

SEASONAL INCIDENCE OF CONIDIA OF Colletotrichum falcatum W. AND OTHER AIR BORNE SPORES OVER A SUGAR- CANE PLANTATION

By

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Air over a sugarcane plantation in Assam was sampled four times a month for one crop season exposing nutrient petri-plates and vaseline smeared slides to recognise the distribution of conidia of red rot fungus, *Colletotrichum falcatum* W. and the other components of the air spora. The incidence of *C. falcatum* W. was found to be very low in comparison with total air spora, the highest recorded being 1.95% by nutrient petriplate method and 1.91% by slide exposure. Commonly recorded spores were of *Alternaria*, *Helminthosporium*, *Nigrospora*, *Cercospora*, *Cladosporium*, *Gleosporium* and *Leptosphaeria* which were the chief components of the total air spora.

INTRODUCTION

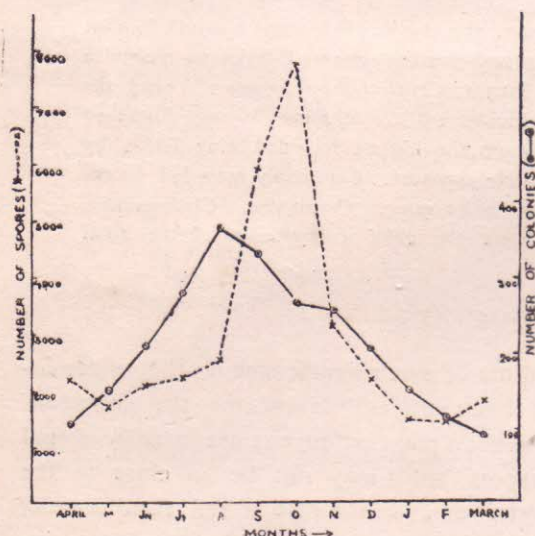
Airborne spores of pathogenic fungi are of much significance in the epidemiology of plant diseases when infected hosts themselves become the source of inoculum for secondary infections. Individual plant pathogens are usually found to be minor components of the total airspora, but it may not be so close to the heavily diseased crop (Gregory and Hirst, 1957). In the case of red rot disease of sugarcane, airborne spores are regarded as important source of inoculum in causing epiphytotics under favourable conditions (Butler, 1918 ; Chona, 1950 ; Edgerton, 1958). However very little is known about its seasonal distribution pattern, mechanism of spore release and dispersal and factors associated with the spread of disease in field conditions. Aeromycological studies with nutrient petriplate method (Ahmed and Baruah, 1975) and volumetric spore trap (Sreeramulu, 1971) have not revealed an appreciable amount of conidia of *C. falcatum* W. over the crop. Further studies were therefore carried out to analyse the air over a sugarcane plantation at regular intervals throughout a crop season for the red rot fungus and associated spores of the air spora.

MATERIALS AND METHODS

Air sampling was carried out in a sugarcane plantation (Vars. Co. 313, Co. 419 and POJ 2714) situated beside a forest and surrounded on three sides by paddy field. The methods used were the same as described by Baruah and Chetia (1966). Vaseline smeared slides were exposed for 24 hrs. five feet above the ground level on a simple aeroscope. Oat-meal-agar plates (10 cm diameter) were exposed for 10 min. at the same height as the slides in the morning at 9 a.m. Spores were identified on the basis of their microscopical characters, viz., size, shape, colour, septation. Fungal colonies developed on Oat-meal-agar plates were identified on the basis of their cultural characters.

RESULTS AND DISCUSSION

The total number of spores and fungal colonies collected in different months are shown in Text fig. 1 and percentages of different types of spores and colonies of fungi are presented in Tables 1 and 2 respectively.



Text fig. 1. Total number of spores trapped on four 2 sq. cm. area and total number of fungal colonies on four oat-meal-agar plates (10 cm diam.) in different months.

It has been observed that the incidence of conidia of *C. falcatum* W. is significant in comparison to the total number of spores collected. Similar result was also obtained by petriplate method. The highest incidence of the fungus was recorded in the month of February by slide exposure (1.91%) and in the month of December by nutrient petriplate exposure (1.95%). Spores were rarely detected in the early summer (from April to July) though acervuli were not uncommon on the hosts. Conidia were, however, mostly recorded during the winter when crop was maturing and extensive fruit body of the fungus developed on mid-ribs and drying infected leaf-sheaths.

