

بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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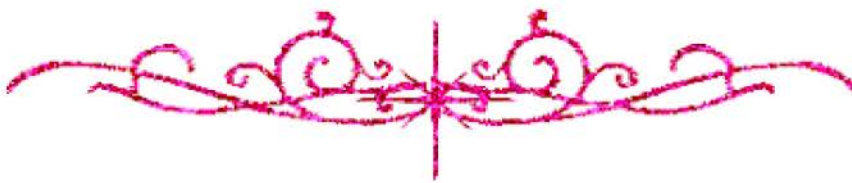


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STUDIES ON CITRUS STUBBORN DISEASE

By

Ayman Faisal Abdo Omar

B.Sc. (Agric.), Tanta Univ., A.R.E., 1994

THESIS

*Submitted in Partial Fulfilment of the Requirements
for the Degree*

of

MASTER OF SCIENCE

In

Plant Pathology

Agricultural Botany Department

Faculty of Agriculture,

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Tanta University

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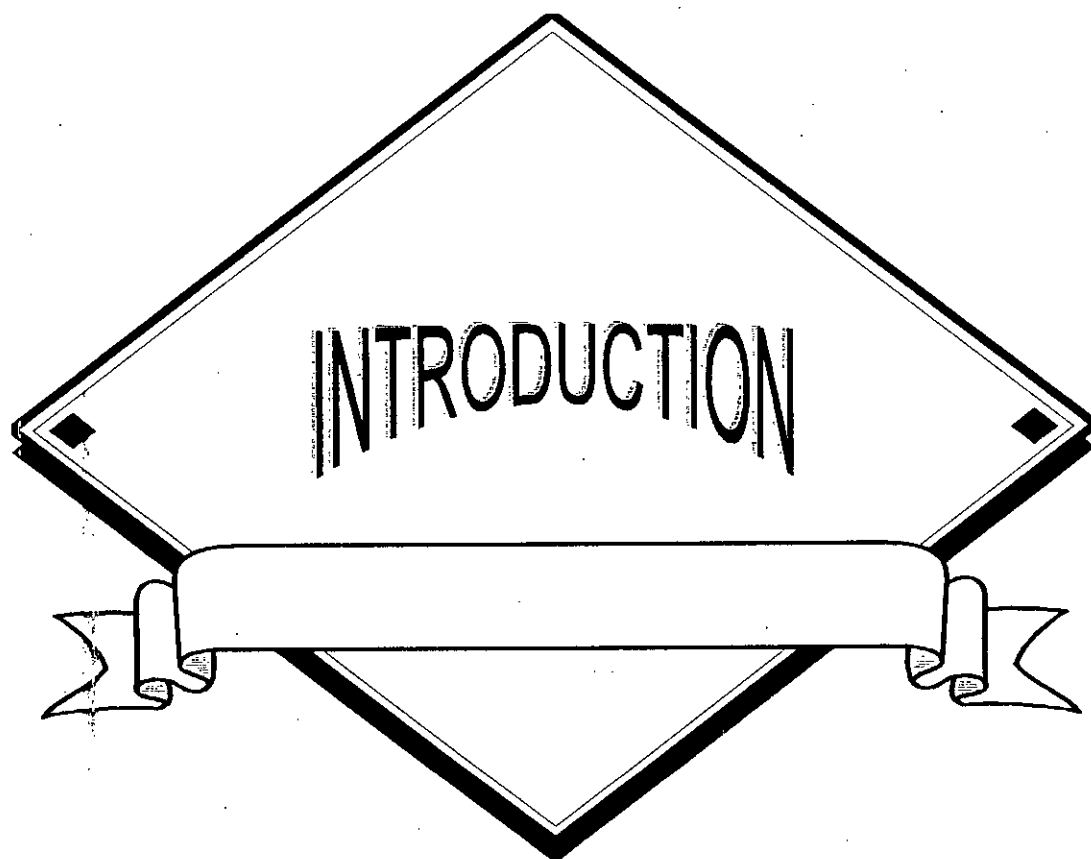
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CONTENTS

	Page
INTRODUCTION	1
REVIEW OF LITERATURE.....	4
MATERIALS AND METHODS.....	16
I. Samples collection and survey of the disease.	16
II. Isolation and cultivation of <i>S. citri</i>	16
II.A. Isolation from plant tissues using filtration.	16
II.B. Isolation from aborted seeds	17
III. Immunization and serology	18
III.A. Antigen preparation.....	18
III.B. Methods of rabbits injection	18
IV. Methods of <i>S. citri</i> detection	19
IV.A. Examination by Dark-field light microscopy.....	19
IV.B. Examination by electron microscopy	19
IV.C. Use of Dienes, stain to detect plant disease induced by <i>S. citri</i>	19
IV.D. Serodiagnosis.....	20
IV.D.a. The agglutination test.....	20
IV.D.b. Double gel diffusion	20
IV.D.c. Crossed immunoelectrophoresis	21
IV.D.d. Detection of <i>S. citri</i> using enzyme-linked immunosorbent assay (ELISA).....	24
IV.E. Biologically by grafting	26
V. Factors affecting growth of <i>S. citri</i>	26
V.A. Effect of temperature on growth <i>in vitro</i> of <i>S. citri</i>	26
V.A.a. Effect of incubation temp. on the amount of growth.....	26
V.A.b. Effect of direct temp. on viability of <i>S. citri</i>	26
V.A.c. Effect of direct temp. on antigenic properties	27
V.B. Effect of antibiotics on viability of <i>S. citri</i>	27
V.C. Daily changes of inoculated media pH and colour	28

