhe (1980) and Bhalke (1981) reported 0.07% and 0.50% to the total airspora at Udgir and Aurangabad respectively. Shastri (1981), Pillai (1983), Bale (1984), Khot (1985), Bhate (1986), Modak (1989), Deshpande (1992), Nagia (1994) and many more workers recorded these spores from the different regions of Maharashtra. Deshmukh (2000), Patel (2002) and Hogale (2008) recorded 0.75%, 0.2% and 0.33% to the total airspora at Jalgaon, at Nashik and at Karad region respectively.

14) *Valsaria* Ces and de Not.

Spores two celled, broadly elliptical and strongly constricted at the septum, 16-18 x 9-10 µm. They show lowest concentration during the investigation period. They contributed 0.007% to the total airspora [Table IV. 1]. They were recorded only on wheat field showing 0.012% contribution to the total airspora over wheat field. [Table IV. 2]

Tilak and Kulkarni (1980) reported presence of this spore type from the atmosphere of Aurangabad. Aher S.K., Thite S.V. and Pande B.N. (2004) reported occurrence of these spores while studying Aerobiology and epidemiology of certain diseases of groundnut from Aurangabad. Ambore (2003) also recorded occurrence of this spore type over wheat field at Kanchanwadi, Aurangabad.

III] BASIDIOMYCOTINA:-

1) Smut spores - [PLATE- VI Fig. 17]

Spores are one celled, rounded, shortly elliptical or angular, dark brown or black in mass, smooth or slightly echinulate, 10-20µm. All types of smut spores recorded during the investigation period have been grouped under this category. These spores were found throughout the investigation period. They contributed 11.742% to the total airspora [Table IV.1]. They show 12.614% and 10.455% contribution over wheat and groundnut fields respectively. [Table IV.2]. Maximum concentration (31269/m3) 33.59% was recorded in the month of June. [Table IV.3].

Kulkarni (1971) and Gaikwad (1974) at Aurangabad and at Ahmedpur recorded 3.89% and 7.23% to the total spore catches over the sugarcane field and hybrid jowar field respectively. Pande (1976) reported 3.24% to the total airspora at

Nanded. Mane (1978) observed high concentration of these spores in July at Vaijapur. Lakhe (1980) recorded 18.65% spores over vegetable field at Udgir. Bhalke (1981), Shastri (1981) recorded this spore type from Aurangabad. Bale (1983) recorded 24.05% to the total airspora at Osmanabad. Khot (1985) recorded occurrence of these spores type from the atmosphere at Ambejogai with contribution of 1.27% to total airspora. Siddiqui (1988), Modak (1989), Bapat (1991), Baviskar (1993), Nagia (1994) and Pardeshi (1995) also, recorded 1.63%, 1.30%, 2.16%, 5.5%, 3.40%, 4.06%, and 3.19% contribution of this spore type respectively to the total airspora, during their studies at various places of Maharashtra.

Qudsia Begum (1997) reported in her studies 0.86% contribution of this spore type to the total airspora from vegetable market at Aurangabad. Deshmukh (2000) recorded 3.62% contribution to the total airspora over the gram field at Jalgaon. Patel (2002) reported 2.70% and 2.00% contribution to the total airspora during kharif and rabbi seasons over the vegetable field at Nashik. Ambore (2003) and Khedkar (2005) noted occurrence of smut spores over wheat and Jowar field at Kanchanwadi, Aurangabad and over jowar and bajara field at Kada, Beed. Hogale (2008) reported 12.46% to the total airspora during their studies at Karad.

2) Uredospores - [PLATE-VII Fig. 18]

Uredospores are one celled, oval to broadly elliptical, stalked, pyriform, yellowish-reddish brown, thick walled with tiny spiny, 4 germ pores arranged along the equatorial zone, 20-30 to 17-20 µm. These spores belongs to *Puccinia* was observed throughout investigation period. Maximum concentration was recorded in the month of December (21652/m3) 30.69% [Table IV.3]. Their contribution to total airspora was 6.214% [Table IV. 1]. They show 6.408% and 5.864% contribution over wheat and groundnut fields respectively. [Table IV.2]

Tilak and Srinivasulu (1967) reported 0.57% at Aurangabad. Kulkarni (1971) reported 0.61% concentration to the total airspora catches at Aurangabad. Gaikwad (1974) and Pande (1976) reported 0.10% and 2.24% contribution to the total airspora at Ahmedpur and Nanded respectively. Lakhe (1980) and Bale (1983) reported 0.15% and 0.08% to the total airspora over vegetable field at Udgir and over sunflower field at Osmanabad respectively.

Khot (1985) recorded 0.035% concentration to the total airspora over vegetable field at Ambejogai. Bhate (1986) noted 1.28% concentration of this spore

type over jowar field at Ambejogai. Modak (1989) reported 0.395% concentration of this spore type to the total airspora from atmosphere of Malegaon (Nashik). Baviskar (1993), Nagia (1994) and Pardeshi (1995) also reported occurrence of these spores while working at Chalisgaon, Mumbai, and Jalgaon respectively. Qudsia Begum (1997) recorded 0.37% concentration to the total airspora during her investigation over vegetable field at Aurangabad. Deshmukh (2000) recorded 1.04% contribution to the total airspora over sunflower crop at Jalgaon.

Patel (2002) reported 0.92% contribution to the airspora over vegetable field at Nashik. Ambore (2003) also contributed the occurrence of this spore over wheat field at Aurangabad. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad. Hogale (2008) recorded 5.89% to the total airspora at Karad.

IV] DEUTEROMYCOTINA:

1) *Alternaria* Nees. - [PLATE- VII Fig. 19]

Conidia variously shaped obclavate to elliptical, ovoid, dark brown, with transverse and longitudinal septa, frequently borne acropetal in long chains. In some instance borne singly and having an apical simple or branched appendage of different sizes belongs to different species. The size of the spore was 5-11 × 4-5µm.These spores were recorded throughout the period of investigation. Highest concentration was observed in the month of June (34957/m3) 32.86% [Table IV.3]. They contributed 11.516% to total airspora [Table IV.1]. They show 11.002% and 11.946% contribution over wheat and groundnut fields respectively. [Table IV.2]

Tilak and Srinivasulu (1967) reported 9.7% contribution from the atmosphere of Aurangabad. Lakhe (1980) reported 7.15% contribution of this spore type to the total airspora over jowar field at Udgir. Bhalke (1981), Shastri (1981), Saibaba (1983), Babu (1983) recorded this spore type from atmosphere of Aurangabad. Bale (1983) reported 1.18% to the total airspora over sunflower field at Osmanabad. Bhate (1986) reported 9.77% to the total airspora over hybrid jowar field at Ambejogai. Deshpande (1992) reported 4.36% spore concentration to the total airspora over sunflower field at Ambejogai. Nagia (1994) reported 1.18% spore concentration to the total airspora over sunflower crop at Mumbai. Sewalikar (1995) reported 10.04% contribution to the total airspora over maize field at Aurangabad.

Pardeshi (1995) reported 9.75% and 9.19% contribution to the total airspora over sunflower field at Jalgaon. Qudsia Begum (1997) reported 5.12% contribution to

the total airspora over vegetable field at Aurangabad. Deshmukh (2002) reported 4.25% contribution to the total airspora over sunflower field at Jalgaon. Patel (2002) reported 9.46% and 11.93% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) also noted occurrence of this spore over wheat field at Aurangabad. Khedkar (2005) also noted the occurrence of this spore over jowar and bajara field at Kada, Beed. Hogale (2008) reported 7.20% spores to the total airspora from Karad.

