EFFECT OF FUNGICIDES ON SOME SOIL FUNGAL DISEASES

By

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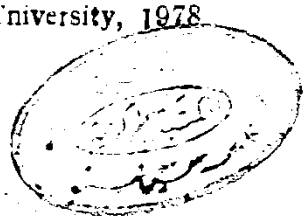

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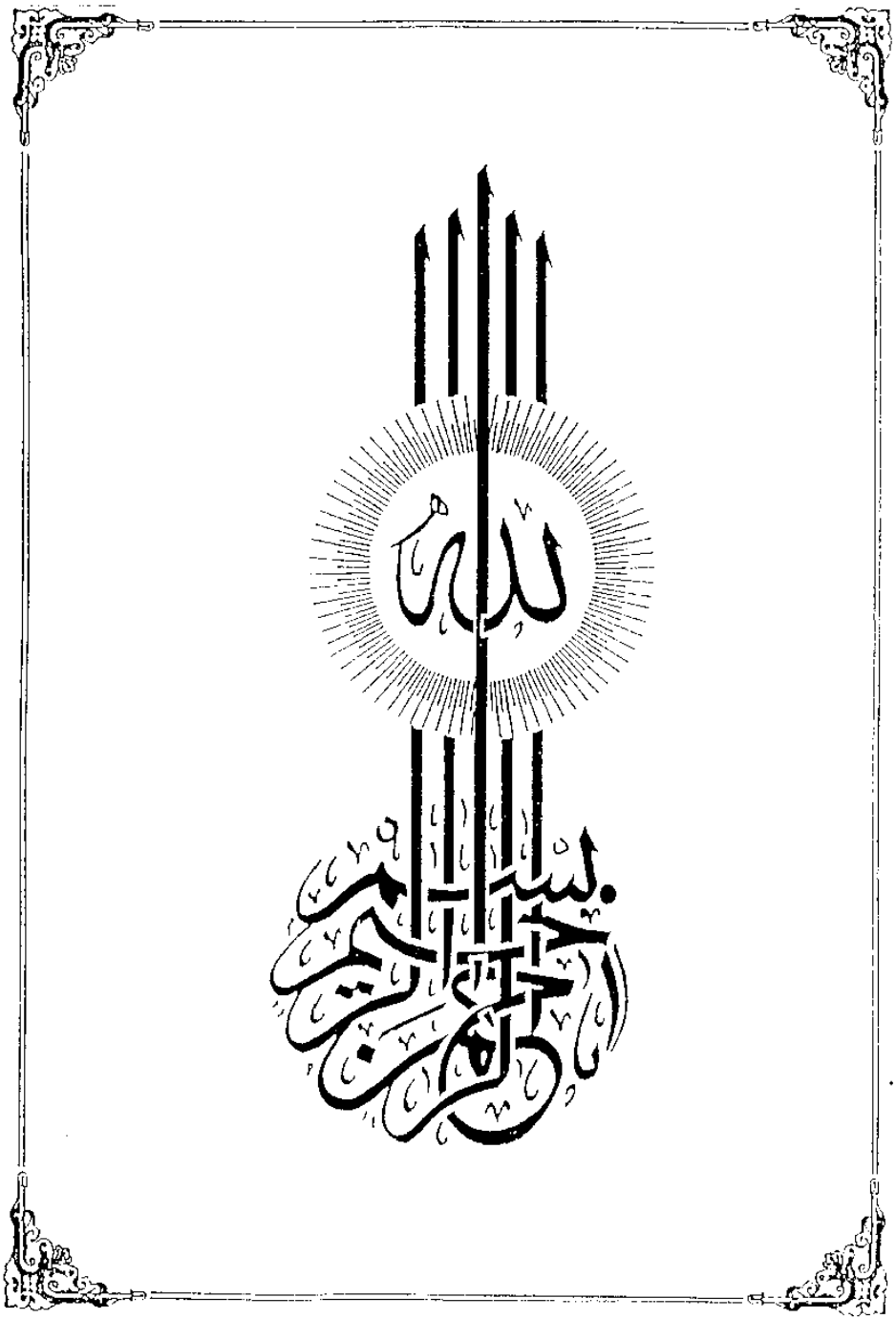

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INTRODUCTION

Soil-borne diseases are reported all over the world among the major limiting factors of agricultural production. In Egypt, studies on this group of plant diseases refer to the importance of root rots and seedling damping-off on many crops. On the other hand Leguminous crops are among the crops that suffer from these diseases, reflecting big losses on both of yield quality and quantity. Soybean Glycine max (L.) Merr, is one of the important leguminous crops which suffers from soil-borne fungi. Fourty percent of the world supply of edible vegetable oil is extracted from soybeans. However, soybean has been newly introduced to the Egyptian agriculture. Its acreage rose sharply from only about 4000 feddans in 1974 to 159000 feddans in 1981. As soybean acreage has expanded, diseases have increased in number and severity. Large number of soil fungi attacks the roots of soybean causing root-rots diseases with varying amount of losses.