The ability of a pathogen to cause large scale infection is dependent as much on its dispersal as on high production of infective propagules (Singh, 1975). However very low incidence of red rot fungus conidia very close to the diseased crop, inspite of presence of extensive fruit bodies of the pathogen, is difficult to explain in view

Table 1. Percentage occurrence of monthly total spores of different fungi in different months

Types	% of the monthly total spores											
	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	March
<i>Fusarium</i>	1.93	4.57	2.57	4.69	1.36	1.11	0.55	1.52	1.22	0.44	—	—
<i>Curvularia</i>	3.19	4.05	4.61	6.82	1.94	0.86	0.69	2.31	1.65	2.38	2.16	2.05
<i>Torula</i>	0.45	0.46	0.14	—	0.31	0.05	0.48	0.47	—	—	—	—
<i>Tetraploa</i>	—	—	—	0.31	0.08	0.94	0.20	1.11	3.00	0.75	—	—
<i>Cercospora</i>	0.48	0.87	0.24	0.97	4.34	2.02	0.69	0.92	1.09	0.50	—	—
<i>Cladosporium</i>	6.16	8.74	15.25	15.15	13.84	3.17	2.93	6.24	11.72	11.20	10.76	8.85
<i>Nigrospora</i>	1.53	0.87	1.14	1.59	1.01	0.93	0.56	4.99	4.44	6.63	4.14	2.76
<i>Gleosporeum</i>	7.06	7.58	3.42	2.61	2.25	0.64	0.51	3.42	2.14	4.63	5.67	6.50
<i>Helminthosporium</i>	1.57	0.69	0.66	0.75	0.54	0.64	0.24	0.44	0.83	1.00	0.45	0.20
<i>Piricularia</i>	—	—	0.33	1.24	—	0.05	0.18	0.06	0.39	—	—	—
<i>C. falcatum</i>	0.03	—	—	0.66	1.08	0.77	0.57	0.95	1.61	1.56	1.91	1.28
<i>H. eustomoides</i>	—	—	0.62	1.68	2.91	3.91	4.04	8.49	5.27	9.14	5.73	1.43
<i>Melanconium-type</i>	2.96	0.52	—	—	2.29	1.21	0.73	1.08	1.22	—	—	0.77
<i>Elsinoe-type</i>	—	—	—	—	1.24	0.18	0.28	0.32	0.92	0.94	0.83	0.21
<i>Trichocoenitis</i>	—	0.35	0.47	0.18	—	0.07	0.10	0.13	0.44	—	—	—
<i>Corynospora type</i>	—	—	0.67	0.22	0.19	0.29	0.24	0.22	0.35	0.81	0.25	—
<i>Leptosphaeria</i>	—	—	0.33	0.53	1.16	1.15	0.38	3.90	3.27	4.44	3.57	2.25
<i>sacchari</i>												
<i>Alternaria</i>	0.63	—	—	0.40	0.23	0.19	0.26	0.32	0.96	1.06	0.57	0.77
<i>Pleospora-type</i>	—	0.41	0.76	0.80	2.17	0.15	0.03	0.23	—	—	—	—
<i>Aspergillus</i>	8.32	9.78	10.97	14.00	19.03	55.58	57.68	10.04	10.46	6.38	6.18	7.31
<i>Apiospora-type</i>	0.31	—	0.43	0.49	1.85	0.03	0.18	0.54	0.61	0.63	0.13	—
Ascospores	11.68	5.91	5.70	5.67	10.23	4.26	5.33	13.94	16.60	13.70	12.68	12.02
Basidiospores	14.92	18.88	14.03	12.18	12.33	12.85	11.70	14.80	15.69	11.20	15.80	14.07
1-celled hyaline spores	30.65	22.76	13.21	10.54	13.18	4.48	7.06	15.50	6.32	10.89	12.29	19.59
Unclassified	7.82	13.55	23.99	17.63	5.97	4.46	4.48	7.99	9.80	11.70	16.88	19.95

