Growth Responses of *Fusarium oxysporum* to Metabolites of Some Rhizospheric Microflora of Egyptian Cotton Varieties

DURING studies on the rhizospheric microflora of different cotton varieties grown in Egypt, *Fusarium* wilt-resistant Ashmouni cotton variety rhizosphere proved to be inhabited by the highest percentage of strains of *Bacillus subtilis*, while susceptible Giza 26 cotton variety rhizosphere contained the highest percentage of a strain of *B. megatherium*[1].

Preliminary screening tests in which each of the bacterial strains was streaked against *Fusarium oxysporum* on either Dox's or soil-extract agar media have proved that *B. subtilis* strains were highly antagonistic to the wilt-inducing pathogen; the former spread rapidly and overgrew *Fusarium* mycelium and encircled it completely. Hyphæ of *Fusarium* were lysed and malformed. On the other hand, *B. megatherium* was stimulatory to *Fusarium* mycelial growth. The latter overgrew *B. megatherium* and produced comparatively very abundant conidia with abnormally large size and high septation.

Growth responses of *Fusarium oxysporum*, which proved to be a virulent pathogen causing wilt of either Karnak or Giza 26 cotton variety seedlings, to metabolites of either *B. subtilis* or *B. megatherium* on Dox's liquid medium have been tested by the following two methods: (1) germinative potentialities of *Fusarium* microconidia in hanging-drop cultures of either *B. subtilis* or *B. megatherium* metabolites; (2) growth of *Fusarium* mycelium on differently treated metabolites of either *B. subtilis* or *B. megatherium*. Filtrates of the test organisms were obtained from cultures of two ages, that is, 5- and 10-days old and were either cold-sterilized[2] or autoclaved. Control solutions using either Dox's liquid or water were also used.

The results (Tables 1 and 2) show that considerable suppressed germination of *Fusarium* microconidia and mycelial growth took place in response to either 5- or 10-days old culture filtrates of *B. subtilis* whether unheated or autoclaved. Ageing of culture or application of heat to its filtrate did not appreciably affect the latent period and final percentage of germination or the mycelial dry-weight of *Fusarium*. On the other hand, on using filtrates of *B. megatherium* from either 5- or 10-days old cultures, the final percentage germination of *Fusarium* microconidia rose to 100 per cent. At the same time, *Fusarium* mycelial growth was significantly higher as compared with that on control Dox's liquid media. A stimulatory factor for *Fusarium* microconidial germination and mycelial growth seems to be present in filtrates of *B. megatherium* the potency of which is not affected by heating. On the other hand, ageing of culture results in an increased stimulative effect over *Fusarium* mycelial growth.

Table 1. GROWTH RESPONSES OF *Fusarium* MICROCONIDIA TO METABOLITE-FILTRATES OF *Bacillus subtilis* AND *B. megatherium* AT 30° C.

Experimental medium	Age of culture	Filtrate treatment	Germinative capacities	
			Latent period	Germination (per cent)
B. subtilis filtrate	5 days	unheated	5 hr.	40
		autoclaved	5 hr.	40
	10 days	unheated	5 hr.	48
		autoclaved	5 hr.	50
B. megatherium filtrate	5 days	unheated	5 hr.	100
		autoclaved	5 hr.	100
	10 days	unheated	5 hr.	100
		autoclaved	4 hr.	100
Pure Dox's	—	—	2 hr.	90
Water	—	—	3 hr.	80

Table 2. *Fusarium* MYCELIAL DRY WEIGHT (IN MGM.) AFTER 10 DAYS at 30° C. IN RESPONSE TO DIFFERENTLY TREATED METABOLIC-FILTRATES OF *B. subtilis* AND *B. megatherium*. PURE DOX'S LIQUID IS DILUTED WITH WATER AND METABOLITE FILTRATES WITH PURE DOX'S LIQUID*

Experimental medium	Dilution (per cent)	Filtrate from 5-day old cultures		10-day old cultures	
		Unheated	Autoclaved	Unheated	Autoclaved
B. subtilis filtrate	100	33	35	29	30
	50	38	40	33	35
	25	45	48	38	41
B. megatherium filtrate	100	40	43	38	42
	50	73	77	80	85
	25	81	85	92	105

* Mycelial dry weight on 100 per cent pure Dox's liquid, 75 mgm.; on 75 per cent Dox's liquid, 61 mgm.; on 50 per cent Dox's liquid, 40 mgm.

Further work concerning the nature of the inhibitory anti-fungal metabolites of *B. subtilis* and the stimulatory factor of *B. megatherium* for *Fusarium* growth are still in progress. The former are probably of the nature of an antibiotic[3] while the latter seems to be a growth factor. Difference in the rhizosphere microflora of wilt-resistant and susceptible cotton varieties might explain why *Fusarium oxysporum* fails to invade Ashmouni cotton roots while its pathogenicity is established on susceptible Karnak and Giza 26 cotton varieties.

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A Simple Technique for producing Fruit Bodies of Wood-destroying Basidiomycetes

IN attempts to identify some of the many basidiomycete cultures isolated in our investigations of decay, we have tested a number of methods and have found that described here of the greatest value. It produces relatively large, identifiable fruit bodies from cultures representing a wide range of genera and families, and it has given consistent results in the hands of a number of workers, is not laborious, and requires no special equipment or materials.

The method involves establishing the culture to be identified on an enriched sawdust medium in a glass jar and then allowing it to grow through, and fruit on, a block of readily decayed wood incubated in diffuse daylight in a humid but not stagnant atmosphere.

The medium now used is a mixture of air-dry sawdusts (4–24 mesh) of seven timbers in the following proportions: *Pinus radiata* D. Don (sapwood), 25; *Eucalyptus obliqua* L'Herit. (sapwood), 25; *E. diversicolor* F. v. M., 10; *Acacia dealbata* Link., 10; *Nothofagus cunninghamii* Oerst., 10; *Rhizophora* sp. 10; *Ceratopetalum apetalum* D. Don, 10. (This