2) *Aspergillus* Micheli ex Link. -

Conidia one celled, globose, smooth or finely echinulate, hyaline, olive-green or dull-green in mass, spores in besipetal chains, 4-4 × 3-4µm. They contributed 2.213% to the total airspora [Table IV.1]. They show 2.168% and 2.230% contribution over wheat and groundnut fields respectively. [Table IV.2]. Maximum concentration was recorded in the month of January (9751/m3) 40.85% [Table IV. 3].

Kulkarni (1971), Gaikwad (1974), Pande (1976), Mane (1978) reported this spores from the airspora during their studies. Lakhe (1980), Bhalke (1981) and Shastri (1981) recorded the spores of *Aspergillus* with the contribution of 0.02%, 8.91% and 10.85% at Udgir and Aurangabad respectively. Pardeshi (1995) reported 0.20% over sunflower at Jalgaon. Qudsia (1997) and Deshmukh (2000) reported 9.26% and 0.17% over vegetable and sunflower field, at Aurangabad and Jalgaon respectively. Kakade and Saoji (2001), Chandel (2002), Mane (2002) recorded contribution of *Aspergillus* in air during their studies. Patel (2002) and Hogale (2008) recorded 6.00% and 0.20% to the total airspora at Nashik and Karad respectively.

3) *Beltrania* Penzig. - [PLATE- VII Fig. 20]

Spores one celled, smooth, biconic, dry, pale to dark brown, sub hyaline, equatorial band, conidia rounded with a scar or denticulate at the base with a long conical one celled, hyaline to sub hyaline septa at the apex, 12-23.5 × 8.5-11.5µm. They contributed 0.162% to the total airspora [Table IV.1]. They show 0.171% and 0.148% contribution over wheat and groundnut fields respectively. [Table IV.2]. Highest concentration was recorded in the month of June (685/m3) 40.11% [Table IV.3].

Lakhe (1980) reported 0.23% spores at Udgir from jowar field with highest concentration of air (660/m3) were recorded in June. Bhalke (1981), Shastri (1981)

recorded low percentage of this spore type from Aurangabad. Bhagwan (1983) reported these spores from airspora over sugarcane fields at Nanded. Saibaba (1983), Pillai (1983), Babu (1983), also recorded these spores from Aurangabad. Patel (2002) reported 0.3% at Nashik. Khedkar (2005) also noted the occurrence of this spore over jowar and bajara field at Kada, Beed. Hogale (2008) recorded 0.041% to the total airspora from Karad.

4) *Beltraniella* Subram. - [PLATE- VII Fig. 21]

Conidia unicellular, top shaped, biconic, brown with polar middle band, septa absent, with size 18.5-23 x 8.5-11 µm. These spores were recorded throughout the investigation period. Although less in number but with maximum concentration (72/m3) 42.60% in November [Table IV.3]. They contributed 0.009% to the total airspora [Table IV.1]. They were recorded only on wheat field showing 0.015% contribution to the total airspora. [Table IV. 2]

Kulkarni (1971) recorded these spores over sugarcane field at Aurangabad. Pande (1976), Dhawre (1976) and Mane (1978) reported 0.04%, 0.004% and 0.04% over orange, paddy and bajara fields at Nanded, Udgir and Vaijapur respectively. Lakhe (1980) at Udgir, Bhalke (1981), M.Babu (1983) at Aurangabad reported these spores at low concentration. Jogdand (1987) at Nanded, Deshpande (1992) at Ambejogai, Suryawanshi (2002) at Anadur, Osmanabad, Patel (2002) at Nashik and Hogale (2008) at Karad recorded these spores at low concentration.

5) *Bispora* Corda. - [PLATE- VII Fig. 22]

Conidia dark, oblong to ellipsoid, 2 celled or less often 3 celled with thick black septa, catanulate, measuring 6-11 × 5-8µm. Highest concentration was recorded in the month of March (2024/m3) 32.68% [Table IV.3]. They contributed 0.596% to the total airspora [Table IV.1]. They show 0.564% and 0.626% contribution over wheat and groundnut fields respectively. [Table IV.2]

Kulkarni (1971) recorded 0.03% over sugarcane field at Aurangabad. Dhawre (1976), Mane (1978), Lakhe (1980), Bhalke (1981) and Mrs. Kale (1983) reported 0.58%, 0.12%, 0.67%, 0.68% and 0.32% at Udgir, Vaijapur, Udgir, Aurangabad and Parli Vaijanath respectively. M. Babu (1983) at Aurangabad, Saibaba (1983) at Aurangabad, Khot (1985) and Bhate (1986) at Ambejogai, Pardeshi (1995) at Jalgaon, Qudsia (1997) at Aurangabad and Deshmukh (2000) at Jalgaon also found

contribution of this spore type to the total airspora. Patel (2002) at Nashik, Ambore (2003) at Kanchanwadi, Aurangabad also noted occurrence of this spore. Khedkar (2005) at Beed and Hogale from Karad also noted the occurrence of this spore.

6) *Brachysporium* Sacc. - [PLATE- VII Fig. 23]

Spores ovoid to obvoid, dark brown, unequally, 3-5 celled, 30-70 x 13-25 µm. Central cell may be sub hyaline; spores with slender pedicel, when detached carry away with them a part of the narrow pedicel. These are occasionally present in the atmosphere. They show low concentration during the studies, contributing 0.019% to the total airspora [Table IV.1]. They were recorded only on wheat field showing 0.035% contribution to the total airspora. [Table IV. 2]. Maximum concentration was recorded in the month of November (119/m3) 31.15% [Table IV.3].

Kulkarni (1971), at Aurangabad reported occurrence of *Brachysporium* in the airspora over sugarcane field. Pande (1976) has also reported these spores over orange field at Nanded at low concentration to the total airspora.

7) *Botryodiplodia* Sacc. - [PLATE- VIII Fig. 24]

Spores two celled, ovoid to ellipsoid, dark brown with longitudinal striations, 24-28×10-14µm. They contributed 0.245% to the total airspora [Table IV.1]. They show 0.215% and 0.278% contribution over wheat and groundnut fields respectively. [Table IV.2]. Highest concentration was recorded in the month of June (980/m3) 39.55% [Table IV.3].

Kulkarni (1971) at Aurangabad reported sporadic occurrence of *Botryodiplodia* in the airspora over sugarcane field. Pande (1976) has also reported these spores from the airspora over orange field at Nanded. Mane (1978) at Vaijapur and Lakhe (1980) at Udgir recorded 0.02% and 0.05% to the total airspora respectively. Khot (1985), Bhate (1986), Modak (1989), Pardeshi (1995), and Qudsia (1997) also found contribution of this spore type to the airspora during their studies. Patil (1988) at Karad reported these spores in the airspora of library. Patel (2002) at Nashik, Pathare (2004) at Aurangabad and Hogale (2008) at Karad has reported these spores.

