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AEROBIOLOGY OF MULBERRY FIELDS IN VELLORE DISTRICT

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ABSTRACT
Mulberry which forms the exclusive source of food for commercial silk producing silk worm (*Bombyx mori* L.) is affected by a number of diseases and pests. The aerobiology of crop field was very limited and much of the fields were to be opened for investigation. It affects the nutrition, growth and cocoon production of silkworm. Hence a detailed investigation was carried out on the aerobiology of mulberry fields in Vellore district. The Vellore district comprises of eight taluks, 14 ranges and 64 subdivisions. Much of the Vellore district land area is cultivated by Mulberry as a cottage industry. It is found that from October to January rainfall was maximum, Vaniyambadi, Tirupattur and Gudiyattam receives maximum rain. The humidity is relatively maximum during the period of October to September 1999. The temperature was maximum from March to June. This helps for the spread and growth of various microflora and airspores in Vellore district environs. From these data, the causative organisms of various diseases of Mulberry were identified. This data will be helpful for the treatment, management of the much useful plant Mulberry in Vellore district.

KEYWORDS: Mulberry, commercial silk, *Bombyx mori,* aerobiology, Vellore district *etc.*

INTRODUCTION

Aerobiology is the study of air borne particles of biological origin in the atmosphere consisting mainly of fungal spores, bacteria, pollen grains, viruses, plant fragments *etc*. The population of biological particles suspended in air has been named as 'air-spora' by Gregory (1952). Speculation about the occurrence of airborne microorganisms mostly dates from the time of Leeuwenhoek and is described in his letters to Royal Society in 1680. Micheli first recorded the release into the air of a range of fungal spores but there were few detailed studies until the Nineteenth Century (Ainsworth, 1976). Pasteur (1861) was perhaps the first to analyse sample particles suspended in air, including fungal spores, yeasts and bacteria. One of the most important earlier studies was the one carried out by Cunningham (1873) who undertook experiments to determine whether a correlation could be established between the daily spore content of the atmosphere and the incidence of cholera and other fevers in the jails of Calcutta. The same year saw the publication of another medical classic, "Experimental researches on the causes and nature of *Catarrhus aestivus* (Hay-fever or Hay asthma) by Blackley, 1873. *Morus alba* linn. is the main food plant of the silk worm (*Bombyx mori* linn). Mulberry is affected by a number of fungal diseases, bacterial diseases and pests it causes much damage and destruction to Mulberry. Indirectly it affects the growth of *Bombyx mori* leads to the destruction of cocoon production and yarn length. Mulberry is affected by leaf spot diseases caused by *Peridiospora moricola* cooke, leaf rust cast by *Peridiopsora mori*, powdery mildow caused by *Phyllactnia corylea*, bacterial leaf spot caused by *Psuedomonas mori*, and an important stem disease, the stem canker caused by *Lasiodiplodia theobromaen.* Three broad seasons namely rainy, winter and summer seasons in Vellore is suitable for growing mulberry. By using the Anderson sampler much of the fungus was trapped and the conversion the counts to m^3 of air have been done. The same method is used here to trap various air micro floras of Mulberry fields in Vellore district. The study throws high on the following aspects *i.e.* The collection and identification of air microfloras around the mulberry field, trapping of the causative organisms involved in various diseases of mulberry, identification of Air microfloras proper management to control diseases of mulberry, economic loss by yarn length and less cocoon production is prevented.

MATERIALS AND METHODS

The air sampler Andersen six stage viable samplers was used for air sampling in present investigation. The description of samplers and sampling site is given below.

Description of the sampling site

The vertical cylinder trap was fixed on the mulberry fields (about 15m above ground level) of Vellore district. The area is located in a busy area and surrounded closely by *Morus alba*, schools, residential houses, huts, timber shops, vegetable and fruit market, mutton and fish markets.

