FUSARIUM WILTS OF WATERMELON AND PEAS IN BOMBAY STATE

Wilt of Watermelon.—A wilt disease of watermelon (*Citrullus vulgaris* Schrad.) causing serious damage was recorded in January 1953 at Dorli near Kalyan in Thana District. Roots of affected plants showed the characteristic browning of vascular system and a microscopic examination showed presence of fungus hyphæ in the xylem vessels. A species of *Fusarium* was consistently isolated from roots of diseased vines and the fungus proved pathogenic to watermelon (local variety) in inoculation experiments at Poona. Isolates of the fungus from artificially inoculated plants were indistinguishable from the original cultures. This is the first time that a *Fusarium* wilt of watermelon has been recorded in India.

The fungus is indistinguishable from ***Fusarium oxysporum*** f. ***niveum*** (E.F.S.) Snyder and Hansen causing watermelon wilt in the U.S.A. and Europe.

Wilt of Peas.—A destructive wilt disease of garden peas (*Pisum sativum* L.) was recorded at Wai and Mahableshwar in North Satara District in November 1952 where garden peas is an important cash crop. The disease is now common in Poona District also and causes serious damage. A species of *Fusarium* was isolated from wilted pea vines in December 1952 and proved pathogenic to pea in infection experiments carried out at Poona. A detailed study of the fungus showed that it was indistinguishable from *Fusarium oxysporum* f. *pisi* (Linford) Synder and Hansen, race 1, causing wilt of peas in the U.S.A.

The following commercial varieties of peas resistant to wilt were obtained from the U.S.A. and Holland and tested at Poona in a glasshouse against the fungus causing wilt of peas in Bombay State: Alaska, Wisconsin Perfection, Pride, Perfected Wales and New Era from U.S.A. and Alaska, Celsior, Korza, Vares and Zelka from Holland. All these varieties proved susceptible to the Bombay strain of the fungus. It is, therefore, possible that the Bombay fungus is a biotype of the American pea wilt fungus, though conclusive evidence has not yet been obtained. More work on this problem is in progress at Poona.

Plant Pathological Lab., College of Agriculture, Poona-5, *April* 19, 1953.

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ANTIBIOTIC PRODUCTION BY *FUSARIUM VASINFECTUM* ATK. IN SOIL

Evidence indicating antibiotic production in soils, has so far been presented only in the case of non-pathogenic soil fungi.[1-4] The present note reports production of an antibiotic in soil by a plant pathogenic soil fungus, *viz.*, *Fusarium vasinfectum* Atk. Earlier work[5,6] has already shown that this fungus produces fusaric acid, a phytotoxin, also capable of antibiosis, *in vitro*.

The soil (pH 8·1 and moisture-holding capacity 47·5%) used was collected from the Madras University Botany Field Laboratory Garden. 90 g. of sieved soil taken in 250 ml. Erlenmeyer flasks were given 10 g. of the following amendments glucose, filter-paper, stubbles of cotton plants (*Gossypium arboreum*), green leaf choppings (*Glyricidia maculata*), farmyard manure and oats. Distilled water was added to each flask to keep the moisture level at 60%. After sterilisation at 20 lb. steam pressure for an hour and a half, the flasks were inoculated with spore suspensions of **F. *vasinfectum*** and incubated at room temperature (28-32° C.). The uninoculated series served as control. At regular intervals, cultures in replicates of four were removed with minimum amount of distilled water and centrifuged at 3,000 r.p.m. for 45 minutes.[3] The extracts thus obtained were tested for final pH before assaying for antibiotic potency in terms of fusaric acid equivalent.[6]

Table I

Production of antibiotic (expressed as μg. fusaric acid equivalent/g. of soil) in sterilised soil with different amendments

Age in days	None	Glucose	Filter paper	Stubbles	Farmyard manure	Green leaf	Oats
7	nil	nil	nil	nil	nil	nil	1·25
14	nil	nil	nil	traces	nil	2·30	7·90
21	nil	nil	nil	nil	nil	2·90	2·19
28	nil	nil	nil	nil	nil	2·60	2·00

The results in Table I indicate that *F. vasinfectum* produces this antibiotic in sterilised and amended soil (+ green leaf and oats), the maximum quantity produced (7·9 μg/g.) being in the presence of oats. There seems to be no detectable quantities of

this antibiotic in soil with any of the other amendments tried except for traces on the 14th day in stubble amendment. In both oat and green leaf amended soils there was a drift to the acid side from the original pH of 8·1.

Unlike *Aspergillus terreus*, *A. clavatus* and *Penicillium patulum* which were shown by Grossbard[3] to produce antibiotics in soils supplemented with glucose alone, *F. vasinfectum*, as evident from these results, requires ample source of both organic nitrogen and carbohydrate for the production of fusaric acid in soil. In fact, it is worthwhile to note that *P. patulum* produced decreasing quantities of antibiotic with increasing concentration of nitrogen.[3]

The significance of the production of this antibiotic by *F. vasinfectum* in sterilised soil amended with rich source of organic food, especially in the light of increasing knowledge of microbial activity in the rhizosphere[7,8] has been discussed elsewhere.[9]

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OBSERVATIONS ON NUCLEAR PHENOMENON OF SPORE-GERMINATION IN THE MYCELIA OF *POLYSTICTUS SANGUINEUS* (L.) MEY.