8) *Cercospora* Fries. -

Conidia are hyaline, fusiform, several celled, 115-480 × 4.3-7.3µm. In the present investigation they were trapped throughout the investigation period. Highest concentration was recorded in the month of February (1831/m3) 38.85% [Table IV.3]. These spores contributed 0.466% to the total airspora [Table IV.1]. They show 0.428% and 0.504% contribution over wheat and groundnut fields respectively. [Table IV.2]

Tilak and Srinivasulu (1967) reported these spores from Aurangabad. Kulkarni (1971) at Aurangabad, Pande (1976) at Nanded, Lakhe (1980) at Udgir, Bhagwan (1983) at Nanded reported 0.15%, 0.33%, 0.05%,and 0.59% conidia to the total airspora over sugarcane, orange, vegetable fields and sugarcane field respectively. Gaikwad (1974), Mane (1978) S.Pillai (1983), Bale (1984) also reported the conidia of *Cercospora* in their airspora studies. Khot (1985) has reported 0.67% concentration of this spore type to the total airspora from atmosphere of Ambejogai on vegetable field.

Bhate (1986), Modak (1989), Bapat (1991), Deshpande (1992), and Pardeshi (1995) reported this spore type during their studies. Sewalikar (1995) reported 0.2% concentration to the total airspora over maize field at Aurangabad. Qudsia Begum (1997) also reported this spore type in their aerobiological studies. Deshmukh (2000) reported 5.83% contribution to the total airspora over sunflower field at Jalgaon. Patel (2002) reported 1.98% and 1.03% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) also recorded these spores over wheat field at Kanchanwadi, Aurangabad. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad. Hogale (2008) recorded 0.29% to the total airspora from Karad.

9) *Chaetomella* Fuck. -

Spores one celled, cylindrical to fusoid, somewhat curved, sub hyaline to dark, 55-7 × 3.5 µm, occasional contributor to airspora. Their contribution was 0.042% to the total airspora [Table IV.1]. They show 0.046% and 0.037% contribution over wheat and groundnut fields respectively. [Table IV.2]

Bhagwan (1983) and Ahuja (1992) recorded the spores at Nanded and Aurangabad respectively. Khilare (1996) reported these spores from environment of Kolhapur. Hogale (2008) reported 0.09% to the total airspora at Karad.

10) *Cladosporium* Link. - [PLATE- VIII Fig. 25]

Conidia are hyaline to dark brown produced by budding, single or branched chain, easily separating and polymorphs. Globular, oval, ovoidal to cylindrical, some are typical lemon shaped, obtuse or tapering at one end or both the ends, smooth or finely verrucose, 1-4 hilla, length variable 4-4.8×2-4.8µm conidiophores. Clustered spores were recorded throughout the investigation period. In this investigation they contributed 9.584% to the total airspora [Table IV.1]. They show 8.294% and 11.009% contribution over wheat and groundnut fields respectively. [Table IV.2]. Maximum concentration was observed in the month of January was (36514/m3) 29.04% [Table IV.3].

Mishra and Kamal (1971) recorded *Cladosporium* spores dominating in winter season at Gorakhpur. Pande (1976) and Mane (1978) recorded 34.25% and 28% contribution of the spores at Nanded and at Vaijapur respectively. Lakhe (1980) reported 08.15% spores to the total airspora over vegetable field at Udgir. Kulkarni (1979) at Kolhapur, Verma (1980) at Gorakhpur also reported *Cladosporium* from airspora during their studied. Bhalke (1981), Saibaba (1983) recorded high concentration of *Cladosporium* from atmosphere of Aurangabad. Bale (1983) reported occurrence of this spore type from the atmosphere of Osmanabad. Khot (1985) reported 11.96% contribution of this spore type from the atmosphere at Ambejogai.

Bhate (1986), Modak (1989), Bapat (1991) have recorded 21.73%, 12.23%, and 12.07% contribution of this spore type to the total airspora during their studies. Pardeshi (1995) has recorded 13.30% of this spore type from atmosphere at Jalgaon during aerobiological studies over sunflower field. Deshmukh (2002) reported 28.27% concentration to the total airspora over sunflower field at Jalgaon. Patel (2002) reported 11.12% and 25.70% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) also noted occurrence of this spore over wheat field at Kanchanwadi, Aurangabad. Khedkar (2005) also noted the occurrence of this spore over jowar and bajara field at Kada, Beed. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad. Hogale (2008) also recorded 10.33% to the total airspora at Karad.

11) *Cordana* Preuss. - [PLATE- VIII Fig. 26]

Spores two celled, ovoid to broadly ellipsoid, dark or grayish, not constricted at septum, dark band at the tip, pointed at base, 10-15 × 6-9µm. They contributed 0.347% to the total airspora. They show 0.340% and 0.349% contribution over wheat and groundnut fields respectively. [Table IV.2]

Tilak et.al. (1980) recorded 0.08% spores to the airspora during October-January at Aurangabad. Bhagwan (1983), Bapat (1991), Aher S.K., Thite S.V. and Pande B.N. (2004) reported occurrence of this spore during their studies. Ambore (2003) at Kanchanwadi, Aurangabad and Munde (2005) at Parli-Vaijanath recorded these spores. Hogale (2008) also recorded 0.0082% to the total airspora at Karad.

12) *Corynespora* Guessow. - [PLATE- VIII Fig. 27]

Conidia single celled, terminal, sometimes occurred in short chain, obclavate or cylindrical, straight or curved, smooth, brown with 4-20 pseudo-septa with thick colourless expose and prominent dark based scar, 55-210 × 8-16 µm. In the present investigation they contributed 0.310% to the total airspora [Table IV.1]. They show 0.331% and 0.278% contribution over wheat and groundnut fields respectively. [Table IV.2].

Mane (1978) recorded 0.16% spores to the total airspora over Bajara at Vaijapur. Lakhe (1980) reported 0.12% spore contribution to the total airspora over vegetable filed at Udgir. Shastri (1981) recorded 0.11 % contribution to the total airspora at Aurangabad. Pillai (1983) recorded 0.4% spores at Aurangabad, while Bale (1984) reported 0.04% to the total airspora at Osmanabad. Khot (1985) recorded 0.61% contribution of these spore types to the total airspora at Ambejogai. Bhate (1986), Deshpande (1992) reported 0.85% and 1.15% contribution respectively to the total airspora at Ambejogai.

Pardeshi (1995) recorded 0.06% and 0.81 % to the total airspora over sunflower and groundnut field at Jalgaon. Qudsia Begum (1997) recorded 0.78% and Deshmukh (2000) recorded 1.33% to the total airspora over vegetable fields at Aurangabad and sunflower field at Jalgaon. Khedkar (2005) also noted the occurrence of this spore over jowar and bajara field at Kada, Beed. Chavan (2006) reported spores over paddy field at Raigad and Hogale (2008) recorded 0.18% spores at Karad respectively.

13) *Curvularia* Bode. [PLATE- VIII Fig. 28]

Conidia dark, 3-5 celled, more or less fusiform, typically bent or curved with one to two central cells enlarged, 17-45×11-20µm. The spores were present throughout the investigation period. The highest concentration (10986/m3) 32.03% [Table IV.3] was reported in the month of May. Their contribution to total airspora was 3.137 % [Table IV. 1]. They show 3.459% and 2.683% contribution over wheat and groundnut fields respectively. [Table IV.2]

Mishra and Kamal (1971) reported seven species of *Curvularia* from Gorakhpur. Kulkarni (1971) reported this spore type from airspora of Aurangabad. Agarwal and Shivpuri (1974) trapped *C. lunata* (Walker) from Delhi atmosphere. Gaikwad (1974) reported highest concentration 784/m3 of air in September at Ahmedpur. Pande (1976) reported 5.08% contribution to the total airspora at Nanded over orange field. Mane (1978), Lakhe (1980), Bhalke (1981), Shastri (1981), and Babu (1983) have also reported the occurrence of this spore type in their airspora studies. Khot (1985) noted the occurrence of these spore types with concentration of 4.80% to the total airspora at Ambejogai on vegetable field. Venugopal (1986), Bhate (1986), Bapat (1991), Deshpande (1992) also recorded the occurrence of this spore type in their aerobiological studies.