Andersen sampler

Andersen sampler was used to get information on the culturable fungal spores in the atmosphere of mulberry fields. A brief description of the sampler is given below. The Andersen Sampler is a highly specialized instrument used to collect and enumerate all airborne microorganisms into 6-aerodynamic size fractions. The sampler is made entirely of aluminum alloy with stainless steel fittings. It is 8" high 4 1/2" in diameter excluding fasteners and outlets and weigh 3 1/3 lb without petriplates. It consists of 6 aluminum stages that are held by 3 spring clamps and

sealed with O-ring gaskets. Each stage has an internal air inlet section that contains 400 orifices. The stages are numbered 1 to 6 from top to bottom. The diameter of all the stages is approximately 3.125". The size of the orifices is constant for each stage. The orifices are progressively smaller from top to bottom stages ranging from 0.0465" diameter in stage 1 to 0.0100" diameter in stage 6. Consequently the jet velocity is uniform in each stage, but increases in each succeeding stage. Air is drawn through the device at the rate of 28.3 lit/min and the instrument is run on 12V battery. Each succeeding stage will remove a top fraction (largest particles) and each stage holds a glass Petri plate containing 27 ml of nutrient medium which serves as a collection surface.

Preparation of the sampler

The six separable metal fractionating units were sterilized in hot air oven by wrapping in an aluminum foil. Petri plates of 9 cm diameter containing 2% Malt Extract Agar (MEA) and Dermasel Agar (DA) were used for exposure. The composition of the 2 media is given below.

Malt extract agar (Mea)

Malt Extract	20 g
Agar	20 g
Distilled water	1000 ml
Streptopenicillin	8 ml of 1% solution

Dermasel agar (Da)

Peptone	10 g
Dextrose	20 g
Agar	20 g
Cycloheximide	500 mg
Chloramphenicol	40 mg
Distilled water	1000 ml

Sterilization of media and Glassware, incubation and subculturing, slide preparation were done according to the method of Annadurai *et al*. (1996, 1998, 1999, 2000).

Spore trapping

The Andersen sampler was positioned over a chair corresponding to 50 cm height on the terrace of the building close to Vertical Cylinder Trap and run for 15 minutes on the whole 13 samples were taken.

Conversion of counts of air

The colony counts were converted to number/m of air by multiplying with an appropriate conversion factor which is calculated as follows:

Amount of air sampled = 28.3lir/min
Duration of each sampling = 15 min
Amount of air sampled in 15 min = 28.3 X 15
= 424.5 l
Let the No. of colonies recorded = X 3
The No. of colonies/m of air = 1000/424.5.5 Xx
= 2.35 rounded to 2.4

These are represented as colony forming units/cubic meter of air (CFU/m3).

Weather records

Data on the daily rainfall, Relative humidity, maximum and minimum temperature corresponding to the sampling period was obtained from the GTM, Gudiyattam. The mean monthly maximum, mean minimum and daily mean temperature, monthly mean relative humidity, and total rainfall of Vellore District 9 months (Oct-98 -Sep'99) are given.

Statistical procedure

The mean and the standard deviations were calculated from the determined values by using the standard procedures (Bailey, 1984). The standard deviation was calculated by using the formula.

$$S = \frac{(x_1 - \bar{x})^2}{n - 1}$$

Where x_1 = value of individuals
x = mean value of the sample
n = number of samples.

In order to examine whether the difference in results obtained was significant or not the following formula (student's t test) was employed.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{S_1^2/n_1 + S_2^2/-n_2}$$

Where $\bar{x}_1$ = mean value of one sample
$\bar{x}_2$ = mean value of other sample
S_1 and S_2 = corresponding standard deviations
n_1 and n_2 = the number of tests for each sample.

The level of significance (P-value) between x_1 and x_2 was determined by using the students `t' distribution table of fractiles and critical values (Radhakrishna Rao *et al*., 1985)

RESULTS

The Department of Sericulture for the sake of convenience divided the Vellore district into 8 taluks (Table 1).

TABLE 1. Sericulture ranges and subdivisions in Vellore District

Taluk	Ranges	Subdivisions
Vellore	Vellore	1. Vellore
		2. Mugamadpuram
		3. Guruvarajapalayam
		4. Asanapet
		5. Pallikonda
		6. Odugathur
Katpadi	Katpadi	1. Katpadi
		2. K.V. Kuppam
		3. P.K. Puram
Gudiyattam	1. Gudiyattam	1. Gudiyattam
		2. Paratharami
		3. Valathur
		4. Sempalli
		5. Keelalathur
		6. Kamalapuram
		7. Aithampattu
	2. Pernampet	1. Pernampet
		2. Erukkumpet
		3. Chinnathamamal Seru
		4. Melpatti
Vaniyampadi	1. Vaniyampadi	1. Vaniyampadi
		2. Minur
		3. Ambur
	2. Natrampalli	1. Natrampalli
		2. Kommitiyur
		3. Kothur
		4. Agraharum
	3. Odugathur	1. Odugathur
		2. Pinnathurai
		3. Melpallipattu
		4. Madanur
		5. Pallikonda
	4. Alangayam	1. Alangayam
		2. Nimmianpattu
		3. Vellakuttai
		4. Vellakall
		5. Kathakottai
		6. Vallipattu

