EFFECT OF COTTON DUST AND 2,4-D ON HOST-PARASITE RELATIONSHIP. (I) COTTON AND FUSARIUM-WILT.

by

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I. INTRODUCTION

Cotton dust has been extensively used in Egypt in the last few years for combating the cotton leaf worm. Cotton dust is a mixture of these insecticides: sulphur, dichlorodiphenyltrichloroethane (DDT) and the gamma isomer of benzene hexachloride (BHC). As the cotton dust components DDT and BHC are known to be persistent in the soil (SMITH, 1948 and FLEMING, 1950), different concentrations of cotton dust — representing different degrees of the insecticide accumulation in the soil — were dealt with. In addition, a comparative study has been carried out to test the herbicide 2,4-Dichlorophenoxyacetic acid (2,4-D) on the host-parasite balance of cotton-wilt disease due to Fusarium solani.

Many investigators recorded that DDT has no effect on the host-parasite relationship (HEUBERGER & STREARNS, 1946, MACDONALD, 1948, DAVIDSON & RICH, 1947 and SACKSTON, 1949). On the other hand, JOHNSON (1946) found that spraying wheat plants with DDT — four days after being infected with Puccinia graminis tritici — resulted in the formation of larger uredosori than those formed on control plants. DDT was recorded by BOWSER (1946) to have an indirect effect on the potatoes against aster-yellow virus disease through inhibiting the carrier “leaf hoppers”. BONDE & SNYDER (1946) recorded that potato plants sprayed with basic copper sulphate, to which DDT or BHC was added, caused good control of early blight due to Alternaria solani and late blight caused by Phytophthora infestans. The control of early blight — due to DDT application — was attributed to delayed plant maturity and to the

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greatly reduced number of flea-beetle punctures, which afforded entry to the fungal pathogen. BHC was proved also to be effective in controlling the wheat bunt disease caused by *Tilletia caries* and *Tilletia foetida* (YERSIN and co-workers, 1947). Its gamma isomer was found to control the damping off disease of *Pinus* seedlings. Its application stimulated further mycorrhizal development in these seedlings. Concerning sulphur, FIKRY (1936 and 1948) found that sulphur dusting was effective in controlling the powdery mildew of cucurbits in Egypt - due to *Erysiphe cichoracearum* - and had a remarkable effect in increasing the yield of vegetable marrow plant. Similarly, it was found to be effective in controlling bean rust caused by *Uromyces fabae* (ZAUMEYER, 1946) and vine powdery mildew due to *Uncinula necator* (BIOXO, 1947). Sulphur was applied by PERSON (1946) to eliminate losses of sweet potatoes caused by soil rotting due to *Actinomyces ipomoea*; the action of sulphur was to shift the soil pH from a value favourable for infection (i.e. 5.6-5.8) to an unfavourable value (i.e. 5.0).

2,4-D on the other hand was found to affect the host-parasite relationship in mould diseases. Thus, treatment of tomato fruits with 2,4-D caused a reduction in the number of fruit cracking due to fruit cracking moulds (SHROADER & SMITH, 1946). Similarly, GUISCAFRE-ARRILLAGA (1949) reported the inhibitory effect of 2,4-D to post harvest decay of orange due to *Penicillium digitatum*, *Penicillium citri* and *Phomopsis citri*. IBRAHIM (1951) found that spraying of oat plants with dilute solutions of 2,4-D butyl ester induced their resistance against *Puccinia graminis avenae*.

HSIA & CHRISTENSEN (1951) reported that 2,4-D treated wheat plants were weakened, stunted and predisposed to heavier infection.

CROWDY & WAIN (1951) recorded a reduction in the chocolate-spot disease of bean plants when dipped or sprayed with 2,4,6 trichlorophenoxyacetic acid. LONGCHAMP, ROY & GAUTHERET (1952) recorded the development of *Claviceps purpurea* in wheat fields due to their herbicidal spray with 2,4-D ethyl ester.

II. MATERIAL AND METHOD

Agrocide cotton dust, pure sodium salt of 2,4-D as well as Fernoxone (80 % 2,4-D, commercial) were kindly supplied by the Imperial Chemical Industries. *Fusarium solani* was isolated from wilted cotton plants. “Giza 26” and “Menoufi” cotton seeds were kindly supplied by the Plant Breeding Section, Ministry of Agriculture.

Sandy soil of the following mechanical analysis: Clay 1 %, silt 2 %, fine sand 70 % and coarse sand 27 %, was prepared and steam sterilized. The sterilized soil was subsequently left exposed — for one week — in the laboratory to be aerated.

**Soil treatment with cotton dust:** Sterilized soil was then