Nagia (1994) reported 7.90% to the total airspora over sunflower field at Mumbai. Sewalikar (1995) reported 9.12% contribution to the total airspora over maize field at Aurangabad. Pardeshi (1995) reported 7.69% and 9.35% contribution to the total airspora over sunflower and groundnut field at Jalgaon. Qudsia Begum (1997) in her studies reported 4.63% contribution over vegetable field at Aurangabad. Deshmukh (2002) reported 2.44% contribution over sunflower field at Jalgaon. Patel (2002) reported 8.84% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) and Khedkar (2005) noted occurrence of this spore type over wheat field at Aurangabad and jowar and bajara field at Kada, Beed respectively. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad. Hogale (2008) recorded 3.65% spores at Karad.

14) *Dictyoarthrinium* Hughes. - [PLATE- VIII Fig. 29]

Conidia four celled, cross shaped, somewhat squarish, constricted at septa, thick walled, verrucose, dark drown, 12-14, flattened, 12-17 × 14µm. The spores were present throughout the investigation period. Their Contribution was 1.558% to the

total airspora [Table IV.1]. They show 1.621% and 1.453% contribution over wheat and groundnut fields respectively. [Table IV.2]. The highest concentration (7815/m3) 43.80% was reported in the month of November. [Table IV. 2].

Kulkarni (1971) and Mane (1978) reported 0.02% and0.03% spores to the total airspora over sugarcane field at Aurangabad and over bajara field at Vaijapur. Lakhe (1980) at Udgir, Shastri (1981) Pillai (1983), at Aurangabad recorded 0.004%, 0.05% and 0.01% to the total airspora respectively. Khot (1985) reported 0.13%, Modak (1989) 0.15%, Bapat (1991) 0.23%, contribution to total airspora at Ambejogai, Malegaon and Aurangabad. Qudsia (1997) reported 0.15% and Deshmukh (2002) 0.48% spores over vegetable and sunflower field at Aurangabad and Jalgaon respectively. Patel (2002) reported 0.17% spores in the airspora at Nashik. Hogale (2008) recorded 0.054% spores from Karad.

16) *Diplodia* Fr. -

Conidia dark brown, 2 celled, ellipsoidal or ovoid, thick walled, measuring 12-15.5×3-7µm. They contributed 0.239% to the total airspora. [Table IV.1]. They show 0.301% and 0.158% contribution over wheat and groundnut fields respectively. [Table IV.2]. The maximum concentration (1115/m3) 33.60% was recorded in month of November. [Table IV.3].

Gaikwad (1974), Pande (1976), Lakhe (1980), Shastri (1981) reported 0.23%, 0.83%, 0.02% and 0.15% spores contribution to the total airspora at Ahmedpur, Nanded, Udgir and Aurangabad respectively. Khot (1985) reported 0.68% contribution to the total airspora over vegetable field at Ambejogai. Ramakrishna Reddy (1987) reported 0.53% over sunflower field at Aurangabad. Modak (1989) reported 0.79% over *Sorghum* field at Malegaon. Bapat (1991) reported 0.53% contribution to the total airspora over forest nursery at Aurangabad. Deshpande (1992) reported 0.18% contribution over sunflower field at Ambejogai. Nagia (1994) reported 0.57% contribution over sunflower field at Mumbai. Sewalikar (1995) reported 9.12% contribution over maize field at Aurangabad. Qudsia Begum (1997) reported 1.46% contribution over vegetable fields at Aurangabad.

Patel (2002) reported 0.81% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) also noted occurrence of this spore over wheat field at Kanchanwadi, Aurangabad. Chavan (2006) recorded the occurrence of these spores

over paddy field at Raigad, Konkan region. Hogale (2008) recorded 0.17% spores at Karad.

17) *Epicoccum* Link. -

Conidia are globose to sub-globose, dark brown, one to several celled, irregularly septate, 7-9 µm. The spores were trapped throughout the investigation period. Their highest concentration was observed in the month of February (10326/m3) 32.85% [Table IV.3]. Their Contribution was 3.239% to the total airspora [Table IV.1]. They show 2.855% and 3.655% contribution over wheat and groundnut fields respectively. [Table IV.2].

Kulkarni (1971), Tilak and Bhalke (1978) and Shastri (1981) at Aurangabad, Mane (1978) at vaijapur and Lakhe (1980) at Udgir, reported 0.11%, 0.25%, 0.40%, 0.25% and 0.02% spores contribution to the total airspora. Khot (1985) recorded 0.19% contribution at Ambejogai over vegetable field. Venugopal (1986), Meghraj (1989) and Minhaj (1988) also reported these spores from their aeromycological studies from different parts of Maharashtra. Deshpande (1992), Nagia (1994), Sewalikar (1995), Pardeshi (1995) reported 0.36%, 0.17%, 0.40% and 0.58% contribution to the total airspora at Ambejogai, Mumbai, Aurangabad and Jalgaon respectively. Deshmukh (2002) and Patel (2002) reported 0.25% and 0.12% contribution to the total airspora over sunflower field at Jalgaon and vegetable field at Nashik respectively. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad, Konkan region. Hogale (2008) recorded 2.93% spores at Karad.

18) *Exosporium* Link. - [PLATE- IX Fig. 30]

Spores obclavate to cylindrical, straight or slightly curved, with 3-10 pseudoseptate, not constricted at septa, subhyaline to dark olivaceous brown with prominent scar, at broader base, 23-92 X 4-7 µm. These spores show low concentration in the atmosphere. They contributed 0.025% to the total airspora. [Table IV.1]. They were recorded only on wheat field showing 0.044% contribution to the total airspora. [Table IV. 2].

Tilak (1974) and Pande (1976) reported the occurrence of these spores at Aurangabad and Nanded respectively. Ambore (2003) also noted these spores over wheat field at Kanchanwadi, Aurangabad.

19) *Fusariella* Sacc. [PLATE- IX Fig. 31]

Conidia 3 celled, cylindrical, greenish dark, curved, septate and borne in chains and each conidium is attached at the side of conidium below, and not end to end, 18-25 × 4-7μm. Their highest concentration was observed in the month of March (1192/m3) 35.85% [Table IV. 3]. Their Contribution was 0.296% to the total airspora [Table IV.1]. They show 0.376% and 0.190% contribution over wheat and groundnut fields respectively. [Table IV.2].

Mane (1978) reported 0.13% spores over bajara field at Vaijapur. Lakhe (1980) reported highest concentration (00.01 %) of these spores in the month of July at Udgir. Shastri (1981) recorded 0.04% spores from total airspora at Aurangabad. Bhagwan (1983) reported these spores at Nanded over sugarcane field. Khot (1985) reported 0.31 % contribution to the total airspora over vegetable field at Ambejogai. Tilak et al. (1980) reported these spores from the airspora at Aurangabad. Bhate (1986), Modak (1989) also recorded this spore type in their studies.