Chemical control including the use of seed dressing fungicides have been found effective to minimize the severe losses due to the soil fungi incorporated with this type of

REVIEW OF LITERATURE

Causal organisms :

I- Macrophomina phaseolina (Tassi.) Goid. = M. phaseoli (Maubl.) Ashby = Rhizoctonia bataticola (Taub.) Butler = Sclerotium bataticola Taub. and Botryodiplodia phaseoli (Maubl.) Thir. The incitant of "Charcoal Rot" disease is one of the most widespread and destructive soil borne fungi. The fungus is endemic in Egypt, since it has been reported as early as 1925 by Briton-Jones. He demonstrated the presence of that fungus parasitizing cotton, cowpea, bean, pea, pumpkin and groundnut in Egypt.

Bekhit (1957) described the charcoal rot disease of soybean caused by M. phaseoli. He added that the fungus also infects lupine, sesame and sunflower plants. Sabet et al., (1961) showed that R. bataticola is the incitant fungus causing charcoal rot disease of maize stalks. Atteia (1966) declared that S. bataticola is the causal organism of charcoal rot disease of sweet potato, and is also able to attack several host plants, i.e. maize, french bean, sesame, cotton and tomato. Khan (1966) isolated S. bataticola among other fungi from diseased cotton plants.

M. phaseolina has been also reported on soybean by Jooste (1969), Wyllie and Calvert (1969), Abd El-Aziz, Ferial (1970), Hussain and Kamal (1970), Gangopadhyay and Wyllie (1973 and 1974), Agarwal et al., (1973), Kirkpatrick and Sinclair (1973),

Ostwald and Wyllie (1973), Dhingra and Sinclair (1973 a,b and 1974 a,b), Meyer et al.,(1973 & 1974),Ammon et al.,(1974),Dhingra et al., (1974) Gangopadhyay et al., (1974), Ilyas and Sinclair (1974), Jimenez Diaz and Montes Agusti (1974), Ilyas et al., (1975), Ellis and Sinclair (1976) and Ilyas and Ellis (1976).

Fadl and Hessien (1978) pointed out that the causal organisms of root rot diseases of soybean in Egypt are Cephalosporium gregatum, Sclerotium rolfsii, Sclerotinia sclerotiorum, Pythium ultimum, R. solani, M. phaseoli, Fusarium oxysporum f.sp. tracheiphilum and F. solani.

II- Rhizoctonia solani :

Rhizoctonia solani has been frequently considered an important pathogen to many host plants including soybean as recorded by Nacion (1924), Johanson and Koehler (1943), Boosalis (1950), Kernkamp and Gibler (1951), Atkins and Lewis (1952) Wyllei (1962), French and Kennedy (1963), Lambe and Dunleavy (1967) and Tachibana (1968).

Abd El-Azizi, Ferial (1970) isolated R. solani, F.solani and S. rolfsii from damped off seedling and root rotted plants of soybean. Abdallah, Soad (1973) found that R. solani was the main pathogen for soybean root rot in Egypt. Agha (1977) isolated R. solani, M. phaseolina, Pythium graminicola and

Trichoderma lignorum that were associated with seedling root rot of soybean in Egypt.

Fadl and Hessien (1978) isolated several causal organisms of root rot diseases of soybean including R. solani. Naiki and Ui (1981) stated that R. solani was isolated from diseased bean and soybean plants and was the most pathogenic to these hosts.

III- Fusarium spp.

Armstrong and Armstrong (1950) showed that there are definitely two and probably other biological races of F. oxysporum f. sp. tracheiphilum which could attack soybeans and/or cowpeas. Race I caused wilting of some varieties of the two hosts, while race 2 caused severe wilting only of some varieties of cowpea. Another group of isolates from soybeans caused wilt of soybean but not of cowpea. They stated that observations on many soybean varieties indicated that most varieties might be wilt resistant.

On the other hand, Anon (1953)and Killpatrick and Johanson (1953) noticed species of Fusarium caused root rot to soybean and isolated F. oxysporum from roots, cotolydon, stem and leaf. Matuo et al., (1958) indicated that F. oxysporum f. sp. tracheiphilum and F. moniliforme caused blight or wilt of

soybean, and were found for the first time in Japan.

French (1963) found that F. oxysporum was the causal organism of wilt and root rot of soybean.

Wu et al., (1964) reported that the genus Fusarium was one of the predominant pathogens found in pre-and post-harvest soybean seeds in Taiwan.

Pation (1967) mentioned that Fusarium spp. caused soybean root rot. Vardaniya (1971) stated that soybean pathogens that were detected during 1966-1969 in Abkhazia on the E. Black Sea coast included F. solani causing root-rot, F. solani, F. avenaceoum causing seed and seedling rot and F.oxysporum causing wilt of mature plants.