	5. Andiappanur	1. Andiappanur
		2. Kurusilapattu
		3. Madavalam
		4. Mittur
		5. Julthi
		6. Poonkulam
Tiruppattur	Tiruppattur	1. Tiruppattur
		2. Kanthily
		3. Kurusilapattu
		4. Jolarpetti
		5. Elagirihills
		6. Jamunamarthur
		7. Vishamangalam
		8. Madavalam
Arcot	Arcot	1. Arcot
		2. R. Mankuppam
		3. Thimiri
Walajah	Walajah	1. Walajah
		2. Sholingar
		3. Vallimalai
Arakonam	1. Arkonam	1. Arkonam
		2. Kaveripakkam
		3. Kondapuram
		4. Banapuram
		5. Ochery
	2. Nemili	1. Nemili

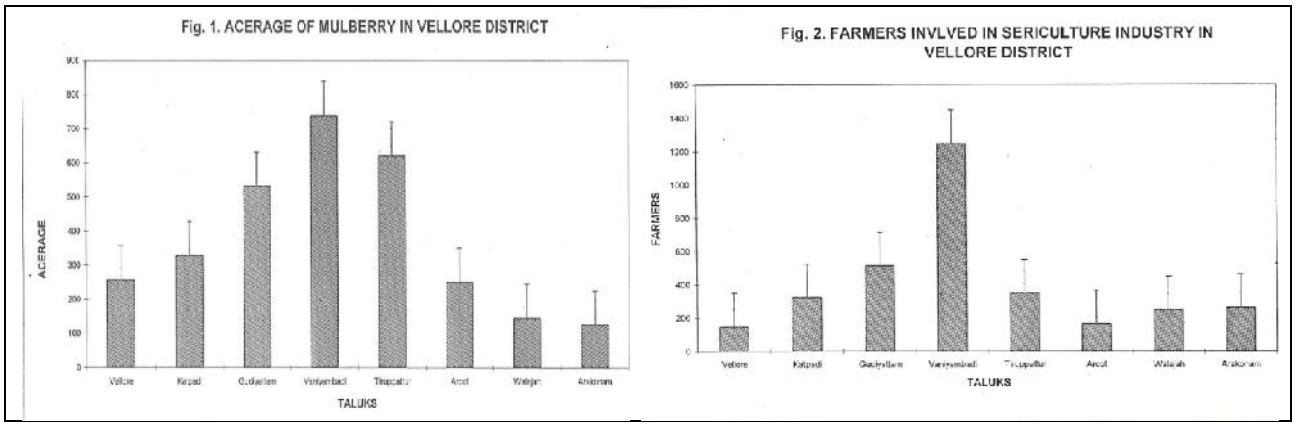

Figure 1. Gives the total acres of mulberry cultivation of mulberry in Vellore District. The cultivation of mulberry is maximum in Vaniyambadi taluk (738 acres) Thirupattur stands 2nd in mulberry cultivation (620 Acres) and Gudiyattam 3 rd position (531 Acres). The Vellore, Katpadi and Arcot taluk has an average from 250 acres to 320 acres. The Waljah and Arkonam taluk has to be improved for cultivation (around 125 acres).

Figure 2. Shows the number of farmers involved in the sericulture industry of Vellore District. The maximum number of farmers involved sericulture industry is in vaniyambadi taluk (1250). Here the 2nd position is Gudiyattam taluk where in 516 farmers are involved in sericulture fields. Tirupattur ranks 3rd where in nearly 350 farmers are involved. The other taluks shows the minimum number of the farmers involved in these industries. Here the ranges of farmer are involved 152 to 262.

