STUDIES ON ALTERNARIA ROT IN CITRUS FRUITS AND ITS CONTROL

By

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B.Sc. Agric. Sci. (Plant Pathology), Fac. Agric., Al-Azhar Univ., 2003
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ABSTRACT

Abou-Ghanima Saad Fath El-Bab Shehata. Studies on Alternaria Rot in Citrus Fruits and its Control. Unpublished Ph.D. Thesis, Department of Plant Pathology, Faculty of Agriculture, Ain Shams University, 2017.

In this study data indicated that, the disease survey in the nurseries and orchards of citrus during 2011 till 2012 revealed that, citrus fruit-rot disease was presented in all the observed Governorates, *i.e.* Beheira, Kalyobia, Menofia, Ismaelia Gharbia, Dakahlia, Giza and Beni Suief Governorates. Also, the highest percentage of disease survey was obtained in Beheira, followed by Kalyobia while the lowest percentage in Dakahlia Governorate.

Also, the results showed that, the highest percentage of isolated fungus was *Alternaria alternata* (Fries) Keissler followed by *A. citri* Ellis and Pierce. The tested isolates were significantly various in their responsibility to cause the disease.

Pathogenicity tests showed that, the tested isolates of *A. citri* can be arranged led to their pathogenic capabilities such as, *A. citri* isolates (code S24), (S4) and (S26) whilst, *A. citri* (S68) was the lowest pathogenic isolate. Whilst, *A. citri* isolate code (S71) not gave disease symptoms when Minneola detached leaves were inoculated with *A. citri*. On the other side, results of varietal reaction indicated that, the tested citrus cultivars cv., *i.e.* Minneola was more susceptible (indicator host), Navel orange was highly susceptible to infect by *A. citri* compared with minneola but, valencia was more tolerant to infect by tested pathogen.

Also, data of polymerase chain reaction (PCR) detection (molecular biology techniques) revealed that, 16 isolates of *A. citri* were identified by using 5 specific primers (ITS, OPA10-2, OPA2-1, OPA1-3

and Endo-PG) but, analysis technique showed that, the diversity between *A. citri* isolates based on two primers (OPA1-3 and Endo-PG) two both primers showed the diversity between tested *Alternaria* isolates.

Therefore results of Alternaria toxin bioassay revealed that, induce and produce necrotic lesions on Minneola citrus detached leaves similar to those produced by the pathogen. Moreover, the disease symptom was appeared after 48-72hr.

The effect of different solid cultures media was studied on the growth, sporulation and conidiospore measures of *A. citri* resulted that, potato dextrose agar (PDA) medium gave the maximium growth, the highest spore production (sporulation) and the best spore size with all tested isolates of Alternaria.

This study was extended to include the biological control of causal pathogen of citrus fruit-rot disease. Five bioagents were used, *i.e. Trichoderma harzianum*, *Bacillus subtilis, T. album* (Bio-Zeid), *B. megaterium* (Bio-ARC) and *Bacillus* spp. (Omega). All bioagents were the most antagonistic action effect against the causal pathogenic isolates of *A. citri in vitro* and *in vivo* trials but, with different degrees. Chemical control results indicated that, the seven tested fungicides namely, Score, Montoro, Iprodione, Pyraclostrobine, Coprax, Coprareekh and Azoxystrobine were evaluated for their effect on the linear growth of *A. citri* isolates (code K2) causing citrus fruit-rot disease *in vitro* trials. Also, the same fungicides were evaluated for their effect on disease incidence *in vivo* trials. Score, Montoro, Iprodione, were the most effective fungicides against causal pathogen.

Key words: Citrus, Fruit-rot, Alternaria toxin bioassay, Biological control, chemical control.

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LIST OF ABBREVIATION

A	**:**	Alternaria
ABS	**:**	Alternaria brown spot
ABR	**:**	Alternaria black rot
ACT	**:**	*Alternaria citri* toxin
Agric.	**:**	Agriculture
a.i.	**:**	Active ingredient
AKT	**:**	*Alternaria kikuchiana* toxin
AMT	**:**	*Alternaria mali* toxin
ANOVA	**:**	Analysis of variance
CFU	**:**	Colony forming unit
CLM	**:**	Czapek's liquid medium
CV	**:**	Cultivar
DNA	**:**	Deoxyribonucleic acid
Endo-PG	**:**	Endo-polygalacturonase
EC	**:**	Emulsifiable concentrate
Fac.	**:**	Faculty
Fig.	**:**	Figure
f.sp.	**:**	Form specials
G	**:**	Granules
g	**:**	Gram(s)
GFP	**:**	Green fluorescent protein
HSTs	**:**	Host-selective toxins
ITS	**:**	Internal transcript spacer
KG	**:**	Kilogram
L	**:**	Liter
LSD	**:**	Least significant differences

L.W.	**:**	Losses of weight
M. Sc.	**:**	Master Science
NA	**:**	Nutrient agar medium
NB:	**:**	Nutrient broth medium
PCR	**:**	Polymerase chain reaction
Ph.D.	**:**	Doctor of philosophy
PPM	**:**	Part per million
PPO	**:**	Polyphenol oxidase
pv	**:**	Pathovar
SC	**:**	Soluble concentrate
T	**:**	Trichoderma
TBZ	**:**	Thiabendazole
Univ.	**:**	University
UV	**:**	Ultraviolet
WA	**:**	Water agar
WP	**:**	Watible powder