THE EFFECT OF SORGHUM POLLEN ON THE GERMINATION OF CONIDIA OF *DRECHSLERA TURCICA* (PASS.) SUBRAM. AND JAIN

EPIDEMIOLOGICAL studies on leaf blight disease caused by *Drechslera turcica* were being conducted in our laboratory since 1971. The data[1] have revealed that the disease reaches a peak, when sorghum plants are at the flowering stage[2]. Pollen stimulates the germination, number and growth of germ tubes and lesion development of facultative pathogens such as *Botrytis cinerea*[3], *Fusarium graminearum*[4], *Helminthosporium sativum*[2], *Phoma betae*[5,6] and *Septoria nodorum*[2]. These pathogens cause infection after considerable mycelial growth on the surface of leaves which in turn is influenced by pollen[2]. *In vitro* experiments conducted to study the influence of sorghum pollen on the germination and growth of *D. turcica* conidia are reported here.

The germination studies were conducted using field collected sorghum pollen (concentration 30 mg/ml) and *D. turcica* conidia (concentration 20-30 conidia/drop under 10 × 8 X) obtained from leaf blight infected leaves. Cellophane strips used were sterilized by treating them with 70% alcohol for 30 minutes and then washed thoroughly with sterile water to remove alcohol.

Pollen suspension taken on the slides was separated from *D. turcica* conidia by a cellophane strip. For control, distilled water was used. These slides were then kept in moist chambers for 24 h at 21°–26° C and 90–100% RH. The effect of pollen on the germination of *D. turcica* was studied at 4 hourly intervals upto 24 h. About 100 conidia were scanned for each treatment. The results are presented in Table I.

TABLE I

The effect of sorghum pollen on the germination of D. turcica *conidia*

	CONTROL†			POLLEN‡		
	TIME (HRS)					
	4	8	12	4	8	12
Parameters						
1. % of germination	8	13	13	92	92	97
2. No. of germ tubes	10	17	15	189	194	198
3. Length* of germ tube/spore	+	+	+	+	++	+++
4. No. of branches/spore	0	0	1–2	0	1–2	3–4
5. No. of appressoria/spore	0	0	0	0	1–2	3–4
6. No. of infection hyphae/spore	0	0	0	0	1–2 (few)	1–2
7. Length* of infection hyphae/spore	0	0	0	0	+ (few)	+

* + = 50–250 μ ++ = 251–500 μ +++ = 501–750 μ

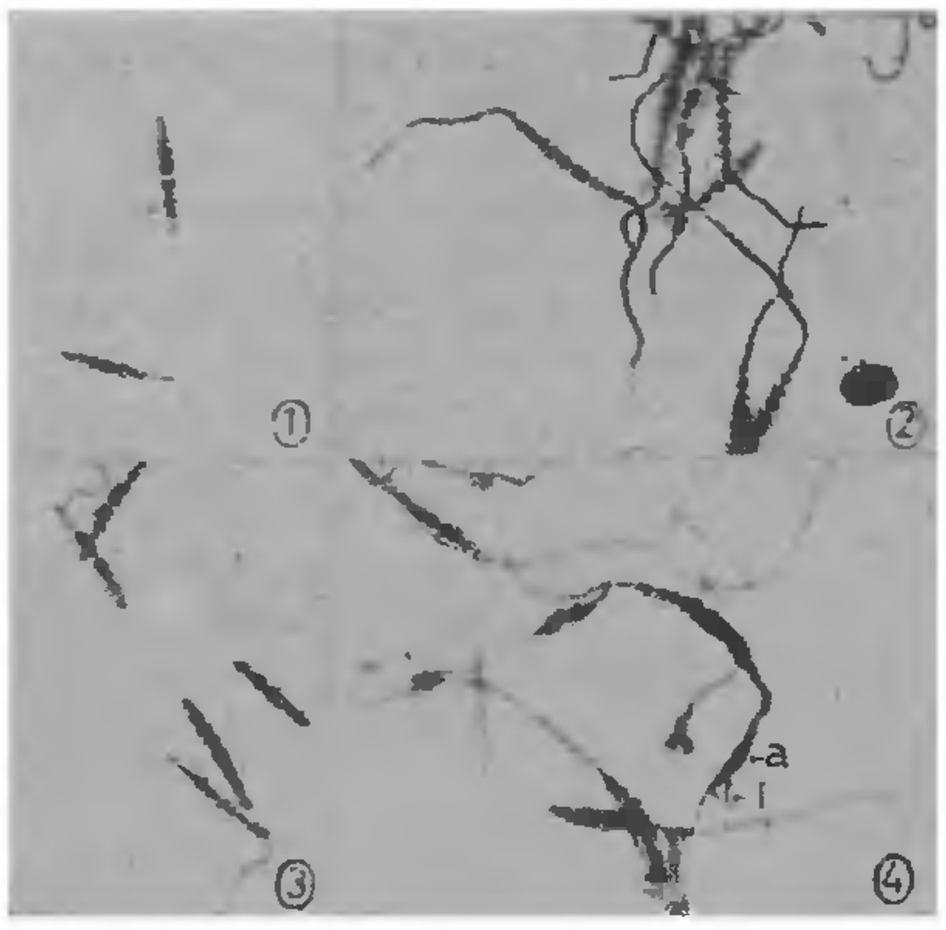
†After 12 hours and upto 24 hours there was a slight increase in the per cent of spore germination and appressoria and infection hyphae were formed in very few conidia.

