



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغييرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



HANAA ALY

**STUDIES ON SOME MEDICINAL PLANT
EXTRACTS FOR COMBATING MICROBIAL
INFECTION OF *SOLANUM TUBEROSUM***

Submitted By

Dina Gamal Abd El-Azeem Nasr El-Din

B.Sc. of Science (Chemistry/Botany), Faculty of Science, Cairo University, 2010

Diploma of Biochemical Analysis, Faculty of Science, Ain Shams University, 2013

A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Master Degree

In

Environmental Sciences

Department of Environmental Basic Sciences

Institute of Environmental Studies and Research

Ain Shams University

2020

APPROVAL SHEET
**STUDIES ON SOME MEDICINAL PLANT
EXTRACTS FOR COMBATING MICROBIAL
INFECTION OF *SOLANUM TUBEROSUM***

Submitted By

Dina Gamal Abd El-Azeem Nasr El-Din

B.Sc. of Science (Chemistry/Botany), Faculty of Science, Cairo University, 2010

Diploma of Biochemical Analysis, Faculty of Science, Ain Shams University, 2013

A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Master Degree

In

Environmental Sciences

Department of Environmental Basic Sciences

This thesis was discussed and approved by:

The Committee Signature
1- Prof. Dr. Mohamed Emad Azzab Ali El Fakharani

Prof. & Head of Organic Chemistry Division

Faculty of Science

Ain Shams University

2-Prof. Dr. Rawhia Abd El-Monem Arafa

Prof. of Microbiology and Botany

Faculty of Science (Girls)

Al-Azhar University

3-Prof. Dr. Taha Abd El Azim Mohamed Abd El- Razek

Prof. of Environmental Chemistry, Department of Environmental

Basic Sciences - Institute of Environmental Studies & Research

Ain Shams University

4-Prof. Dr. Azza Mohamed Ali

Prof. & Head of Postharvest Diseases Department

Plant Pathology Research Institute

Agricultural Research Center

**STUDIES ON SOME MEDICINAL PLANT
EXTRACTS FOR COMBATING MICROBIAL
INFECTION OF *SOLANUM TUBEROSUM***

Submitted By

Dina Gamal Abd El-Azeem Nasr El-Din

B.Sc. of Science (Chemistry/Botany), Faculty of Science, Cairo University, 2010

Diploma of Biochemical Analysis, Faculty of Science, Ain Shams University, 2013

A Thesis Submitted in Partial Fulfillment

Of

The Requirement for the Master Degree

In

Environmental Sciences

Department of Environmental Basic Sciences

Under The Supervision of:

1-Prof. Dr. Taha Abd El Azim Mohamed Abd El- Razek

Prof. of Environmental Chemistry, Department of Environmental

Basic Sciences - Institute of Environmental Studies & Research for

Ain Shams University

2-Prof. Dr. Azza Mohamed Ali

Prof. & Head of Postharvest Diseases Department

Plant Pathology Research Institute

Agricultural Research Center

2020

ACKNOWLEDGEMENT

First and foremost my unlimited thanks to "ALLAH", the Most Beneficent and Merciful, who gave me the strength to accomplish this work.

*I would like to express my great thanks and gratitude to my supervisor, **Prof. Dr. Taha Abd EL Azim M. A. Razeq**, Prof. of Environmental Chemistry, Department of Environmental Basic Sciences - Institute of Environmental Studies and Research, Ain Shams University, for the directions on which this message was based, he was a symbol of abundant giving throughout the study period. He dedicated time and effort and provided valuable instructions in all stages of the present study. May Allah reward him with the best reward and wellbeing the continuity of wellness; may Allah accept this work in his good deeds.*

*I would like also to thank **Prof. Dr. Azza Mohamed Ali Naffea**, Prof. and Head of post-harvest diseases Research Dept. Plant pathology Research Institute, ARC, for her sincere advices and guidance and giving me a lot of time and effort, may God give her the best.*

*I have the honor to thank, with all appreciation **Prof. Dr. Mohammed Emad Azab**, Prof. and Head of Organic Chemistry, Division - Chemistry Dept. Faculty of Science, Ain Shams University, for his great support and beneficial directions.*

*I would like also to extend my sincere thanks to **Prof. Rgwhia Abd EL Monem Arafu**, Prof. of Applied Bacteriology, Plant Microbiology Dept. Faculty of Science, Al-Azhar University, for his help and continuous support throughout the whole work.*

*My great thanks and gratitude to my Father and my Mother, **Prof. Dr. Soad Fayek**, Professor of Agricultural Economics, Agri. Eco. Research Institute, Agri. Research Center, and my sister for their endless efforts, great hardship and continuous support in every step of my life.*

*I can't forget to thank the present yet absent, **Prof. Mohamed El Malki**, Institute of Env. Studies and Research, Ain Shams University, for giving me a strong and positive motivation to initiate this study, may mercy and blessings of Allah be upon him., Also, to my Grandfather and Grandmother, God's mercy and blessings be upon them all.*

My gratitude is extended also to all staff members of the Post-harvest Pathology Research Department, Agric. Res. Center, Giza, Brown Rot Project (PBRP), El Dokki and Egyptian Scientific Society of Moringa, Horticulture Technology Department, National Research Center. Last but not least, I thank all those who helped me in every step; surely Allah does not waste the reward of the good-doers.