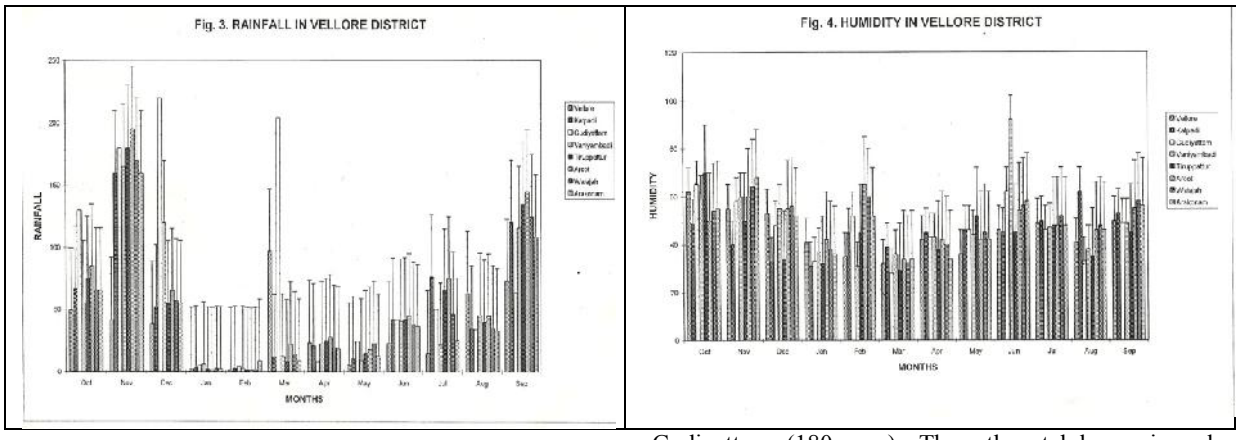

Figure 3. Explains range of rainfall from October 1998 to September 1999 in Vellore District. From this graph, the rainfall is maximum in November months from 65 mm to 130 mm. It is also understood that fairly good amount of rains are showered in the district during September (135 mm), December (220 mm).

It is also note worthy to mention that the rainfall is maximum in Vaniyambadi taluk (165 mm) Tirupattur and Gudiyattam (180 mm). The other taluk receives less rainfall.

Figure 4. Indicates the relative Humidity of Vellore district in percentage from October 1998 to September 1999.The humidity is maximum during October 70% November 68% December 56% February and June 58 %. It is worth to mention the humidity is the maximum during September 58%, August 46% this figure also indicates that the humidity is maximum in Tirupattur, Vaniyampadi and Gudiyattam taluks,

Fig. 5.TEMPERATURE IN VELLORE DISTRICT

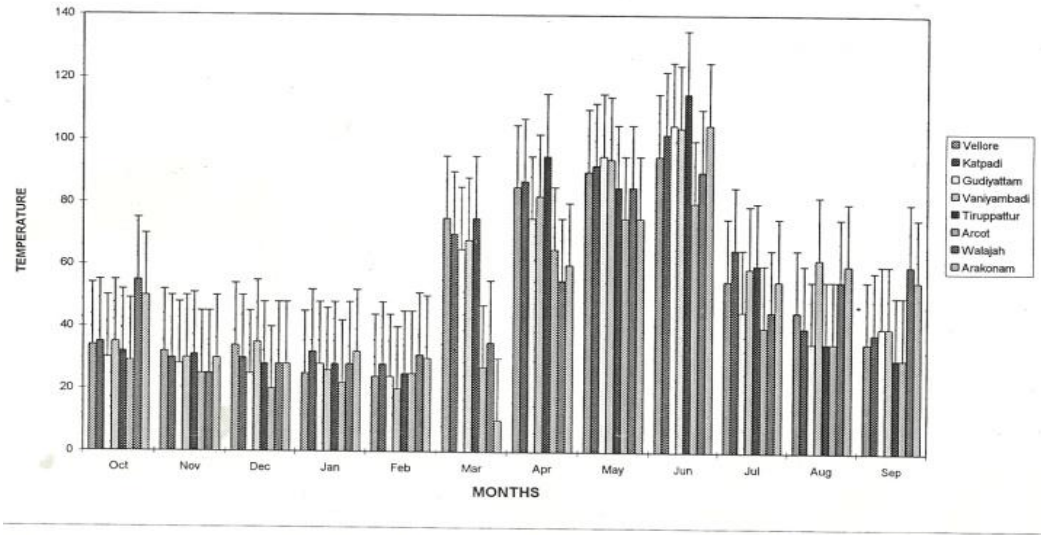

Figure 5. Explains range of the temperature in Vellore district from October 1998 to September 1999. The temperature is maximum during June (115^{o} C), May (94^{o} C), April (95^{o} C) and March (75 ^{o} C). The temperature is fairly moderate during July (60^{o} C) August (62^{o} C) and September (55^{o} C) The minimum amount of temperature is seen from October (30^{o} C) to February (31^{o} C) the temperature is minimum in Vaniyampadi taluk and maximum in Vellore, Katpadi and Arkonam taluk