‡After 12 hours, parameters 1–7 gradually increased but could not be measured due to the increase in the length of germ tube.

The data presented in Table I indicate that the maximum number of *D. turcica* conidia treated with sorghum pollen have germinated in a bipolar manner (Fig. 2) within 4 hours. By the end of 8th hour, the distal end of one or two germ tubes of the conidium enlarged to form a clavate appressorium. In a few conidia, short infection hyphae arose from these appressoria (Fig. 4). In the controls only 2.5% conidia have germinated (Figs. 1 and 3) and the formation of appressoria and infection hyphae have taken place only after 20 hours.

The data indicate the tremendous influence of sorghum pollen on the germination of *D. turcica* conidia and its consequent growth which in turn might have a great effect on leaf blight incidence of sorghum plants. In general, facultative pathogens have to compete with the Phylloplane microbes for nutrients such as amino acids, sugars and minerals present on the leaf

surfaces in order to establish themselves[7,8]. On the onset of flowering, pollen grains get deposited on the leaf surfaces, and serve as an additional source of nutrients for both the saprophytes and facultative pathogens[2]. If saprophytes are able to utilize the pollen nutrients and increase in numbers rapidly, they inhibit the increase of disease both by depleting the nutrients and also by their antagonistic activites[2,7,8]. If, on the other hand, the infection spots as well as conidia of the facultative pathogens are present on the leaf surfaces in sufficient numbers at the time of flowering, and can utilize the pollen nutrients more rapidly than others, then the severity of the disease will be increased[2,6]. This is the reason for the rapid increase of leaf blight infection of sorghum after flowering.



FIGS. 1–4. Germination of conidia of *Drechslera turcica*, × 100. Fig. 1. Control (4 h), Fig. 2. Pollen (4 h), Fig. 3. Control (8 h). Fig. 4. Pollen (8 h).

(*a*—appressorium; *i*—infection hypha.)

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1. Shenoi, M. M., *Ph.D. Thesis*, University of Mysore, 1974.
2. Fokkema, N. J., *Neth. J. Pl. Path.*, 1971, Suppl. 1, 59.
3. Chou, M. Chu and Preece, T. P., *Ann. Appl. Biol.*, 1968, **62**, 11.
4. Naik, D. B. and Busch, L. V., *Can. J. Bot.*, 1978 **56**, 1113.
5. Warren, R. C., *Neth. J. Pl. Path.*, 1972, **78**, 89.
6. Warren, R. C., *Ann. Appl. Biol.*, 1972*b*, **71**, 193.
7. Blakeman, J. P., *Ibid*, 1978, **89**, 151.
8. Fokkema, N. J., *Ibid.*, 1978, **89**, 115.

DIFFERENTIAL RESPONSE OF CHROMOSOMES OF YOUNG AND ADULT TISSUE TO CHEMICALS

THE effects of mutagenic agents and specially of alkylating compounds on plant chromosomes are well worked out[1]. No data are available on differential response of chromosomes of meristematic and differentiated nuclei to the action of mutagens. In this laboratory, 2, 4-dichlorophenoxyacetic acid (2,4–D) has been found to induce division in differentiated nuclei[2] and the level of action too has been worked out[3]. Ethylmethane sulphonate (EMS) is one of the very potent mutagens and its mutagenic effect has been reported by several authors[4]. The present investigation gives the comparative effect of EMS on meristematic and differentiated nuclei when followed and preceded by 2,4–D treatment.

Germinating bulbs of *Allium cepa* with roots 20 mm long were placed in two different tubes containing (1) EMS—0·01% and (2) 2,4-D—0·01% solution. After 24 h, a few roots (about 10 mm long) were cut from the bulbs and fixed in acetic ethanol (1 : 2). Then the bulb of the tube (1) with the remaining roots was put into a third tube containing 0·01% 2, 4-D soln. and the bulb with the remaining roots from tube (2) was put into another tube containing 0·01% EMS soln. After 24 h, the rest of the roots (about 10 mm long) were cut and fixed in acetic ethanol. Staining was performed with the usual aceto-orcein schedule. Each root was cut into two parts—meristematic and differentiated (5 mm away from the tip) and squashed in 45% acetic acid. The results obtained are summarised in Table 1.

In addition to condensation, stickiness and diplochromatids, one of the significant effects of EMS on meristematic tissue is the formation of chromosome bridges. Such aberrations in meristematic tissue are significantly reduced if the application of EMS is followed by 2, 4-D treatment. No such bridges were recorded when the tissue was treated with 2, 4-D prior to EMS application. These results indicate that 2, 4-D might protect the chromosomes against the damage caused by the mutagen (EMS). It is also likely that 2, 4-D instead of acting directly on chromosomes may combine with EMS making the latter ineffective against chromosome damage. Thus no such aberrations could be recorded when 2, 4-D preceded EMS treatment. This is likely due to accumulation of