 **Dina Gamal Abd El-Azeem Nasr El-Din**

ABSTRACT

Fungicidal effect of *Moringa oleifera* plant parts extract such as oil, leaves and *Simmondsia chinensis* compared with effect of Imazalil was investigated *in vitro* and *in vivo* against eight pathogenic 5 fungi and 3 bacteria that infected potato tubers i.e., *Alternaria solani*, *Fusarium solani*, *Helminthosporium solani*, *Rhizoctonia solani*, *Sclerotinia sclerotiorum*, *Ralstonia solanacearum*, *Erwinia carotovora* and *Streptomyces scabies*. The pathogens causing many diseases during the growing and post-harvest season. Controlling of such diseases mainly depend on synthetic fungicides treatments, that cause hazards to the health of human, animal and increase environmental pollution. such as Imazalil is classified as carcinogenic in humans. Due to this, there is an increasing interest to find new strategies of fungicides alternative for using in plant disease control systems. leaves and oil extracts of *Moringa oleifera* significantly reduced radial growth, disease severity and improved quality parameters for all tested pathogens. *M. oleifera* extracts had different degrees of antifungal activity against tested pathogens. Reduction effect on test pathogens was increased by the increase concentrations of *M. oleifera* extracts. The highest reduction records on radial growth of all tested pathogens were at (30 % and 1.5%) third concentrations of leaves and oil extracts. *Fusarium solani*, *A. solani*, *Ralstonia solanacearum* and *Erwinia carotovora* were highly affected by *M. oleifera* extracts and Imazalil than other treatments. Oil and leaves extracts of *Moringa oleifera* may be recommended as a potent bio-fungicide. This is a preliminary study on the use of *M. oleifera* extracts *Simmondsia chinensis* (*Jobba oli*) as a natural fungicide against plant pathogens in Egypt. Extensive studies should be undertaken for the leaves extracts of *Moringa oleifera* as strong antifungal agents against fungal plant diseases in future studies.

Keywords: *Moringa oleifera*, *Jobba*, diseases of potato, pathogenic fungi, pathogenic bacteria, Antifungal activity, Antibacterial activity, Weight loss, Sporulating, Firmness.

CONTENTS

Subject	Page
ACKNOWLEDGEMENT	i
CONTENTS	ii-x
ABSTRACT	1
INTRODUCTION	3-7
REVIEW OF LITREATURE	8-ε4
1. Economic importance of potato tubers	9
2. The organisms causing post-harvest diseases for potato tubers	12
2.1.Fungal infection of potato tubers	12
2.2.Bacterial infection of potato tubers	15
3. Pathogenicity of infected diseases to potato tubers	17
4. Syndrome of some post-harvest diseases of potato tubers	23
5. Economic significance of some post-harvest diseases on potato tubers	29
6. Control of studies	ε1
6.1. Effect of certain fungicides on fungal growth of <i>Fusarium</i> spp. and dry rot of potato tubers	ε0
6.2. Effect of certain natural plant oils on linear growth of <i>Fusarium</i> spp. and dry rot of potato tubers	ε7
6.3. Effect of certain natural plant oils on linear growth of <i>Rhizoctonia solani</i> and Black scurf disease of potato tubers	ε9
7. The chemical and Natural treatments	ε0
7.1. Imazlil as a chemical control	ε0
7.2. Plant extracts as a natural control	ε1
7.2.1. <i>Moringa oleifera</i> Lam. (Family: Moringaceae)	ε1
7.2.2. <i>Jojoba</i> (<i>Simmondsia chinensis</i>) (Family: Simmondsiaceae)	εε
AIM OF STUDY	ε0
MATERIALS AND METHODS	ε7-08