Bapat (1991) reported 0.46% concentration over forest nursery at Aurangabad. Pardeshi (1995) reported 0.12% concentration over sunflower field at Jalgaon. Qudsia Begum (1997) and Deshmukh (2002) reported 0.36% and 0.96% concentration to the total airspora over vegetables and sunflower fields at Aurangabad and Jalgaon respectively. Patel (2002) recorded 0.20% over vegetable field at Nashik. Khedkar (2005) and Chavan (2006) also recorded the occurrence of this spore types over jowar and bajara fields at Kada, Beed, and paddy field at Raigad, Konkan region. Hogale (2008) recorded 0.21% spores at Karad.

20) *Haplosporella* Speg. -

Spores one-celled, ovoid or oblong rounded to ends, smooth walled, large dark, and 15-18 × 10-12 μm. Their highest concentration was observed in the month of December (415/m3) 36.79% [Table IV.3]. Their Contribution was 0.096% to the total airspora [Table IV.1]. They show 0.102% and 0.086% contribution over wheat and groundnut fields respectively. [Table IV.2].

Gaikwad (1974) and Mane (1978) reported 0.18% and 0.56% contribution to total airspora at Aurangabad and Vaijapur respectively. Tilak and Bhalke (1978) reported these spores in mean percentage (0.6) from Marathwada region (Aurangabad). Lakhe (1980) and Patil (1980) reported 0.64% and 0.02% to the total airspora over vegetable fields at Udgir and hospital area at Kolhapur respectively.

Patil (1988) reported 0.107% to the total airspora in library area at Karad. Ambore (2003) Khedkar (2005) noted occurrence of this spore type over wheat field at Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed, Respectively. Hogale (2008) recorded 0.0096% spores from Karad.

21) *Helminthosporium* Link. - [PLATE- IX Fig. 32]

Conidia dark, typically containing more than 3 cells, cylindrical to ellipsoid, some time slightly curved or bent, with rounded ends, measuring 20-26 × 7.9µm. These spores trapped throughout the period of investigation. Their maximum concentration was observed in the month of April (8168/m3) 35.34% [Table IV.3]. Their Contribution was 2.286% to the total airspora. [Table IV.1]. They show 2.340% and 2.179% contribution over wheat and groundnut fields respectively. [Table IV.2].

Sreeramulu and Seshavataram (1962) noted *Helminthosporium oryzae* from Pentapadu. Bharat Rai (1969) reported *Helminthosporium annamilum* from airspora of Varanasi. Kulkarni (1971) reported 2.83% of these spores from airspora at Aurangabad. Pande (1976), Mane (1978), Lakhe (1980), Babu (1983), Khot (1985) reported occurrence of this spore type during their studies. Bale (1984) reported 0.80% spore concentration from Osmanabad. Bhate (1986) reported 4.43% contribution from Ambejogai. Modak (1989) reported 6.80% contribution over jowar field at Malegaon, Deshmukh (1989) reported 0.77% and 2.00% contribution over groundnut field at Parli-Vaijanath for kharif and rabbi season. Bapat (1991) reported 13.46% spores contribution over forest nursery at Aurangabad. Deshpande (1992) reported 2.94% contribution over sunflower field at Ambejogai. Sewalikar (1995) reported 0.92% and 1.85% contribution over maize crop and wheat crop respectively at Aurangabad.

Nagia (1994) reported 3.95% spore contribution to the total airspora over sunflower field at Mumbai. Pardeshi (1995) reported 3.20% and 2.78% contribution over sunflower at Jalgaon. Qudsia Begum (1997), Deshmukh (2000) and Patel (2002) reported 5.17%, 0.47% and 5.48% contribution at Aurangabad, Jalgaon and Nashik respectively. Ambore (2003) and Khedkar (2005) noted occurrence of this spore type over wheat and jowar field at Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed respectively. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad, Konkan region. Hogale (2008) recorded 3.39% spores at Karad.

22) *Heterosporium* Klotzsch. - [PLATE- IX Fig. 33]

Conidia dark, typically 3-4 celled, cylindrical rough, echinulate to verrucose, 23-45 × 7.5-8.2 µm. These spores trapped throughout the period of investigation. They contributed 0.677% to the total airspora [Table IV.1]. They show 0.634% and 0.718% contribution over wheat and groundnut fields respectively. [Table IV.2]. Their maximum concentration was observed in the month of March (2180/m3) 32.62% [Table IV.3].

Kulkarni (1971) recorded 0.04% spores at Aurangabad. Agarwal and Shivpuri (1974) reported *Heterosporium alli* spores from Delhi atmosphere. Pande (1976) at Nanded, Tilak and Bhalke (1978) at Aurangabad, Mane (1978) at Vaijapur, Lakhe (1980) at Udgir recorded the occurrence of this spore type recorded in air during their studies. M. Babu (1983) and Mrs. Kale (1983) recorded 0.22% and 0.27% contribution to the total airspora at Aurangabad and at Parli-Vaijanath respectively. Khot (1985) recorded to 0.75% contribution of this spore type over vegetable field at Ambejogai. Bhate (1986) reported this spore type during their studies at Ambejogai. Bapat (1991) recorded 0.60% contribution to the total airspora over forest nursery from Aurangabad. Deshpande (1992) reported 0.80% contribution to the total airspora over groundnut field at Ambejogai.

Pardeshi (1995) reported 0.51% and 1.18% contribution to the total airspora over sunflower and groundnut field at Jalgaon. Qudsia Begum (1997) reported 0.72% contribution over vegetable field at Aurangabad. Deshmukh (2002) recorded 1.56%, contribution to the total airspora over sunflower field at Jalgaon. Patel (2002) reported 0.45% and 0.20% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) also noted occurrence of this spore over wheat field at Kanchanwadi, Aurangabad. Khedkar (2005) also recorded the occurrence of this spore over jowar and bajara field at Kada, Beed. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad, Konkan region. Hogale (2008) recorded 0.79% spores at Karad.

23) *Lacellinopsis* Subram. –

Spores 1- celled, globose, pale brown to dark-brown, smooth, 5-10µm. These spores are produced acropetally in branched or unbranched chains. They contributed 0.059% to the total airspora [Table IV.1]. They show 0.067% and 0.047%

contribution over wheat and groundnut fields respectively [Table IV.2] and shows highest contribution (319/m3) 42.99% in the month of December. [Table IV.3].

Mane (1978) reported 0.29%, Tilak et.al. (1980) 0.16%, Khot (1985) 0.97%, Deshpande (1992) 2.13%, Qudsia (1997) 0.29% and Deshmukh (2000) 1.29% contribution to the total airspora at various places of Maharashtra. Patel (2002) reported 1.03% and 0.25% spores to the total airspora at Nashik. Kakade (2001), Ambore (2003), Deshmukh (2002) recorded occurrence of these spores in the airspora during their studies. Hogale (2008) recorded 2.82% spores at Karad.

24) *Memnoniella* Hohn. - [PLATE- IX Fig. 34]

Conidia dark, one celled, globose, 6.6 to 9µm. These spores show low concentration. They contributed 0.041% to the total airspora [Table IV.1]. They were recorded only on wheat field showing 0.074% contribution to the total airspora. [Table IV. 2].

Tilak and Srinivasulu (1967) have reported these spores from airspora at Aurangabad. Kulkarni (1971) reported 0.71 %, Pande (1976) 1.26%, Mane (1978) 0.84%, Lakhe (1980) 0.86%, Shastri (1981) 03.65% contribution to the airspora at Aurangabad, at Nanded, at Vaijapur, at Udgir, at Aurangabad respectively. Babu (1983) and Pillai (1983) recorded these spores from Aurangabad. Khot (1985) noted 1.24% contribution of this spore type to the total airspora at Ambejogai, while studying vegetable field. Bhate (1986) reported 1.31 % spore concentration to the total airspora at Ambejogai. Bapat (1991) reported 0.43% spore concentration over forest nursery at Aurangabad.

