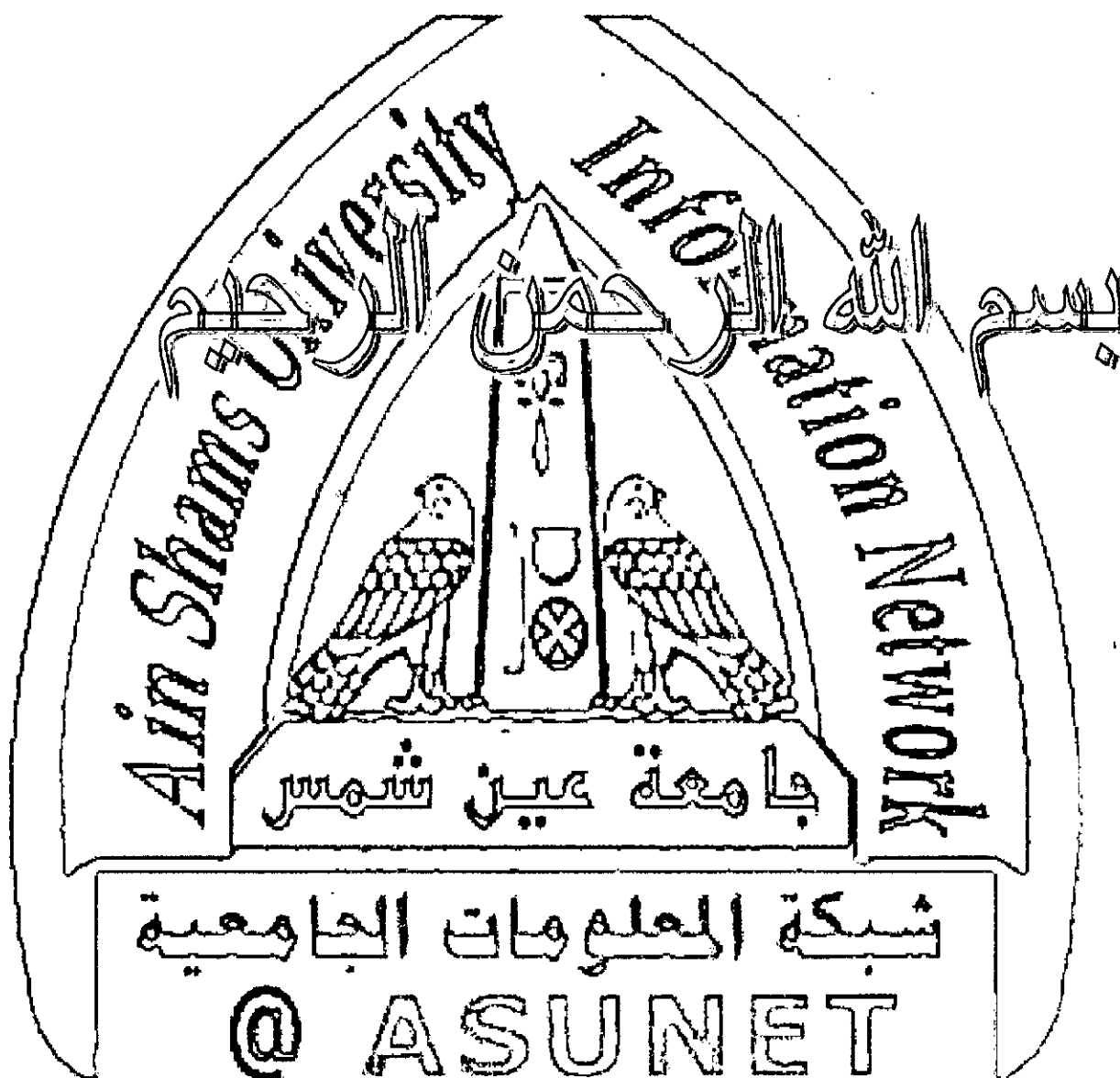




شبكة المعلومات الجامعية





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
على هذه الأفلام قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