VI. Determination of physical and chemical fruits quality	28
EXPERIMENTAL RESULTS	29
I. Symptoms of citrus stubborn disease	29
II. Survey of the disease in Egypt	29
III. Isolation of <i>S. citri</i>	32
IV. Immunization and serology	35
V. Methods of <i>S. citri</i> detection	37
V.A. Examination by Dark-field light microscope.....	37
V.B. Examination by electron microscope.....	37
V.C. Use of Dienes, stain to detect plant disease induced by <i>S.</i> <i>citri</i>	37
V.D. Serodiagnosis	37
V.D.a The agglutination test.....	37
V.D.b Double gel diffusion (DGD)	37
V.D.c. Crossed immunoelectrophoresis (CIF).....	40
V.D.d. Detection of <i>S. citri</i> using enzyme-linked immunosorbent assay (ELISA).....	40
V.E. Biologically by grafting	44
VI. Factors affecting growth of <i>S. citri</i>	44
VI.A. Effect of temperature on growth <i>in vitro</i> of <i>S. citri</i>	44
VI.A.a. Effect of incubation temp. on the amount of growth.....	44
VI.A.b. Effect of direct temp. on viability of <i>S. citri</i>	46
VI.A.c. Effect of direct temp. on antigenic properties	46
VI.B. Effect of antibiotics on viability of <i>S. citri</i>	46
VI.C. Daily changes of inoculated media pH and colour.	52
VII. Determination of physical and chemical fruits quality	52
DISCUSSION	56
SUMMARY	65
REFERENCES.....	68
ARABIC SUMMARY	



INTRODUCTION

Citrus is considered one of the important fruit crops in Egypt. The cultivated area is 340, 433 feddans which represents 32.2% of the total fruit cultivated area in Egypt. The citrus yield is 2, 243, 178 tons (Ministry of Agriculture, 1998).

Citrus stubborn disease caused by *Spiroplasma citri* Saglio *et al.* was first observed in Washington navel orange trees in California about 1915, the name "a corn disease" was also used to describe the disease because of the many a corn-shaped fruits found on diseased trees (Fawcett *et al.*, 1944). The disease has been described under such different names as "Safargali" disease of citrus in Egypt (Nour Eldin 1959) and little leaf in Israel (Chapot 1959).

It was first thought that, stubborn was caused by a virus. A close relation between mycoplasma like bodies and stubborn was first described by Igwegbe and Calavan (1970). Then Saglio *et al.* (1973) characterized and named the cause of disease as *Spiroplasma citri*. It was characteristically as a helically filamentous, motile, cell wall-less prokaryote which is a recognized representative of the family Spiroplasmataceae placing it in the order Mycoplasmatales and class Mollicutes. This microorganism was isolated and successfully cultured for the first time by Saglio *et al.* (1971) in France and Fudl-Allah *et al.* (1972) in USA.

Stubborn disease is found in most countries that grow citrus under desert or semi-arid conditions. It is a problem in the warmer areas of California and Arizona and in most of the countries of North Africa, the near and Middle East and the Arabian Peninsula. The disease has been

reported in Turkey, Greece, Italy, Mexico, Spain, Sudan and Pakistan (Roistacher, 1991).

Numerous studies have established that stubborn disease is a serious problem widely distributed in many Mediterranean and Mideast countries including Algeria, Corsica, Cyprus, Egypt, Iran, Iraq, Jordan, Lebanon, Morocco, Sardinia, Sicily, Syria, Tunisia and Turkey (Maramorosch and Raychaudhuri, 1988).

Also, the widespread of *S. citri* has been reported in Israel by Rassolly *et al.* (1994).

S. citri is capable of infecting several brassiceous cultivars and species representing nine other dicotyledonous families and one monocotyledonous family (Oldfield and Kaloostian 1979). In addition to, all important commercial varieties of citrus appear to be susceptible to stubborn when graft inoculated but in California natural infection occurs mostly in sweet orange, grapefruit, and tangelo trees (Carpenter 1959 and Calavan and Christiansen 1961).

The agent was transmitted by leaf hopper from three species of Cicadellidae, *Circulifer tenellus* (Baker), *Scaphytopius nitridus* (DeLong) and *Scaphytopius acutus delongi* Young from plant to plant under experimental conditions (Saglio *et al.*, 1973).

Citrus stubborn disease is one of the most destructive disease of citrus in the East Mediterranean countries. The pathogen causes heavy losses in yield and fruit quality (Kersting and Sengonca 1992). The disease is known to effect the size and to reduce the quality and quantity of the fruit (Rasooly *et al.*, 1994).

Since **Abou-Zeid *et al.* (1988)** there is no any published work on citrus stubborn in Egypt.

The main objectives of the present study are:

- 1- Isolation and cultivation of *S. citri*.
- 2- Identification of the causal agent by dark-field light microscopy, electron microscopy, 'Dienes' stain, serologically (ELISA) and biologically by grafting.
- 3- Preparation of Anti *S. citri* serum.
- 4- The efficiency of different serological techniques, i.e. the agglutination test, ELISA, double gel diffusion test and crossed immunoelectrophoresis in the detection of *S. citri*
- 5- Some factors affecting growth of *S. citri*.
- 6- The effect of the disease on the physical and chemical fruit quality of citrus trees.