Table 2. Percentage occurrence of types of fungi (exposed nutrient plates) in different months

Types	% of the monthly total colonies											
	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	March
<i>Fusarium</i>	1.55	3.92	7.14	3.57	3.02	1.81	2.26	7.18	3.41	2.03	—	—
<i>Curvularia</i>	15.50	11.76	16.19	10.36	10.71	15.11	15.09	14.17	14.63	16.89	16.22	15.73
<i>Aspergillus</i>	7.75	13.75	7.14	8.93	7.69	9.06	7.55	2.76	3.41	3.38	2.70	3.37
<i>Penicillium</i>	11.63	3.92	10.95	13.57	12.36	12.39	8.30	5.51	11.22	10.81	10.81	—
<i>Alternaria</i>	—	—	—	1.78	2.75	6.95	7.55	4.33	6.84	13.51	6.31	11.24
<i>Cladosporium</i>	12.40	17.65	17.14	22.86	20.33	16.31	24.53	22.05	28.29	14.19	13.51	13.48
<i>Trichoderma</i>	—	—	—	1.43	6.32	4.53	4.53	5.51	3.41	—	—	—
<i>Helminthosporium</i>	—	—	1.90	1.43	6.87	6.04	4.53	10.63	4.39	6.76	5.41	—
<i>Cercospora</i>	3.89	11.76	4.76	8.57	5.77	3.63	3.02	3.94	0.98	—	—	—
<i>C. falcatum</i>	—	—	—	—	0.55	0.91	1.13	1.18	1.95	1.35	1.80	1.13
<i>Nigrospora</i>	3.87	6.54	3.81	7.14	10.99	14.20	11.32	10.63	14.63	12.16	6.31	4.49
<i>Phoma</i>	—	—	3.81	1.43	2.75	1.21	0.75	0.39	—	—	—	2.25
<i>Gleosporium</i>	24.03	13.07	3.34	1.79	—	—	—	2.76	1.95	6.76	18.92	13.48
Other fungi	19.38	17.65	23.82	17.4	9.89	7.85	9.43	9.06	4.88	12.16	18.02	34.83

of the present findings. It is possible that a detail study on the systemic nature of the fungus, frequency of production of conidia on acervuli and factors influencing the dispersal of the conidia may reveal a reasonable explanation for such a phenomenon.

Spores of other sugarcane pathogens such as *Helminthosporium*, *Melanconium* and *Leptosphaeria* were not uncommon. However, most of the spores caught were of *Curvularia*, *Cladosporium*, *Nigrospora*, *Gleosporium*, *Alternaria*, *Fusarium*, *Cercospora*, *Aspergillus* and different types of ascospores and basidiospores. A large number of 1-celled hyaline spores of different morphology was recorded throughout the season.

REFERENCES

- Ahmed, G. U. and Baruah, H. K., 1975. Certain observation on *Colletotrichum falcatum* Went, red rot fungus of sugarcane in Asam. *Sci.Cult.* 41 : 119-121.
- Baruah, H. K. and Chetia M. 1966. Aerospora and allergic human disease : A study of certain fungal spores and pollen grains of Gauhati. *Indian Jr. Exptl. Biol.* 4 : 226-238.
- Butler, E. J. 1918. *Fungi and disease in plants*. Thacker Spink & Co., Calcutta.
- Chona, B. L. 1950. Studies on the disease of sugercane in India. III. Sources and modes of red rot infection. *Indian Jr, Agric. Sci.* 20 : 363-385.
- Edgerton, C. W. 1958. *Sugercane and its diseases*. Lousiana State University Press.
- Gregory, P.H and Hirst J.M, 1957. The summer airspora at Rothamsted in 1952. *J. Gen. Microbio.*, 17 : 135-152.
- Pady, S. M. 1957. Quantitative studies of fungus spores in the air. *Mycologia* 49 : 339-353.
- Singh, R. S, 1975. *Introduction to principles of Plant Pathology*. Oxford & IBH Publ. Co,
- Sreeramulu, T. 1971. Aeromycological observations and their implications in the epidemiolog of some diseases of sugarcane. *Proc. Indian. Nat. Sci. Acqd.* 37 Part B : 506-510.