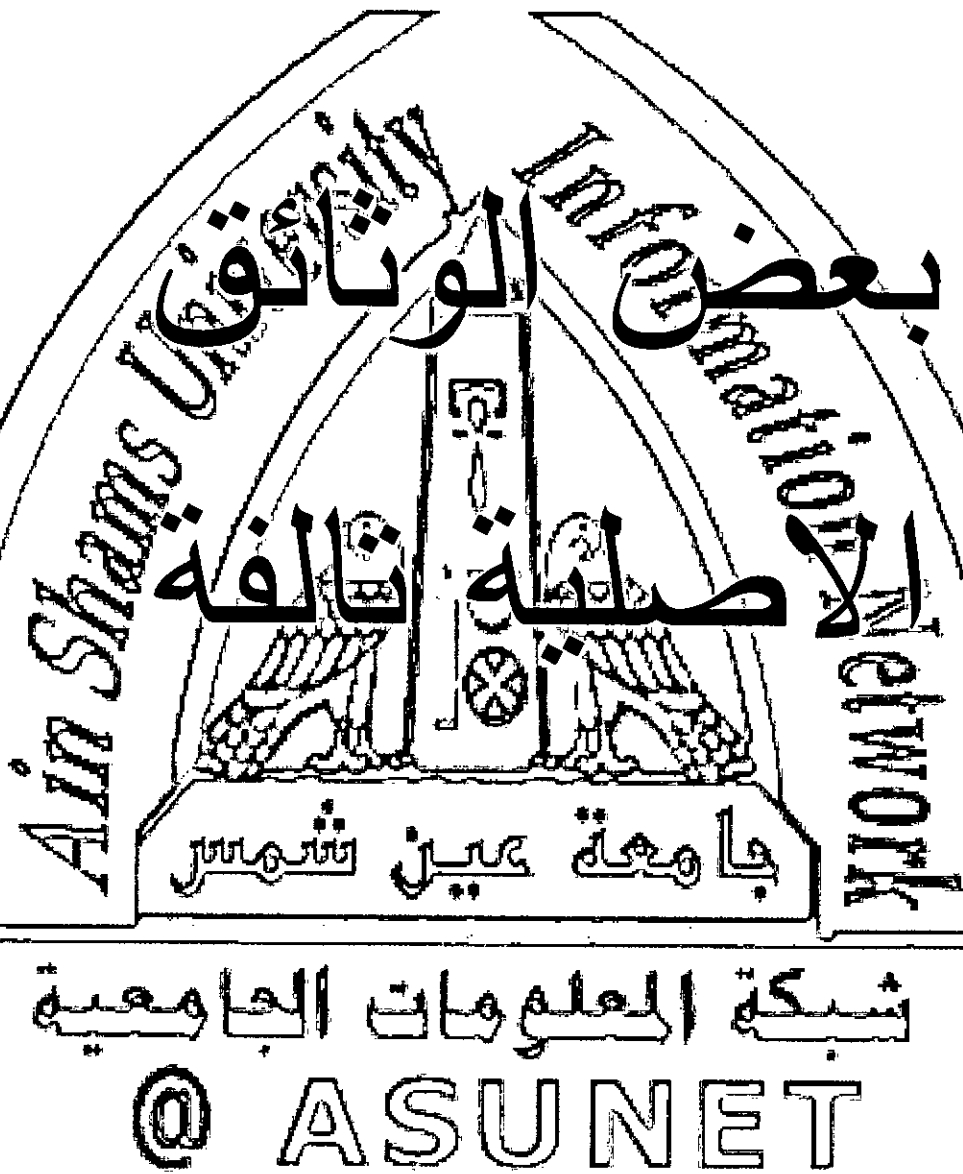
في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

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

بالرسالة صفحات لم



شبكة المعلومات الجامعية
@ ASUNET



**Studies on application of some plant products and their
mixtures with modified atmospheres against certain
insects infesting stored maize**

By

TAREK ABD - EL - MOAZ ABD EL-RAHMAN BADR

(B. Sc. Agric., Zagazig University, 1988)

(M. Sc. Agric., Zagazig University, 1996)

THESIS

**Submitted in partial fulfillment
of the requirements for the degree**

**Of
Doctor of philosophy**

**In
Agricultural Science
(Economic Entomology)**

**Department of plant protection
Faculty of Agriculture, Moshtohor
Zagazig University, Banha Branch**

2004

604417

**Studies on application of some plant products and
their mixtures with modified atmospheres against
certain insects infesting stored maize**

By

TAREK ABD EL - MOAZ ABD EL-RAHMAN BADR

B. Sc., Moshtohor Fac. Agric., Zagazig Univ. Banha branch, 1988

M. Sc., Moshtohor Fac. Agric., Zagazig Univ. Banha branch, 1996

Under the supervision of:

Prof. Dr. Faris Amin Mohamed El-Lakwah, *Faris El-Lakwah*
Professor. Of Economic Entomology, Department of plant protection,
Faculty of Agriculture, Moshtohor, Zagazig University.