Table 2 shows the periodicity of occurrence of air microflora in the Mulberry field of Vellore district. It shows after air sampling there is frequent occurrence of mircoflora from 8 to 11Cm^3 there are occasional occurrence of microflora range 4 to 11 Cm^3 there is also occurrence of mircoflora from 1 to 3 Cm^3

The frequent occurrence of air microflora in 8 taluks of Vellore district in mulberry fields are *Aspergillus inger, Aspergillus flavus, Aspergillus nidulans, Pencillium citrinum, Cercospora moricola, Pseudomonas mori, Lasiodiplodia theobromae.* Among these species Cercospora *moricola, Pseudomonas mori, Lasiodiplodia theobromae* are causing disease in *Morus alba.* The occasional occurrence of airmucrofhora in the mulbery filed of Vellore district are *Pencillium chrysogenum, Cladosporium, Aspergillus Candidus ,Aspergillus Cervirus , Aspergillus fumigatus, Aspergillus Japonicus , Curvalaria tunata , Alternaria alternata , Alternaria terreus , Penicillium citrinum, Phyllactina corylea , Peridiospora mori.* Among these species *Peridiospora mori, Penicillium citrinum , Phyllactina corylea* are causing disease in *Morus alba*

The rare occurance of Airmicroflora in the Mulberry field of Vellore district are *Mucor racemosum , Candida albicans , Fusarium lateristium , Alternaria terreus , Alternaria flavipes, Alternaria Japonicus, Alternaria oryzae, Rhizopus stolomfer, Trichoderma viride, Acricidium mori, Cerotelium fici, Cactothynium sp, Curvularia.* Among these are *Acricidium mori, Cerotelium fici, Cactothynium sp, Curvularia* are causing disease in *Morus alba.*

Table 3 indicates the effect of infected leafs of mulberry on *Bombyx mori*. When healthy leaves are fed to the silk worm the weight of the single cocoon, shell percentage, filament length, demes, renditta was maximum. When infected plants are fed in silkworm, it shows very less amount of single cocoon production, filement length etc.,

Table 4 shows the important mulberry diseases in Vellore district. The common disease are leaf spot disease caused by *Cercospora moricola,* Powdery mildew caused by *Phyllactina corylea,* Leaf rust caused by *Peridiospora mori,* Bacterial leafspot caused by *Pseudomonas mori,* Stem canker caused by *Lasiodiplodia theobromae,* Leaf blight caused by *Cactothyrium sp. and Curvularia sp.,* Leaf Rust caused by *Aecidium mori Cerotelium fici.*

TABLE 2. Periodicity of occurrence of Air microflora in the Mulberry field of Vellore District

Air Microfloras	1	2	3	4	5	6	7	8
Frequent occurrence (8-11)								
Aspergillus inger	126	116	130	136	128	76	72	67
Aspergillus flavus	118	98	121	128	120	62	58	52
Aspergillus nidulans	106	87	112	136	107	34	33	28
Pencillium citrinum	102	97	152	172	105	86	79	96
*Cercospora moricola**	160	113	168	182	167	72	67	87
*Pseudomonas mori**	136	106	148	166	140	61	58	46
*Lasiodiplodia theobromae**	87	95	90	96	92	65	64	76
Occasional occurrence (4-11)								
Pencillium chrysogenum	96	86	101	116	99	47	38	49
Cladosporium	36	27	47	56	39	35	26	34
Aspergillus Candidus	116	107	118	127	126	62	57	37