Deshpande (1992), Sewalikar (1995), Pardeshi (1995) reported occurrence of this spore type as 6.20%, 0.39% and 0.05% concentration respectively during their aerobiological studies at Ambejogai, Aurangabad and Jalgaon. Qudsia Begum (1997) reported 1.33% contribution to the total airspora over vegetable field at Aurangabad. Patel (2002) reported 0.63% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) and Khedkar (2005) noted occurrence of this spore type over wheat field at Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed respectively. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad, Konkan region. Hogale (2008) recorded 0.219% spores at Karad.

25) *Nigrospora* Zimm. - [PLATE- IX Fig. 35]

Conidia dark, smooth, black, one celled, globose to somewhat flattened 12-23×10-26 µm. These spores trapped throughout the period of investigation. Maximum concentration (46568/m3) 32.55% was recorded in the month of November [Table IV.3]. They contributed 12.00% to the total airspora [Table IV.1]. They show 12.995% and 10.555% contribution over wheat and groundnut fields respectively [Table IV.2]

Mishra and Shrivastava (1972), Agarwal and Shivpuri (1974) reported these spores at Gorakhpur and at Delhi respectively. Mishra and Kamal (1971) recorded occurrence of *Nigrospora sphaeriaca* (Sacc) in winter and rainy season at Gorakhpur. Gaikwad (1974) reported 4.13% spores from total airspora at Ahmedpur. Pande (1976) reported the highest concentration (1932/m3 of air) at Nanded. Mane (1978) at Vaijapur, Lakhe (1980) at Udgir, Shastri (1981) and Saibaba (1983) at Aurangabad recorded the presence of this spore type in the airspora during their studies. Kale (1983) at Parli-Vaijanath and Bhagwan (1983) at Nanded has also reported these spores in their aerobiological studies. Khot (1985) reported 0.93% contribution of this spore type over vegetable field at Ambejogai.

Bhate (1986), Siddiqui (1988) noted 1.85% and 8.33% contribution of this spore type at Ambejogai and Nanded respectively. Deshpande (1992) over sunflower field at Ambejogai, Sewalikar (1995) over maize and wheat fields at Aurangabad and Pardeshi (1995) over sunflower field at Jalgaon reported occurrence of this spore type in their airspora studies. Qudsia Begum (1997) reported 1.26% concentration over vegetable field at Aurangabad. Deshmukh (2002) reported 3.16% contribution over sunflower field at Jalgaon. Patel (2002) found 5.8% contribution to the total airspora over vegetable field at Nashik. Ambore (2003) and Khedkar (2005) noted occurrence of this spore type over wheat field at Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed respectively. Hogale (2008) recorded 12.15% spores at Karad.

26) *Oidium* Sacc.Link. - [PLATE- X Fig. 36]

Spores one celled, ovoid, oblong or barral shaped, thin walled, hyaline, 30-40 x 15-20 µm. Mycelium external on host; conidiophores upright, simple, bears simple basipetal chains of conidia. It is present occasionally in the atmosphere. Maximum concentration (348/m3) 33.69% was recorded in the month of December [Table IV.3].

They contributed 0.052% to the total airspora [Table IV.1]. They were recorded only on wheat field showing 0.094% contribution to the total airspora. [Table IV. 2].

Mishra and Shrivastava (1972) at Gorakhpur noted the presence of these spores on *Sorghum* and wheat field. Pande (1976) has also reported these spores over orange field at Nanded at low concentration to the total airspora. Tilak et.al. (1980) reported these spores showing 0.3% to the total airspora from Aurangabad. Khilare (1996) reported these spores at low concentration at Kolhapur.

27) *Periconia* Tode ex.Schw. - [PLATE- X Fig. 37]

Conidia are one celled, globose to spherical, reddish brown to dark, smooth or rough walled, 9-15 µm. They occur throughout the investigation period either singly or in group. Maximum concentration (434/m3) 52.58% was recorded in the month of June [Table IV.3]. They contributed 0.083% to the total airspora [Table IV.1]. They show 0.109% and 0.050% contribution over wheat and groundnut fields respectively. [Table IV.2].

Kulkarni (1971) recorded 1.28% spores at Aurangabad. Mishra and Kamal (1971) recorded occurrence of *Periconia felina* in winter at Gorakhpur. Agarwal and Shivpuri (1974), Gaikwad (1974) reported these spores from Delhi and Ahmedpur respectively. Pande (1976), Dhawre (1976), Mane (1978), Lakhe (1980), and Khot (1985) reported 4.74%, 6.15%, 0.98%, 0.59% and 8.78% contribution at various localities from Maharashtra.

Sewalikar (1995) reported 0.38% over maize field at Aurangabad, Pardeshi (1995) reported 3.33% over sunflower field at Jalgaon, Qudsia (1997) 7.80% over vegetable fields at Aurangabad and Deshmukh (2002) 2.02% over sunflower field at Jalgaon. Patel (2002) reported 2.5% at Nashik. Ambore (2003) also recorded these spores over wheat field at Kanchanwadi, Aurangabad.

28) *Pestalotia* Berk. - [PLATE- X Fig. 38]

Spores 5-false-septate, 4-median cells brown, end cells hyaline, 3-9 apical, cellular, simple or dichotomously branched appendages and 1-basal cellular simple or branched appendages, 14-23 × 5-7µm. They contributed 0.029% to the total airspora [Table IV.1]. They were recorded only on wheat field showing 0.052% contribution to the total airspora. [Table IV. 2].

These spores were recorded earlier by Tilak (1989) and Pole (1995). Pawar (1997) reported 0.21% and 0.05% to the total airspora at Aurangabad. Aher (1993) reported 1.61% and 1.32% to the total airspora over groundnut field at Ahmednagar during kharif and rabbi season. Gopan (2004) reported 0.20% and 0.26% of these spores over bajara field at Namalgaon Phata (Beed) during the two seasons. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad, Konkan region. Hogale (2008) recorded 0.563% spores at Karad.

29) *Phaeotrichoconis* Subram. - [PLATE- X Fig. 39]

Spores elongated, fusiform with long appendages at the apex, 5-8 septate, dark, brownish, constricted at septa, thick walled with granular contents, the second or third cell from the base larger, 47-95×10-18 µm. Maximum concentration (6532/m3) 40.37% was recorded in the month of June [Table IV.3]. They contributed 1.577% to the total airspora [Table IV.1]. They show 1.682% and 1.420% contribution over wheat and groundnut fields respectively. [Table IV.2].

Sreeramulu and Seshavataram (1962) recorded 0.005% spores over paddy field near Vishakhapatnam. Mane (1978) recorded 0.17% contribution to the total airspora over bajara field at Vaijapur. Shastri (1981) recorded 0.07% spores at Aurangabad. Kale (1983) recorded 0.19% contribution to the total airspora at Parli-Vaijanath. Khot (1985) recorded 0.38% contribution to the total airspora at Ambejogai. Modak (1989), Bapat (1991) Deshpande (1992) also noted this spore type contributing 0.39%, 0.74%, and 0.66% at Malegaon, Aurangabad and Ambejogai respectively.

