Effect of Some Formulated Plant Extracts against Microorganisms Causing Rots in Post Harvest Potatoes

A Thesis Submitted In Partial Fulfillment
For The Master Degree
In
Microbiology

By:
Shaymaa Abdel Wahab Abdel Sadyek Mohamed
(B. Sc. Microbiology – Chemistry)
Faculty of Girls for Arts, Sciences and Education
Ain Shams University
2001

Botany Department
Faculty of Girls for Arts, Sciences and Education
Ain Shams University
2007

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By:
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This work is achieved under supervision of:

Dr. Zeinab Hassan Kheiralla

Professor of Microbiology,

Botany Department,

Faculty of Girls for Arts, Sciences and Education,

Ain Shams University**.**

Dr. Fatmah Abdel Wahab Helimesh

Professor of Microbiology,

Botany Department,

Faculty of Girls for Arts, Sciences and Education,

Ain Shams University**.**

Dr. Yasser Wahied Abdel Fattah EL Sheikh

Researcher,

Pesticides Formulation Department,

Central Agricultural Pesticides Laboratory.

Agriculture Research Center

2007

APPROVAL SHEET

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This Thesis Towards A Master Degree

In

Microbiology Has Been Approved By:

Supervisors	**Signature**
1.Dr. Zeinab Hassan Kheiralla	……...
2.Dr. Fatmah Abdel Wahab Helimesh	……...
2. Dr. Yasser Wahied Abdel Fattah EL Sheikh	……...

2007

تأثير بعض مستحضرات المستخلصات النباتية على الكائنات الدقيقة المسببة لأعفان البطاطس في المخزن

رسالة مقدمة من:

شيماء عبدالوهاب عبدالصادق محمد

بكالوريوس العلوم (ميكروبيولوجي – كيمياء)

كلية البنات – جامعة عين شمس

٢٠٠١

للحصول على درجة الماجستير في العلوم (الميكروبيولوجي)

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كلية البنات للآداب والعلوم والتربية

رسالة ماجستير

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لجنة الاشراف:

*** أ.د. زينب محمد حسن خيرالله**	أستاذ الميكروبيولوجي، كلية البنات للآداب والعلوم والتربية - جامعة عين شمس
*** أ.د. فاطمة عبدالوهاب حليمش**	أستاذ الميكروبيولوجي (متفرغ) ، كلية البنات للآداب والعلوم والتربية، جامعة عين شمس
*** د. ياسر وحيد عبدالفتاح الشيخ**	باحث، قسم بحوث مستحضرات المبيدات، المعمل المركزي للمبيدات، مركز البحوث الزراعية

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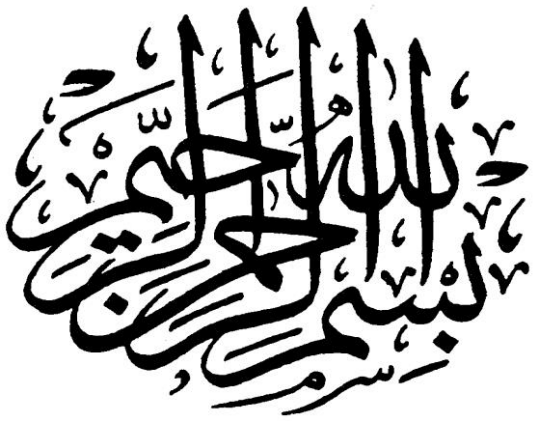

" وَعَلَّمَكَ مَا لَمْ تَكُن تَعلَمُ
وَكَانَ فَضلُ اللهِ عَلَيكَ عَظِيمًا
"

صدق الله العظيم

(سورة النساء جزء من الآية ١١٣)

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Contents

ABSTRACT

Name: Shaymaa Abdel Wahab Abdel Sadyek Mohamed**.**

Title: Effect of Some Formulated Plant Extracts against Microorganisms Causing Rots in Post Harvest Potatoes.

Ethanolic extracts from leaves and/or flowers of 9 medicinal plants grown in the Egyptian environment were screened for antimicrobial activity against the main post-harvest disease of potatoes, the fungal dry rot caused by *Fusarium oxysporum* and *Fusarium solani* and the bacterial soft rot caused by *Eriwinia carotovora* isolated from infected potato tubers. The effective plants were then extracted by two different methods; consequent extraction by different solvents differeing in polarities and hydrodistillation by Clevenger-type apparatus. The essential oil of *Ocimum basilicum* was the most effective extract against *F. oxysporum* while the essential oil of *Mentha spicata* was the most effective one against *F. solani*. The chloroformic extract of *Cassia acutifolia* fruits was the most effective extract against *E. carotovora*. Chemical separation and identification of the effective extracts showed that the eugenol and methyl cinnamate compounds had antimicrobial activities against targets used. They showed the lowest Minimum Inhibatory Concentrations (MICs) for both *F.oxysporum* and *F. solani* (MIC = 200 ppm). When compared with other separted compounds linalool they had little antimicrobial activity, while 1,8-cineol and 9,12-octadecdienoic acid had no activity. The application of the separated effective in formulation forms like granules (G), dustable powder (DP) and emulsifiable concentration (EC) gave significant yield of potato crop when compared with the recommended pesticide used in the field.

Keywords: antifungal, antibacterial activity, *Ocimum basilicum, Mentha spicat, Fusarium oxysporum, Fusarium solani, Eriwinia carotovora,* potatoes dry rot, bacterial soft rot, formulations, eugenol, methyl cinnamate.

AIM OF THE WORK

The objectives of this work were to evaluate the antimicrobial activity of some naturally occurring materials extracted from plants. The investigation was carried out through the following steps:

- Screening a variety or more of plants extracts selected from different plant families against both fungal dry rot and bacterial soft rot
- Selection the most effective plant extracts against the tested targets, then extracting both fresh and dry plants samples with different extraction techniques
- Determination the most effective extract against the investigated microorganisms to separate and identify their active components.
- Applying the isolated effective compounds in suitable formulations to use it easily in the field trial application.

INTRODUCTION

Potatoes are one of the world's most important food crops. Potatoes, compared to most horticultural crops have a long storage life. This difference is due to many physical attributes of potatoes. They are storage organs and so have many stored food reserves and also "nature" has designed them to last at least until the following season, to sprout again and begin the next generation.

Potatoes, as a result are often regarded as tough or robust vegetables. This is a misconception and it does not mean that potatoes shouldn't be handled with care. It has been estimated that losses due to physical wounding, such as cuts and bruises can be as high as 40%.

If potatoes are harvested when the stem and foliage is still green and vigorous or has just recently been cut, the tubers are immature and have very delicate skins. These potatoes are sometimes sold as 'new potatoes' and fetch a premium price. However they are difficult to handle as their natural skin is easily removed there is no defense against microbial infection and rots.

Most potatoes are harvested later when the foliage dies and when the skin of the potato is more developed. At this stage the skin is much tougher but rough handling during harvesting and grading can easily damage the potato skin. This damage can detract from tuber quality, increases moisture loss and provide easy entry points for post harvest rots **(Jobling, 2000a).**

The two main post harvest rots of potatoes are bacterial soft rot and fungal dry rot. **Bacterial soft rot** (*Erwinia sp.*) – soft rot erwinias