Aspergillus Cervirus	126	122	149	157	107	38	29	36
Aspergillus fumigatus	112	105	176	192	121	46	48	52
Aspergillus Japonicus	111	106	119	121	116	54	53	67
Curvalaria tunata	52	48	56	62	66	26	22	42
Alternaria alternata	105	87	126	125	117	86	81	78
Alternaria terreus	127	76	148	157	132	72	69	39
Penicillium citrinum	38	27	40	48	44	27	18	24
Phyllactina corylea *	57	32	62	66	62	32	27	18
Peridiospora mori *	48	46	51	55	51	8	12	15
Rare occurrence (1-3)								
Mucor racemosum	42	37	58	63	43	56	47	37
Candida albicans	102	66	119	126	107	75	68	62
Fusarium lateristium	113	78	126	133	114	68	48	44
Alternaria terreus	116	86	122	127	118	96	86	36
Alternaria flavipes	105	82	113	116	108	22	18	18
Alternaria Japonicus	126	68	130	132	128	38	36	22
Alternaria oryzae	116	77	121	125	118	76	68	36
Rhizopus stolomfer	112	69	114	117	114	28	19	24
Trichoderma viride	33	27	35	37	36	8	12	32
Acricidium mori *	32	24	30	32	34	12	4	12
Cerotelium fici *	30	16	31	33	32	27	16	26
Cactothynium sp	26	15	26	28	28	15	8	14
Curvularia	24	8	29	32	26	16	7	16

1 = Vellore Taluk
2. = Katpadi Taluk
3. = Gudiyattam Taluk
4. = Vaniyambadi Taluk
5 = Tirupattur Taluk
6 = Arcot Taluk
7 = Walajah Taluk
8 = Arkonam Taluk

* Pathogens of Mulberry

The result are presented as mean concentration No./cm^2

TABLE 3. Effect of infected leaves of Mulberry on *Bombyx mori*

Types of leaves fed	Weight of a single cocoon (g)	Weight of a single coccoon	Shell %	Filament length (mts)	DEMES	Renditta	ERR
From Healthy Plants (control)	1.568	0.112	16.85	587.65	2.36	8.365	92
From Infected Plants	1.243	0.89	15.73	543.24	2.18	8.156	62

The results presented are the mean value of 6 individual experiments.

TABLE 4. The important mulberry diseases in Vellore District

Sl. No.	Diseases	Causative organism
	Leaf spot	*Cercospora moricola,*
	Powdery mildew	*Phyllactina corylea*
	Leaf rust	*Peridiospora mori*
	Bacterial leafspot	*Pseudomonas mori*
	Stem canker	*Lasiodiplodia theobromae*
	Leaf blight	*Cactothyrium sp.* *Curvularia sp.*
	Leaf Rust	*Aecidium mori* *Cerotelium fici*

The diseases are identified and established according to Koch postulates

DISCUSSION

Systematic studies on aero mycology are of recent origin in India and only a few crops have been investigated so far (Sreeramulu and Seshavataram 1962; Sreeramulu and Ramalingam 1963, 1966 and Sreeramulu and Vittal 1966, 1971). In systematic studies on air-spora over paddy fields (Sreeramulu and Ramalingam (1966) recorded about 60 types of fungus spores including hyphal fragments, pollens, insect parts and algal cells throughout the season. The chief fungal constituents were *Cladosporium, Aspergilli,* Ascospores, *Fusarium* and *Nigrospora*, Basidiospores, *Curvularia* and *Alternaria*. The rice stackburn fungus *Trichoconis padwickii* occurred in the field when the crop entered the ripening phase (Sreeramulu and Vittal 1966). In a study of air-spora of paddy, (*Sreeramulu* and *Ramalingam* (1966)) showed that high concentration of spores corresponded to the agricultural seasons. Sreeramulu and Vittal (1971) studied periodicity in the uredospore content of air over sugarcane fields. They reported that winter is the favorable season for the rust infection under Indian conditions. In a study of air-spora of sugarcane they (Sreeramulu and Vittal 1972) reported that dispersal of Smut (*Ustilago scitaminea*) spores was coincident with emerging whips. Air-borne inoculant increased sharply inside the crop between June and August and a larger peak appeared in October. Other crops have also been subjected to the aerobiological investigations. Shanmuganathan and Arulpragasum (1966) in their study of air-spora of a tea field observed seasonal and diurnal periodicity in the