Pardeshi (1995), Qudsia Begum (1997) and Deshmukh (2000) reported 0.49%, 0.51 %, and 1.63% contribution to the total airspora at Jalgaon, Aurangabad and Jalgaon respectively. Patel (2002) recorded 0.34% over vegetable field at Nashik. Khedkar (2005) and Chavan (2006) also contributed the occurrence of this spore over jowar and bajara field at Kada, Beed and paddy field at Raigad, Konkan region. Hogale (2008) recorded 0.0659% spores at Karad.

30) *Pithomyces* Berk. - [PLATE- X Fig. 40]

Conidia single, broadly elliptical, dark brown coloured, oblong to pyriform or irregular doliform, many celled with transverse and vertical septa 20-26 × 9-17µm. This spore was recorded throughout the period of investigation. Maximum

concentration (8791/m3) 28.23% was recorded in the month of January [Table IV.3]). Their contribution was 3.172% to the total airspora. [Table IV.1]. They show 2.687% and 3.715% contribution over wheat and groundnut fields respectively. [Table IV.2].

Tilak and Srinivasulu (1967) recorded 0.37 % spores from airspora at Aurangabad. Kulkarni (1971), Babu (1983), Saibaba (1983), Bhagwan (1983) also recorded these spores in their aerobiological studies at Aurangabad, Osmanabad, Aurangabad and Nanded respectively. Khot (1985) observed 0.22% concentration of this spore type at Ambejogai. Bhate (1986) Modak (1989), and Bapat (1991) recorded the occurrence of this spore type from Ambejogai, Malegaon, and Aurangabad.

Pardeshi (1995), Qudsia (1997) and Deshmukh (2000) reported 2.93%, 0.34% and 1.63% contribution to the total airspora at Jalgaon, Aurangabad and Jalgaon respectively. Patel (2002) reported 3.74% spores at Nashik. Khedkar (2005) and Chavan (2006) also contributed the occurrence of these spore over jowar and bajara field at Kada, Beed and paddy field at Raigad, Konkan region. Hogale (2008) recorded 3.23% spores at Karad.

31) *Sirodesmium* do Not. - [PLATE- X Fig. 41]

Spores dark, many celled, elongated or oval, sometimes with longitudinal septa, echinulate often in basipetalous chain, 8-12 µm. These were recorded in low concentration and their contribution was 0.058% to the total airspora. [Table IV.1] They show 0.045% and 0.072% contribution over wheat and groundnut fields respectively. [Table IV.2].

Mane (1978) reported 0.19% this spores over bajara field at Vaijapur. Patil (1980) reported 0.003% to the total airspora in hospital area at Kolhapur, Deshmukh (2000), Pathare (2004) recorded occurrence of this spore to the airspora during their studies. Hogale (2008) recorded 0.059% spores from Karad.

31) *Spegazzinia* Sacc. - [PLATE- XI Fig. 42]

Spores 4 celled with spiny wall, arranged in the pattern of a four leaf clover imparting a square or slightly rectangular shaped to the conidia constricted at septa, dark coloured, 13-15 µm. They were trapped throughout the period of investigation. The maximum concentration (2623/m3) 36.48% was in the month of November [Table IV.3]. Their contribution to the total airspora was 0.661% [Table IV.1]. They

show 0.653% and 0.659% contribution over wheat and groundnut fields respectively. [Table IV.2].

Kulkarni (1971) reported 0.17% and Gaikwad (1974) 0.02%, at Aurangabad and Ahmedpur respectively. Pande (1976) reported 0.19% these spores over orange fields at Nanded, Patil (1980) recorded 0.231% spores in hospital area at Kolhapur. Patil (1988) recorded these spores in library area at Karad. Deshmukh (2000 and 2002), Khedkar (2005), Chavan (2006) also recorded occurrence of these spores to airspora during their studies. Patel (2002) recorded 0.13% and Hogale (2008) recorded 0.41% at Nashik and Karad respectively.

32) *Spicaria* Auct. - [PLATE- XI Fig. 43]

Spores 1-celled, mostly globose or sometimes globose to elliptic, smooth, hyaline, 2.5-3 × 1.8-2.5 µm. Their contribution was 0.015% to the total airspora. [Table IV.1]. They were recorded only on groundnut field showing 0.034% contribution to the total airspora. [Table IV. 2].

Mishra and Kamal (1971) reported these spores from Gorakhpur. Pande (1976) at Nanded, Tilak (1980) at Aurangabad reported these spores in the airspora. Khedkar (2005) also reported the occurrence of this spore over jowar and bajara field at Kada-Beed. Chavan (2006) recorded the occurrence of these spores over paddy field at Raigad, Konkan region and Hogale (2008) reported 0.0425% from Karad.

33) *Sporidesmium* Link. - [PLATE- XI Fig. 44]

Spores many celled, obclavate to fusoid, dark, many septate, sometimes slightly constricted at the basal septum, spores with a turbinate base and flat scar, usually the widest and longest cell dark -brown and the upper cell progressively paler and shorter apical cells, long and sub- hyaline. Spores 37-57×8-11 µm. They contributed 0.207% to the total airspora [Table IV.1]. They show 0.218% and 0.190% contribution over wheat and groundnut fields respectively. [Table IV.2].

Tilak (1980) reported 0.08% to airspora over the Aurangabad, Bapat (1991) recorded the occurrence of this spore type from Aurangabad. Khedkar (2005) also reported the occurrence of this spore over jowar and bajara field at Kada, Beed and Suryawanshi (2002) over sunflower and wheat field from Anadur, Osmanabad. Hogale (2008) recorded 0.074% spores at Karad.

34) *Tetraploa* Berk and Br. - [PLATE- XI Fig. 45]

Spores dark, 3 or 4 septate appendages or arms, smooth or rough 85-86um long and 5-6 µm wide. In this investigation these spores contributed 1.20% to the total airspora. The maximum concentration (3525/m3) 28.33% was in the month of June [Table IV.3]. Their contribution to the total airspora was 1.203% [Table IV.1]. They show 1.171% and 1.222% contribution over wheat and groundnut fields respectively. [Table IV.2].

Kulkarni (1971) at Aurangabad, Gaikwad (1974) at Ahmedpur, Pande (1976) at Nanded, Mane (1978) at Vaijapur, Lakhe (1980) at Udgir recorded these spores. Tilak (1980) at Aurangabad reported 0.7% spores to the total airspora. Khot (1985) reported 0.04%, Qudsia (1997) 0.04% at Ambejogai and Aurangabad respectively. Khilare (1996) recorded these spores to the total airspora at Kolhapur. Deshmukh (2000 and 2002) and Ambore (2003), Khedkar (2005) also recorded occurrence of these spores in their airspora studies. Patel (2002) reported 0.049% and Hogale (2008) 0.1264% spores at Nashik and Karad respectively.

35) *Torula* (Pers.) Link. -

Conidia dark brown, smooth or echinulate, mostly 2-5 septate, deeply constricted at septa so as to become torulose, apical cell darkened and thickened, chain simple or branched, often up to 100 × 4-10µm. Spores occurred throughout the period of investigation. The maximum concentration (2265/m3) 37.58% was in the month of November [Table IV.3]. Their contribution to the total airspora was 1.336% [Table IV.1]. They show 1.345% and 1.301% contribution over wheat and groundnut fields respectively. [Table IV.2].