Mostafa (1982) showed that six different genera of fungi were isolated from diseased soybeans including M. phaseolina, R. solani and Fusarium spp.

Abou Neama (1983) found that R. solani Keuhn, F. solani (Mart.) Sacc. and S. rolfsii Sacc. were the most pathogenic fungi causing root-rot and seedlings damping-off on peas and soybean plants.

Effect of fungicides on pathogenic fungi:

The effect of different fungicides on fungi was studied in different investigation in order to follow the development of their selection. The inhibitory effect of these chemicals *in vitro* against fungi was concerned by different investigators i.e., Hassan and Cox (1947) showed that adding 100 ppm Spergon to Czepek's agar medium prevented to growth of *R. solani* which was isolated from pea.

Rhushdi (1955) found that in liquid medium 20 ppm Thiram, Hydroxymercurichlorophenol, Sodium ethyl dithiocarbamate and Sodium mercapts benzothiazole completely inhibited the growth of *R. solani*. Raffray and Sinclair (1965) stated that the rate of growth of *R. solani* on PCNB-Potato Sucrose Agar (PSA) tended to be less than on Maneb-PSA and Captan-PSA.

Hassanein (1967) showed that Agallol and Dithane A-40 at 200 ppm checked the growth of *R. solani* and the sclerotia were not formed at this concentration.

Zayed (1967) reported that the growth of *R. solani* was inhibited completely at 10 to 100 ppm of Falisan. Broum and Sinclair (1968) showed that *in vitro* Vitavax was fungistatic to that fungus at 1 ppm.

Harfoush, Dorrya (1970) found that Ceresan, Orthocide 75 and Brassicol 75 checked its growth at 200, 800 ppm respectively.

Sirry *et al.*, (1970) reported that Dithant A-40 at 400 ppm checked its growth *in vitro*. Sclerotia were not formed at 200 ppm of Diathane A-40 and at 800 ppm of PCNB.

Mostafa (1972) found that the growth was inhibited completely with addition of 200 ppm of Brassicol, 100 ppm of Captan 70 and 6 ppm of Benlate.

Abdallah, Soad (1973) reported that Orthocide 75 appeared to be the least effective fungicide.

Ahmed (1974) stated that Benlate-50, Demosan-65 mp, and Fallisan-HB were appeared to be the most effective fungicides on linear growth, since the mycelial growth was inhibited at concentrations higher than 100 ppm. However, the fungus did not respond to Dithane-A 40 and Plantvax-75 W.

El-Said et al., (1974) found that Benlate was the most effective fungicide on linear growth.

Gamal El-Din et al., (1975) stated that application of fungicides induced remarkable inhibition to the fungal growth of R. solani particularly with treatments of Benlate-50, Demosan-65 and Falisan-HB.

El-Fiki (1976) found that Vitavax-75 W was more effective at a concentration of 20 ppm however, Falisan-HB was the best contact fungicide which checked the fungal growth at a relatively low concentration of 5 ppm.

Wu (1980) reported that Benlate (benomyl), Benlate C (benomyl + captan), Benlate T (benomyl + thiram), DPX-12 (carbendazim + maneb) and Terraclor (quintozene) (each 1 ppm) and Ronilan (vinclozolin) at 5 ppm were fungistatic but at 100 ppm the first five were fungicidal.

El-Sherif, Ebtisam (1983) stated that Carboxin prevented the growth of R. solani at concentration of 10 ppm.

Terashita and Takai (1955) showed that 0.01%concentration of Ceresan required to inhibit mycelial growth of Fusarium spp. Hassanein (1967) reported that Agallol at 200 ppm, Diathane A-40 at 400 ppm checked the rate of growth of F. solani. Spore formation was checked at 200 ppm of Agallol and Dithane A-40 and at 1600 ppm of Phygon and PCNB.

Harfoush, Dorrya (1970) found that Ceresan checked the growth of F. oxysporumf. sp. lycopersici at all tested concentrations. Fuchs et al., (1970) tested Benomyl against F. oxysporum f. sp. pisi. They found that 1 mg/l. Benomyl in liquid media or on agar plate inhibited the fungal growth.

Decallonne and Meyer (1972) reported that Benomyl was rapidly absorbed by the conidia of F. oxysporum which inhibited their germination. Aly (1974) stated that Benlate appeared to be the most effective fungicide on the linear growth of F. oxysporum followed by Wolfen Thiram 85% and Orthocide 75%. He also added that Vitavax-Captan moderately affected the fungal growth. On the other hand, Topsin 50 and Topsin 70 appeared to be the least effective fungicides.

Harfoush, Dorrya (1975) stated that Benlate and Topsin checked the growth and spore production of F. oxysporum f.sp. phaseoli at low concentration.