1. Survey of post-harvest diseases of potato tubers	٤٨
2. Plant extracts	٤٨
3. Fungicide	٤٨
4. Isolation and identification	٤٩
5. Isolated microbial pathogens	٥٠
5.1. Fungal pathogens	٥٠
5.2. Bacterial pathogens	٥٠
6. Pathogenicity	٥٠
7. Control of Post-harvest diseases	٥٢
7.1. <i>In vitro</i> treatments	٥٢
7.1.1. Effect of <i>moringa</i> oil on mycelia growth	٥٢
7.1.2. Effect of <i>moringa</i> leaves extracts against mycelia growth	٥٢
7.1.3. Effect of <i>Simmondsia chinensis</i> (<i>Jojoba</i>) oil on mycelia growth	٥٣
7.1.4. Effect of Imazalil as chemical treatment on mycelia growth	٥٤
7.2. <i>In vivo</i> treatments	٥٤
8. Quality parameters of potato tubers	٥٦
8.1. Disease severity	٥٧
8.2. Disease incidence	٥٧
8.3. Loss in Weight	٥٧
8.4. Sprouting	٥٧
8.5. Tuber firmness	٥٨
9. Statistical analysis	٥٨
RESULTS	٥٩-٩٢
A- Surveying of the frequency (%) of isolated fungi from potato tubers that collected from different Egyptian governorates.	٦٠
B- Surveying of the frequency (%) of isolated Bacteria from potato tubers that collected from different Egyptian governorates.	٦١
C- Pathogenicity test of fungi and bacteria isolated from potato tubers.	٦٢
I. Control of Post-harvest diseases <i>In vitro</i> :	٦٣

i. Effect of <i>Moringa oleifera</i> extracts and <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil compared with Imazalil against mycelial growth of <i>Alternaria solani</i> on PDA medium.	٦٣
ii. Effect of <i>Moringa oleifera</i> extracts and <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil compared with Imazalil against mycelial growth of <i>Fusarium solani</i> on PDA medium.	٦٧
iii. Effect of <i>Moringa oleifera</i> extracts and <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil compared with Imazalil against mycelial growth of <i>Helminthosporium solani</i> on PDA medium.	٧١
iv. Effect of <i>Moringa oleifera</i> extracts and <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil compared with Imazalil against mycelial growth of <i>Rhizoctonia solani</i> on PDA medium.	٧٥
v. Effect of <i>Moringa oleifera</i> extracts and <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil compared with Imazalil against mycelial growth of <i>Sclerotinia sclerotiorum</i> on PDA medium.	٧٩
vi. Efficacy of <i>Moringa oleifera</i> extracts and <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil compared with Imazalil against pathogenic bacteria (<i>Ralstonia solanacearum</i> , <i>Erwinia carotovora</i> and <i>Streptomyces scabies</i>) on PDA medium.	٨٣
II. Control of Post-harvest diseases <i>In vivo</i> :	٨٥
i. Effect of post-harvest dipping of the potato tubers with <i>Moringa oleifera</i> extracts, <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil and Imazalil against pathogenic fungi on artificial inoculated potato	٨٥
ii. Effect of post-harvest dipping of the potato tubers with <i>Moringa oleifera</i> extracts, <i>Simmondsia chinensis</i> (<i>Jajoba</i>) oil and Imazalil against pathogenic bacteria on artificial inoculated potato	٨٦

iii. Effect of post-harvest dipping of the potato tubers with <i>Moringa oleifera</i> extracts, <i>Simmondsia chinensis</i> (<i>Jjoba</i>) oil and Imazalil against natural infected potato and sprouting percentage	٨٧
iv. Quality parameter to effect of post-harvest treatments on sprouting (%) of artificial inoculated potato with pathogenic fungi.	٨٧
v. Quality parameter to effect of post-harvest treatments on sprouting (%) of artificial inoculated potato with pathogenic bacteria.	٨٨
vi. Quality parameter to effect of post-harvest treatments on weight loss (%) of artificial inoculated potato with pathogenic fungi.	٨٩
vii. Quality parameter to effect of post-harvest treatments on weight loss(%) of artificial inoculated potato with pathogenic bacteria.	٩٠
viii. Quality parameter to effect of post-harvest treatments on weight loss (%) of natural infected potato with tested pathogens.	٩٠
ix. Quality parameter to effect of post-harvest treatments on Firmness (N) of artificial inoculated potato tubers with pathogenic fungi.	٩١
x. Quality parameter to effect of post-harvest treatments on Firmness (N) of artificial inoculated potato tubers with pathogenic bacteria.	٩١
xi. Quality parameter to effect of post-harvest treatments on Firmness (N) of natural infected potato during storage at 25°C for 45 days.	٩٢
DISCUSSION	٩٣-١٠٤
SUMMARY	١٠٥-١١٢
REFERENCES	١١٣-١٢٨
ARABIC SUMMARY	١-8`