Talde (1969) at Parbhani reported 2.08% and Kulkarni (1971) at Aurangabad recorded 0.007% of *Torula herbarum* (Pers.) Link. Mishra and Kamal (1971) reported *Torula ali* spores at Gorakhpur. Gaikwad (1974) recorded 0.286% contribution to the total airspora at Ahmedpur. Pande (1976) recorded highest concentration (1274/m3) at Nanded. Mane (1978), Lakhe (1980), Babu (1983), Saibaba (1983), Pillai (1983), Bale (1984) also recorded occurrence of this spore type in airspora studies. Patel (2002) reported 6.75% contribution at Nashik, Ambore (2003) and Khedkar (2005) noted occurrence of this spore type over wheat field at Kanchanwadi, Aurangabad and jowar and bajara field at Kada, Beed respectively. Chavan (2006) recorded the

occurrence of these spores over paddy field at Raigad, Konkan region. Hogale (2008) recorded 0.76% spores at Karad.

36) *Trichoconis* Clements. - [PLATE- XI Fig. 46]

Spores elongate fusoid with a long appendages at the tip, 3-5 septate, cream yellow, constricted at septa, thick walled, second or third cell from the base longer 98-157×9-19µm, appendages as long as the conidium proper rigid, septate, 2.5um thick, straight or slightly curved, They contributed 0.057% to the total airspora [Table IV.1]. They show 0.053% and 0.061% contribution over wheat and groundnut fields respectively. [Table IV.2].

Tilak (1980) at Aurangabad reported 0.7% spores to the total airspora. Khilare (1996) reported these spores to the total airspora at Kolhapur. Suryawanshi (2002) and Khedkar (2005) noted occurrence of this spore type over wheat and sunflower field at Anadur, Osmanabad and jowar and bajara field at Kada, Beed respectively. Hogale (2008) recorded 0.034% spores at Karad.

V) OTHER TYPES

1) Hyphal fragments - [PLATE- XI Fig. 47]

Hyphal fragments of all types viz., short, long, simple, branched, associated, septate, aseptate, were counted under this group, whether long or short. Hyphal fragments trapped throughout the period of investigation. Their contribution was high 6.105% to the total airspora [Table IV.1]. They show 6.630% and 5.347% contribution over wheat and groundnut fields respectively. [Table IV.2].

Tilak and Kulkarni (1978), Gaikwad (1974), Pande (1976), Mane (2002) reported 2.30%, 26.78%, 4.89%and 1.77% contribution at Aurangabad, Ahmedpur, Nanded and Vaijapur respectively. Khot (1985) recorded 6.13% concentration of hyphal fragments at Ambejogai over vegetable field. Bhate (1986), Modak (1989), Deshpande (1992), Sewalikar (1995), Nagia (1994) also reported considerable concentration of hyphal fragments in their aerobiological studies. Qudsia Begum (1997), Deshmukh (2000), Patel (2002) also reported the occurrence of hyphal fragments with contribution of 0.28%, 2.13%, 1.69% respectively in their studies at Aurangabad, Jalgaon, and Nashik.

Ambore (2003) also recorded 31.55% fungal fragments. Khedkar (2005) also contributed 5.68% fungal fragments during the investigation of airspora over jowar field at Kada, Beed. Chavan (2006) and Hogale (2008) recorded 6.9% and 3.944% spores contribution to the total airspora over paddy field at Raigad, Konkan region and from Karad region.

2) Insect scales and parts -

In the present investigation, complete insects, Archids, thin insect scales, hairs, wings, pest, legs and antennae was observed at the trapping site. Their contribution to the total airspora was 2.566% [Table IV.1]. They show 2.430% and 2.688% contribution over wheat and groundnut fields respectively. [Table IV.2].

Mane (1978) from Vaijapur reported 2.51% insect scales from the total airspora, Patil (1980) reported 1.251% insect scales to the total airspora at Kolhapur, Mulik (1982) reported 3.20% to the total airspora of library at Satara, Patil (1988), Khilare (1993), Deshmukh (2000), Suryawanshi (2002) Kshirsagar (2006) and Hogale (2008) recorded the occurrence of insect parts in the environment, during their airspora studies.

3) Pollen grains-

All types of pollens trapped were grouped under one category. The Pollen grains occurred abundantly and trapped throughout the period of investigation. They contributed 6.516% to the total airspora [Table IV.1]. They show 6.554% and 6.353% contribution over wheat and groundnut fields respectively. [Table IV.2].

Tilak (1980) reported 3.60 % to the total airspora at Aurangabad. Minhaj (1988), .Meghraj (1989), Vaidya (1990), Mahabale (1990), Ahuja (1992) and Aher (1993) reported the pollen grains from airspora of different places. Pawar (1997) reported 8.23 °/0 and 1 8.71 % of pollen grains over bajara field at Aurangabad. Aher (1993) reported 8.67 °/0 and 2.96 % of these pollen grains over groundnut fields at Ahmednagar.

Banswadekar (2002) recorded 0.34% and 1.17% over sunflower field at Udgir. Ambore (2003) recorded 2.69% pollen grains over wheat field at Kanchanwadi, Aurangabad. Gopan (2004) reported 2.94% and 3.53% of pollen grains over bajara fields at Namalgaon Phata, Beed. Khedkar (2005) also recorded 1.69 % and 1.97 % pollen grains during rabbi and kharif season in jowar and bajara fields at Kada, Beed. Chavan (2006) and Hogale recorded 2.09% and 9.28% contribution to the total airspora over paddy field at Raigad, Konkan region and airspora at Karad respectively.

4) Unidentified spores -

One of the objects of this study was to record the total number of spores present in the air. All fungal spores caught on the slide, except which could not be included under any of the named group, included in this category. The spores which could not be classified because of their unsuitable orientation on the observed surface and they were practically observed by debris or other particles were also included in this group. This is a heterogeneous group as such its concentration and composition changed considerably from month to month in season.

This is a heterogeneous group as such its concentration and composition changed considerably from day by day, month to month in a season. They contributed 2.984% to total airspora [Table IV.1]. They show 2.679% and 3.308% contribution over wheat and groundnut fields respectively. [Table IV.2].

Kulkarni (1971) at Aurangabad, Gaikwad (1974) at Ahmedpur and Pande (1976) at Nanded recorded 3.00%, 9.72% and 0.13% unclassified spores to the total airspora respectively. Mane (1978) at Vaijapur recorded 1.09% to the total airspora. Lakhe (1980) at Udgir recorded 03.35% contribution to the total airspora. Pillai (1983) at Aurangabad recorded 0.02% while Bale (1984) at Osmanabad recorded 0.26% contribution to the total airspora. Khot (1985) recorded 3.69% concentration of this group to the total airspora over vegetable field at Ambejogai. Bhate (1986) and Modak (1989) also recorded 2.52% and 3.77% contribution of this group to the total airspora at Ambejogai and Malegaon respectively. Bapat (1991), Deshpande (1992) noted concentration of this group to total airspora in their studies.

Sewalikar (1995) reported 0.44% to the total airspora over maize field at Aurangabad and 1.46% contribution over wheat field at Jalgaon. Qudsia Begum (1997) reported 0.8% contribution over vegetable field at Aurangabad. Deshmukh (2000) and Patel (2002) reported 2.07% and 4.04% to the total airspora during their aerobiological studies at Jalgaon and Nashik. Ambore (2003) also recorded 31.2 % during the investigation over wheat field at Kanchanwadi, Aurangabad. Chavan (2006) recorded 1.09% contribution to the total airspora over paddy field at Raigad, Konkan region. Hogale (2008) recorded 2.58% spores at Karad.