



شبكة المعلومات الجامعية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Ain Shams University Information Network  
جامعة عين شمس

شبكة المعلومات الجامعية

@ ASUNET



# شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم





شبكة المعلومات الجامعية

# جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأفلام قد أعدت دون أية تغيرات



## يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of  
15-25- c and relative humidity 20-40%

# بعض الوثائق الأصلية تالفة



# بالرسالة صفحات لم ترد بالاصل



**ANTIVIRAL SUBSTANCES INDUCED  
IN PLANTS AS A RESULT OF  
VIRUS INFECTION**

B5789

By

**SABRY YOUNIS MOHAMED MAHMOUD**

B.Sc. (Plant Pathology), Kafr El-Sheikh, Tanta University (1984)

M.Sc. (Plant Pathology), Kafr El-Sheikh, Tanta University (1993)

A thesis submitted in partial fulfillment  
of  
the requirements for the degree of

**DOCTOR OF PHILOSOPHY**

in  
Agricultural Science  
(Agricultural Virology)

Department of Agric. Microbiology  
Faculty of Agriculture  
Ain Shams University

2000



APPROVAL SHEET

ANTIVIRAL SUBSTANCES INDUCED  
IN PLANTS AS A RESULT OF  
VIRUS INFECTION

By

**SABRY YOUNIS MOHAMED MAHMOUD**

B.Sc. (Plant Pathology), Kafr El-Sheikh, Tanta University (1984)

M.Sc. (Plant Pathology), Kafr El-Sheikh, Tanta University (1993)

This thesis for Ph.D. Degree has been approved by :

**Prof. Dr. A.I. Abo El-Ghar** ..... *A.I. Abo El-Ghar* .....

**Prof. of Plant Pathology, Fac. of Agric.,  
Minufiya University.**

**Prof. Dr. B.A. Othman** ..... *B.A. Othman* .....  
*30/4*

**Prof. of Agricultural Virology, Department of  
Agricultural Microbiology, Faculty of Agric.,  
Ain Shams University.**

**Prof. Dr. M.A. Abo El-Nasr** ..... *M.A. Abo El-Nasr* .....

**Prof. of Agricultural Virology, Department of  
Agricultural Microbiology, Faculty of Agric.,  
Ain Shams University. (Supervisor)**

Date of examination *30/4* /2000





# **ANTIVIRAL SUBSTANCES INDUCED IN PLANTS AS A RESULT OF VIRUS INFECTION**

By

**SABRY YOUNIS MOHAMED MAHMOUD**

B.Sc. (Plant Pathology), Kafr El-Sheikh, Tanta University (1984)

M.Sc. (Plant Pathology), Kafr El-Sheikh, Tanta University (1993)

Under the Supervision of :

**Prof. Dr. M.A. Abo El-Nasr**

Professor of Agricultural Virology (Department of  
Agricultural Microbiology, Faculty of Agriculture, Ain  
Shams University).

**Prof. Dr. K.A. El-DougDoug**

Professor of Agricultural Virology (Department of  
Agricultural Microbiology, Faculty of Agriculture, Ain  
Shams University).

**Prof. Dr. F.M. Maklad**

Professor of Plant Pathology (Plant Pathology  
Department, National Research Centre, Dukki,  
Giza, Egypt).





## ABSTRACT

**Sabry Younis Mohamed Mahmoud "Antiviral substances induced in plants as a result of virus infection", unpublished Doctor of Philosophy Dissertation, University of Ain Shams, Faculty of Agriculture, Department of Agric. Microbiology, 2000.**

Bean yellow mosaic virus (BYMV) was isolated depending on symptoms, ELISA and electron microscope from different governorates during season 1996. Tomato mosaic virus (ToMV) isolate was identified by indicator hosts and electron microscopy. It was found that *C. amaranticolor* is the suitable hypersensitive host to both viruses, based on acquired resistance and SDS-PAGE.

In leaves of *Chenopodium amaranticolor* locally infected by Tomato mosaic virus (ToMV) or Bean Yellow Mosaic Virus (BYMV), antiviral substance (AVS) was formed after 5 and 6 days from inoculation respectively in inoculated and uninoculated leaves as inhibitor of virus biosynthesis. Crude AVS was extracted by hydrated calcium phosphate and it was purified by DEAE - column chromatography. AVS was acquired systemic resistance against a virus-challenge inoculation. AVS consists of protein and carbohydrate (phosphorylated - glucoprotein) with a molecular weight of 19,400 and 21,500 Kda.

AVS lost its antiviral activity when treated with alkaline phosphate and  $\alpha$ -glucosidase, while it does not when treated with lipase as well as it is inhibited by actinomycin D. This lead to think that its formation depends on the same mechanism which is responsible for the synthesis of cellular RNA, DNA-dependent.

By non-denaturing PAGE, AVS is separated into one antiviral active band in both ToMV and BYMV. SDS-PAGE in denaturing conditions revealed at least two new bands with respect to compared extracts of healthy plants.

The AVS-product is production of non-specific antiviral substances in a general, defence response in plants to viral infections, which could be utilized for practical purposes, such as the use of AVS treatments under green-house conditions and in open field, or the production of transgenic plants producing AVS in the future.

**Key Words:** BYMV, ToMV, Induced resistance, ELISA, Hypersensitivity, Antiviral substances (AVSs), DEAE-Cellulose column chromatography, Gel filtration column chromatography and SDS-PAGE.

## ACKNOWLEDGMENT

**Praise and thanks be to ALLAH, the most merciful for assisting and directing me to the right way**

I would like to thank my advisor **Prof. Dr. M.A. Abo El-Nasr**, Professor of Agriculture Virology, Faculty of Agriculture, Ain-Shams University for suggesting the problems. I like to state that without his inspiration, this work would not have come out.

My heartily thanks are due to **Prof. Dr. Kh.A. El-DougDoug**, Prof. of Agric. Virology, Department of Agric. Microbiology, Fac. of Agric., Ain Shams Univ. for his sincere, kind supervision, critical and valuable criticism either throughout the present work or during writing the thesis which help in illustrating the thesis as it offered now.

Thanks are due to **Prof. Dr. F.M. Maklad**, Prof. of Plant Pathology, National Research Center for their kind helping and valuable suggestions throughout the period of the present work.

Thanks are also contributed my advisor **Prof. Dr. Afaf S. Fahmy**, Professor of Biochemistry, Molecular Biology Department, National Research Centre for her continuous supervision, kind help encouragement through the course of this work and giving the full facilities for proper research work.

I would like to thank **Dr. Saleh A. Mohamed** and **Dr. Tarek M. Mostaffa**, Lecture of Molecular Biology, Molecular Biology Department, National Research Centre, for their valuable help and providing the materials for the various experiments.

I wish to thank all the staff members of the Plant Pathology Department, National Research Center, specially, **Prof. Dr. A.A. Morsy** and Department of Agric. Microbiol., Fac. of Agric., Ain Shams Univ., for their help during this study.