occurrence of *Exobasidium vaxans.* They could obtain higher catches in May/June and these coincided with monsoons. In a study of air-spora of groundnut fields, Deshpande *et al* (1967) have observed different spore types and *Cladosporium,Alternaria* and *Helminthosporium* were the dominant ones. Air-spora over cotton, a major cash crop of this region, has not been studied so far. Observations recorded through cylinder spore-trap have been presented here. The air microflora comprising various species of Deuteromycetes, Ascomycetes, Schizomycetes in the Mulberry field atmosphere grow, reproduce and distributes during October to January months. The humidity of Vellore district show favourable water content in the air during October to January every year. Hence the sps. in the Air grows favorably during this season. While analyzing the temperature venation during the year, temperature was maximum from April to August. But very minimum during October to November season. This also favours the growth of microbes in the atmosphere. The Rainfall in Vellore district along with temperature, Humidity favour the grwoth of Air microflora during October to January every year in the district. The frequency of distribution of air micro flora was showed 3 categories, frequent, occasional and rare. Amongst the frequent visitors the following sp. are screened. *Aspergillus inger, Aspergillus flavus, Aspergillus nidulans, Pencillium citrinum, Cercospora moricola*, Pseudomonas mori*, Lasiodiplodia theobromae**. Amongst which *Cercospora moricola*, Pseudomonas mori*, Lasiodiplodia theobromae** are causing diseases in *Morus alba* are frequently occuring on the atmosphere.he other species like *Pencillium chrysogenum, Cladosporium, Aspergillus Candidus, Aspergillus Cervirus, Aspergillus fumigatus, Aspergillus Japonicus, Curvalaria tunata, Alternaria alternata, Alternaria terreus, Penicillium citrinum, Phyllactina corylea *, Peridiospora mori*.* The *Phyllactina corylea * Peridiospora mori *,* causing disease in *Morus alba.* Other species like *Mucor racemosum, Candida albicans, Fusarium lateristium, Alternaria terreus, Alternaria flavipes, Alternaria Japonicus, Alternaria oryzae, Rhizopus stolomfer, Trichoderma viride, Acricidium mori *, Cerotelium fici *, Cactothynium sp, Curvularia* are very rarely appearing on the atmosphere. Among which Acricidium *mori *, Cerotelium fici ** are causing disease in Mulberry. Percentage contribution of different spore types to the total air-spora was calculated and is presented in table I. *Cladosporium* and *Aspergilli* (with *Penicillium*) made up a major component of air-spora contributing 41 and 19% spores respectively. Unclassified spores, hyphal fragments, ascospores, pollens smut spores, *Alternaria tenuis, Curvularia, Nigrospora* and epidermal hairs contributed from 2-6% to the total air-spora. Helminthosporium, basidiospores and insect scales formed less than 1-2% of the component.Out of 34 spore types caught on strips 11 were pathogens of cotton (through all phases of crop) contributing together 30% to the total air-spora. Deuteromycetes recorded maximum percentage contribution to the total air-spora (73%) and were followed by the members of the miscellaneous group (17%), Basidiomycetes (5%), Ascomycetes (4%) and Phycomycetes (less than 1%) (Table 2).The percentage contribution of different groups in relation to the season was also calculated and the results are presented in table 3. Total air-spora was found to increase gradually and reached peak concentration in September. Another subsidiary seasonal peak was obtained in December. Phycomycetes were present only upto October and the group recorded peak in August. The percentage of ascospores increased abruptly in August and declined later. Ascospores were however, recorded throughout the season. Basidiomycetes were also found throughout the season and reached highest concentration in September. A slight drop was evident in October and thereafter the concentration was considerably reduced. The number of deuteromycetes exhibited sudden rise in September and dropped in October. A slight increase in spore concentration of deuteromycetes again was evident in December. The miscellaneous group did not exhibit any definite pattern of distribution, although the distribution was more or less uniform August onwards.Distribution of spore types in relation to season revealed that except *Alternaria* macrospora other spore types were present in the air throughout the season. *A. Macrospora* appeared at the square formation/flowering stage of the crop. High concentration of *A. tenuis, Cladosporium, Aspergilli,* Basidiospores and ascospores was evident in September-October. The total spore concentration also revealed peak in September-October. Smaller peaks were observed at the end of July and November in all cases. Spores of curvularia and *Helminthosporium* recorded differences in that higher counts were restricted to July and August, though minor peaks were observed later throughout the season. Members of the deuteromycetes appeared to dominate air over mulberry field contributing about 73% to the total air-spora. Amongst the dominant types Cladosporium alone contributed a major share to the total air-spora (41%). *Aspergilli* also formed a major component of the air-spora (19%). Dominance of members of deuteromycetes in air-spora appears to be an universal feature (Gregory and Hirst 1957; Adams 1964; Sreeramulu and Ramalingam 1966; Dransfield 1966 and Turner 1966) irrespective of the crop or the site selected.

