PHYSIOLOGICAL AND PATHOLOGICAL STUDIES ON SOME FUNGI CAUSING ROOT ROT TO TOMATO

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A C K N O W L E D G M E N T

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INTRODUCTION

Tomato (Lycopersecon esculentum var. common) is one is the most important crops in A.R.E. The cultivated area of tomato crop has been increased gradually within the last years. It was about 191.000 feddans in 1965 and 237.000 in 1970 from the total cultivated area with vegetable crops which was 623.000 and 713.000 feddans respectively (Anon. 1971).

Tomato plants are attacked by several pathogens i.e. fungi, Bacteria, virus and nematod.

One of the most important fungal diseases is damping off and root rot. As far as the writer is aware, no attempet was carried out to study the rot rot of tomato in A.R.E. This investigation was carried out to study the following:-

1 - The fungi which are responsible for this disease.
2 - Some physiological studies on the pathogenic fungi as nutrition effect fungicides and others.
3 - Factors affecting the disease severity i.e. varietal resistance, fungicidal effect and fertilization.
4 - Interaction between infection and some metabolic processes in disease plants.

REVIEW OF LITERATURE

A. Causal Organisms:

Samuel (1930) found that the fungus Phytophthora parasitica caused damping-off of seedlings, but sometimes caused by Pythium cryptogae and Pythium spp.

Alexander (1931) observed that Pythium ultimum and Corticium vagum var. solani caused serious damping-off of tomato seedlings in seed bed in Ohio.

Selman and War (1931) reported that Pythium spp. caused a root-rot of young tomatoes.

Houston (1945) reported that tomato seedlings were killed by the fungus Corticium solani primarily in the pre-emergence stage.

Anon. (1949) reported that Rhizoctonia solani attacks vegetable crops. Losses of green-wrap tomato due to soil rot were unusually high, amounting to as much as 50% of certain pickings of experimental planting.

Harrison (1955) stated that Pythium spp. and Rhizoctonia solani caused losses up to 80% from damping-off of field set tomato plants.

Reyes (1957) noted in Cauca Valley, Colombia that *Pythium*, *Fusarium* and *Rhizoctonia* spp. caused damping-off of tomato seedlings.

Strong (1961) and Watterson (1945) reported that *Rhizoctonia solani* caused stem canker of tomato. Inside the stems was coarse brown mycelium of the fungus.

Marras (1964) found that seedlings blights caused by *Pythium debaryanum*, *Phytophthora parasitica*, *Stemphylium* spp., . *Alternaria tenuis* & *Corticium solani* occur occasionally is fairly common in greenhouse but less so in the field.

Harfaush (Dorrya) (1970) found that *Fusarium oxysporum* F. *lycopersici*, *Pythium aphanidermatum* and *Rhizoctonia solani* are the most pathogenic fungi causing damping-off of tomato plants.

Leary (1971) reported that a root rot and crown rot disease of tomatoes caused by *Fusarium oxysporum* different from the classical vascular wilt has been observed in southern California.

B. Physiological Studies:

1 - Effect of media and Temperatures:

Haymaker (1928) found that the best growth of *Fusarium oxysporum* f. *lycopersici* on potato dextrose agar was at 28°C.

Lauritzen and Whitney (1933) found that the optimum temperature of *Rhizoctonia solani* extents from 24 to 30°C.

Le Clerg (1939) found that the optimum temperature for the growth of *R. solani* was at 30°C.

Person (1944) reported that the optimum range for *R. solani* was between 25-30°C.

Kendrick (1951) reported that the optimum temperature for the growth in culture of *R. solani* isolated from various districts in California varied from 64 to 91°F. (17.7 - 32.7°C).

Ashour and El-Kadi (1958) found that potato dextrose agar and Richard's media gave the most rapid growth of *Fusarium semitectum* while the best growth for

Ali and Hanson (1964) indicated that the optimum temperature for growth and spore germination in *Fusarium* spp. was at 28°C and the optimum media was potato-glucose, Czapek's and Richards.

Farahat (1970) found that *Rhizoctonia solani* gave its best rate between 25 - 30°C.

Harfoush (Dorrya,(1970) indicated that *Fusarium oxysporum* f.*lycopersici*, and *Rhizoctonia solani* gave their best rate of growth on Richard's media, the optimum temperature on Richard's medium for *F. oxysporum* f.*lycopersici* and *Rhizoctonia solani* was 30°C.

2 - Effect of Carbon and nitrogen sources:

RAO and Rayudu (1964) indicated that the growth of *Rhizoctonia solani* from ground nut roots on a medium with glutamic acid and nitrate, revealed no differences during the first 4 days; but on the 5th, growth was stopped completely on nitrate.

Ashour et al (1965) found that the best growth amount of *R. solani* was given by using sucrose, while the lowest was with lactose. He found that replacement of aspa·agin instead of potassium nitrate decreased the amount of growth of R. solani. Peptone gave the best amount of growth, but ammonium nitrate or sodium nitrate decreased the amount of growth.

El-Gammal (Sawsan) (1967) found that the addition of the fatty acids to the medium of Aspergillus niger caused a decrease in the amount of growth.

3. Effect of fungicides on growth and physiological processes:

Welman and Wilcoxon (1941) have reported toxic action in which the dosage-response curve consists of two or more linear segments, the whole curve consisting a broken line, for the fungus Macrosporium sarcinaeforme.

Rushdi and Jeffers (1955) found that 20 p.p m Arasan caused complete inhibition of growth of Rhizoctonia solani.

Crossan et al (1958) found that in the presence of 4 p p m Captan, thereonine, glutamic acid, and 4 amino buteric acid were missing in fungus Botryosphaeria ribis. In the presence of 6 p p m Copper sulphate,

-amino buteric acid and methionine, were missing and thoreonine, glutamic acid were reduced in quantity in fungus *Colletotrichum capsici.*

Ross (1959) reported that mycelium of *Verticillium albo-atrum* exposed to 10 and 30 p p.m of fungichromin lost all soluble amino acids.

Siegel and Crossan (1959) indicated that copper caused a general reduction in the amount of the free amino acids present, plus a loss of cystine and argenine, Glydin reduced the amount of the bound amino acids of fungus *Colletotrichum capsici.*

Tolba and Salama (1961) found that suspension of mycelial mats of *Rhizoctonia solani* over media containing 100 - 2000 p p m dihydrostreptomycine increased the uptake of sucrose, release of reducing sugars, synthesis of carbohydrates.

Crossan and Morehart (1962) stated that alcoholic extract of manebtreated cells of fungus *Colletotrichum capsici* showed marked increase in the following amino acids; histidine, leucine and lysine. No change occurred in the quantity of valine.

4. <u>Utilisation of sucrose and absorption of monosaccharides</u>

Said and Naguib (1953) found that sucrose was hydrolysed at the protoplasmic surfaces of their tissues by an enzyme of the fructofuranosidase type before it is taken up.

Mandles (1954) indicated that sucrose is metabolised by non-hydrolytic system in spore of the fungus *Myrothecium verrucaria* even though invertase is present in excess of the metabolic requirements.

Tolba and Salama (1958) observed that sucrose was hydrolyzed at the mycelial surface by an enzyme of the fructofuranosidase type giving glucose and fructose. A part of these hydrolysis products was subsequently absorbed, while the rest remained in the external culture media.