AN investigation into the nuclear conditions in the mature spores of *Polystictus sanguineus* (L.) Mey. before and after germination and also in the monocaryotic as well as dicaryotic mycelia has been made. This has been done from total preparations of spore-deposits and cultures upon thin films of agar on slides prepared according to Kniep's method as modified by Sass.[1]

The observations show that the mature spores are always uninucleate (Fig. 1, *a*). When

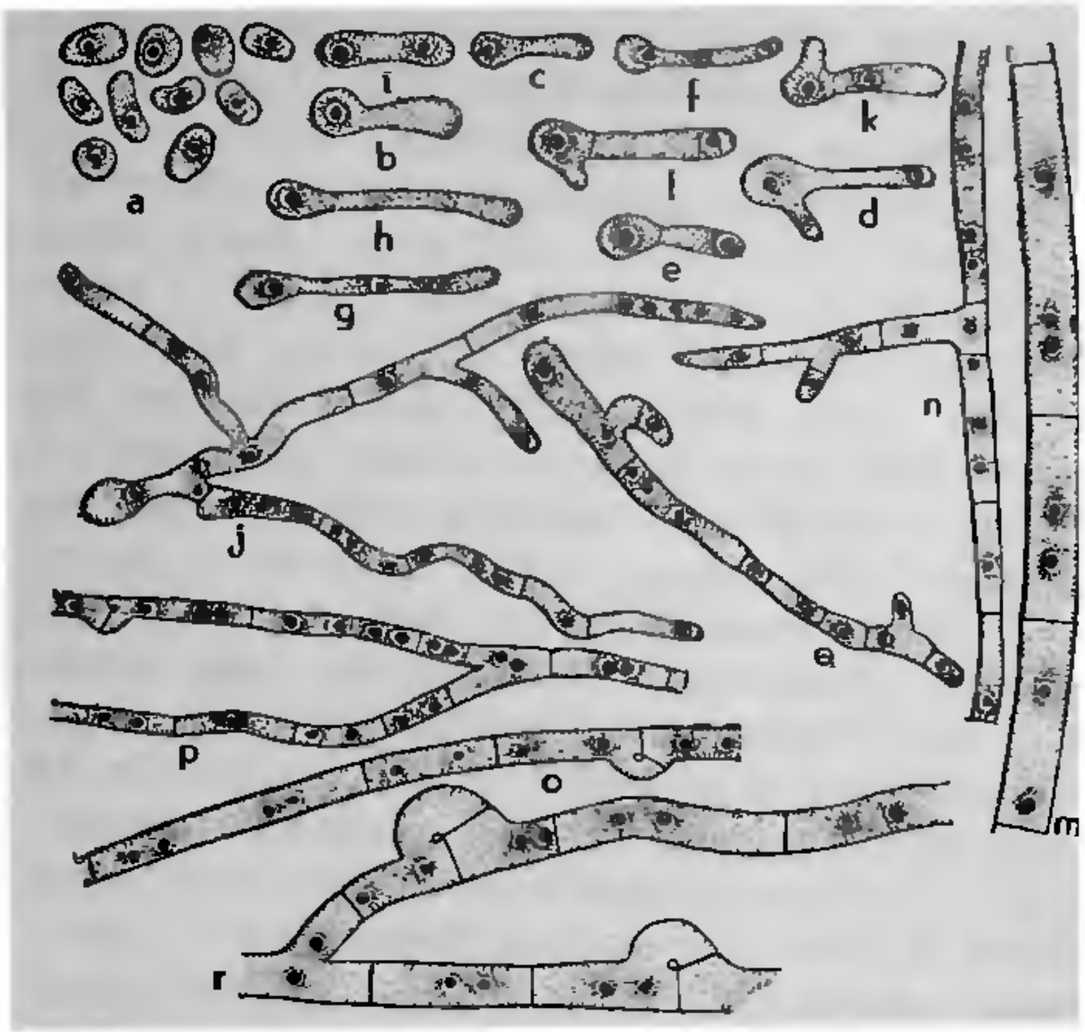

FIG. 1. Nuclear Phenomenon of Spore-Germination in the Mycelia of *Polystictus sanguineus* (×685).

germination starts a short germ-tube is produced (Fig. 1, *b* and *c*). This is followed by the division of the spore-nucleus. One of the two daughter nuclei thus produced then migrates into the germ-tube while its sister nucleus remains within the spore-case (Fig. 1, *i*). As the germ-tube elongates a transverse septum develops usually towards its base close to the point of its emergence from the spore-case (Fig. 1, *e*). This septum-formation may sometimes be postponed until the nucleus within the spore-case has divided further (Fig. 1, *f* and *g*). The aseptate germ-tube, in such cases, may attain a length of 20μ (Fig. 1, *g*). The resulting primary mycelium has most of its constituent cells multinucleate, each with 2-6 nuclei (Fig. 1, *j*). In preparations of monocaryotic mycelia obtained from cultures similar coenocytic conditions have also been found in certain cells (Fig. 1, *n*). It is, therefore, evident that nuclear divisions are not always followed in regular sequence by the division of the cells by the formation of septa. In some cases two successive germ-tubes are produced from different places of the spore-wall, but the second one generally develops almost at right angle to the first (Fig. 1, *k*). In such cases the second germ-tube makes its appearance only after one of the daughter nuclei of the spore has migrated into the first germ-tube (Fig. 1, *k*). The remaining daughter nucleus within the spore-case then divides and one of these daughter nuclei passes into the second