Mulberry does not appear to be an exception. *Cladosporium* has been reported to contribute a major share in air over paddy fields (Sreeramulu and Seshavataram 1962; Sreeramulu and Ramalingam 1963. 1966), in London (Ainsworth, 1952) at Rothansted (Gregory and Hirst 1957), at Kansas (Kramer *et al* 1959), in banana plantations, Jamaica (Meredith, 1962), at Brisbane (Rees 1964) and at Cardiff (Harvey 1967), however, Rajan et al 1952 reported a few and sporadic ones from Kanpur. Sreeramulu and Ramalingam (1963) reported *Cladosporium* as an important element of air-spora. Ramalingam (1971) also recorded highest catches of *Cladosporium*, the most common element of air-spora at Mysore.

Studies by Sreeramulu and Ramalingam (1966), Kramer *et al*. (1960), Hudson (1969) recorded dominance of *Aspergilli* with *Penicillia* Rajan *et al*. (1952) from Kanpur reported that *Aspergilli* were the most common. Dominance of spores of *Alternaria* has been recorded by Corbaz (1969) in wheat field. Our results are in agreement with these studies.

Most of the fungi (*Alternaria, Helminthosporium* and *Curvularia*) thus recorded their seasonal peak in rainy season. Sreeramulu and Seshavataram (1962) observed higher numbers of Curvularia in September-October over paddy fields. Padmanabhan *et al*. (1953) recorded *Helminthosporium oryzae* over rice field during growing season. In a study of air-spora at Cardiff, Harvey (1969) recorded maximum number of spores of *Cladosporium* in July-August. Dransfield (1966) at Samaru recorded spores of this fungus more frequently during rainy season. Sreeramulu and Ramalingam (1963) reported maximum numbers in December. The pattern thus does not appear to differ in Mulberry as well *Aspergilli* were distributed throughout the season. The spore type was found throughout the season growing on decaying plant parts fallen in the field. Sreeramulu and Ramalingam (1966) also reported that *Aspergilli* showed no major seasonal variation and this group occurred in air throughout year in appreciable numbers.

Seasonal peak for total air spora was evident in rainy season (maximum numbers encountered in September -October) when the crop was passing through the growing (active growth phase) stage. Sreeramulu and Ramalingam (1966) also observed the year's maximum spore concentration in October-December which corresponded with the main paddy crop season in this area. A slight increase in the total air-spora was also evident at the close of the season. This can be attributed to the harvesting operations in the field. This is in aggrement with the earlier studies by Sreeramulu and Ramalingam 1963, Sreeramulu and Vittal 196, and Dransfield 1966.Sclerotia of *Rhizoctonia* bataticola were caught on the cylinders during the early months of the season. In increased wind speed cylinders become efficient traps (Gregory, 1951; Hirst, 1953, Hirst and Stedman, 1971). Sclerotia carried on organic debris or dust particles due to high wind speed probably impinge on cylinders and were deposited.The limitations imposed by trapping through cylinders, however, need a mention. Wind speed and dilution of air-spora affect results when the crop is in its initial growth phase. However, the general trend of changes in air-spora in relation to season hears a good correlation with sampling through volumetric spore trap or through other devices (Wadje, 1976).There is no conclusive evidence that the air born microfloral populations of various crops were made (Krishnamoorthi, 1983). The study was aimed at collecting comparative information on the air micoflora on various Mulberry fields in different ranges of subdivisions of Vellore district. Hence a vertical cylinder trap was installed at Mulberry field location. The air spore is known to vary between short distances depending upon the ecology of the site (Lacey, 1981).The present study was taken up with twin objectives collecting information on the air borne fungal spore types and culture of molds in the air of mulberry fields. The air was sampled by using different sampling techniques from October 98-September 99. The results obtained are discussed.

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