LIST OF FIGURES

Figure Title		Page
Figure (1):	Number (N) of isolated fungi from potato tubers that collected from different Egyptian governorates.	60
Figure (2):	Number (N) of isolated bacteria from potato tubers that collected from different Egyptian governorates.	61
Figure (3):	Disease severity (%) of fungi and bacteria that isolated from potato tubers.	62
Figure (4):	Efficacy (%) of <i>Moringa oleifera</i> leaves extract against linear growth of <i>Alternaria solani in vitro</i> .	63
Figure (5):	Efficacy (%) of <i>Moringa oleifera</i> oil against linear growth of <i>Alternaria solani in vitro</i> .	63
Figure (6):	Efficacy (%) of <i>Simmondsia chinensis</i> (<i>Jojoba</i>) oil against linear growth of <i>Alternaria solani in vitro</i> .	64
Figure (7):	Efficacy (%) of Imazalil against linear growth of <i>Alternaria solani in vitro</i> .	64
Figure (8):	Efficacy (%) of <i>Moringa oleifera</i> leaves extract against linear growth of <i>Fusarium solani in vitro</i> .	67
Figure (9):	Efficacy (%) of <i>Moringa oleifera</i> oil against linear growth of <i>Fusarium solani in vitro</i> .	67
Figure (10):	Efficacy (%) of <i>Simmondsia chinensis</i> (<i>Jojoba</i>) oil against linear growth of <i>Fusarium solani in vitro</i> .	68
Figure (11):	Efficacy (%) of Imazalil against linear growth of <i>Fusarium solani in vitro</i> .	68

Figure (12):	Efficacy (%) of <i>Moringa oleifera</i> leaves extract against linear growth of <i>Helminthosporium solani in vitro</i> .	71
Figure (13):	Efficacy (%) of <i>Moringa oleifera</i> oil against linear growth of <i>Helminthosporium solani in vitro</i> .	71
Figure (14):	Efficacy (%) of <i>Simmondsia chinensis</i> (<i>Jojoba</i>) oil against linear growth of <i>Helminthosporium solani in vitro</i> .	72
Figure (15):	Efficacy (%) of Imazalil against linear growth of <i>Helminthosporium solani in vitro</i> .	72
Figure (16):	Efficacy (%) of <i>Moringa oleifera</i> leaves extract against linear growth of <i>Rhizoctonia solani in vitro</i> .	75
Figure (17):	Efficacy (%) of <i>Moringa oleifera</i> oil against linear growth of <i>Rhizoctonia solani in vitro</i> .	75
Figure (18):	Efficacy (%) of <i>Simmondsia chinensis</i> (<i>Jojoba</i>) oil against linear growth of <i>Rhizoctonia solani in vitro</i> .	76
Figure (19):	Efficacy (%) of Imazalil against linear growth of <i>Rhizoctonia solani in vitro</i> .	76
Figure (20):	Efficacy (%) of <i>Moringa oleifera</i> leaves extract against linear growth of <i>Sclerotinia sclerotiorum in vitro</i> .	79
Figure (21):	Efficacy (%) of <i>Moringa oleifera</i> oil against linear growth of <i>Sclerotinia sclerotiorum in vitro</i> .	79
Figure (22):	Efficacy (%) of <i>Simmondsia chinensis</i> (<i>Jojoba</i>) oil against linear growth of <i>Sclerotinia sclerotiorum in vitro</i> .	80
Figure (23):	Efficacy (%) of Imazalil against linear growth of <i>Sclerotinia sclerotiorum in vitro</i> .	80

Figure (24):	Effect of post-harvest treatment on sprouting (%) of artificial inoculated potato with pathogenic fungi.	87
Figure (25):	Effect of post-harvest treatment on sprouting (%) of artificial inoculated potato with pathogenic bacteria.	88
Figure (26):	Effect of post-harvest treatments on weight loss (%) of potato tubers on artificial inoculated with five pathogenic fungi during storage at 25°C for 45 days.	89
Figure (27):	Effect of post-harvest treatments on weight loss (%) of potato tubers on artificial inoculated with three pathogenic bacteria during storage at 25°C for 45 ays.	90
Figure (28):	Effect of post-harvest treatments on weight loss (%) of potato tubers on natural infection during storage at 25°C for 45 days.	90
Figure (29):	Effect of post-harvest treatments on firmness (N) of potato tubers on artificial inoculated with five pathogenic fungi during storage at 25°C for 45 days.	91
Figure (30):	Effect of post-harvest treatments on firmness (N) of potato tubers on artificial inoculated with three pathogenic bacteria during storage at 25°C for 45 days.	91
Figure (31):	Effect of post-harvest treatments on firmness (N) of potato tubers on natural infection during storage at 25°C for 45 days.	92