Prof. Dr. Metwally Mostafa Khattab, *M. Khattab*
Professor of Economic Entomology, Department of plant
protection, Faculty of Agriculture, Moshtohor, Zagazig University.

Dr. Zaghlol Abd El-Fatah Halawah, *Halawah*
First Researcher of Economic Entomology at the plant
Protection Research Institute Agric., Res., Center, Ministry of
Agriculture.

2004

APPROVAL SHEET

**Studies on application of some plant products and
their mixtures with modified atmospheres against
certain insects infesting stored maize**

By

TAREK ABD EL - MOAZ ABD EL-RAHMAN BADR

B. Sc. Moshtohor Fac. Agric., Zagazig Univ. Banha branch, 1988

M. Sc. Moshtohor Fac. Agric., Zagazig Univ. Banha branch, 1996

This thesis for ph. D. Degree has been

Approved by:

- 1- **Prof. Dr. Shalaby Mohamed El- Awady** *S. M. El-Awady*
Professor of Economic Entomology at the plant protection Dept.
Fac., Agric., El-Azhar – EL-Azhar University, Cairo.
- 2- **Prof. Dr. Ezzat Farag El-Khyat** *E. El-Khyat*
Professor of Economic Entomology and Head of plant Prot. Dept.
Fac., of Agric., Moshtohor, Zagazig, University.
- 3- **Prof. Dr. Faris Amin Mohamed El-Lakwah** *Faris El-Lakwah*
Professor of Economic Entomology at the plant protection Dept.
Fac., of Agric., Moshtohor, Zagazig, University.
- 4- **Prof. Dr Metwally Mostafa Khattab** *M. Khattab*
Professor of Economic Entomology at the plant protection Dept.
Fac., of Agric., Moshtohor, Zagazig, University.
- 5- **Dr. Zaghlol Abd El-Fatah Halawa** *Z. A. Halawa*
First Researcher of Economic Entomology at plant Protection
Research Institute, Agric., Res., Center, Ministry of Agriculture.

Data of Examination: 18/5/ 2004

ACKNOWLEDGMENT

This present study was conducted and supported by the National project of integrated pest mangement for post – harvest pests, financed by EEC-Counterpart funds through the Egyptian Ministry of Agriculture and Land Reclamation.

The author is highly indebted to the authorities of this National project.

Meanwhile, I want to express my deep thanks and gratitude to **Prof. Dr. Faris Amin Mohamed El-Lakwah**, Prof. Of Economic Entomology and control of stored product pests at the Plant Protection Dept. Fac. of Agric. Moshtohor, Zagazig Universty for supervision; suggesting the subject, valuable assistance and reviewing the manuscript.

My deep cordial thanks also extended to **Prof. Dr. Metwaly Moustafa Khattab**, Prof. of Economic Entomology at the same Department for his supervision and helpful advice.

I'm thankful also to **Dr. Zaghlol Abd El- Fatah Hal wah** First Researcher of Economic Entomology at Plant Protection Research Institute Agric., Res., Center, Ministry of Agriculture for supervision and helpful advice.

Also I want to express my deep thanks to all staff of the Plant Protection Department of the Faculty of Agric. at Moshtohor for their help.

Contents

	Page
List of Tables.....	1
List of Figures.....	1
Acknowledgement	1
I. INTRODUCTION	1
II. REVIEW OF LITERATURE	6
1. Effect of plant extracts and dusts on stored grain insects .	6
2. Effect of modified controlled atmosphere of CO ₂ against stored grain insects	19
3. Effect of plant extracts/or insecticides under controlled or modified atmospheres of CO ₂ against stored grain insects	37
4. Effect of plant extracts/or insecticides on the germination and chlorophyll content of the seedling of plants	43
5. Effect of plant extracts/ insecticides/ or CA on the population and weight loss of the seeds	46
III. MATERIAL AND METHODS	60
1. Insects	60
1.1 Rearing Technique of stock cultures	60
1.2 Cultures for supplying the developmental insect stages, required for the testes.....	60
2 Materials	61
2.1 Plant extracts used.....	61
2.2 Repellency of the various plant extracts to the tested insect species.....	62
3 Modified atmosphere (MA) tests.....	62
3.1 Technique.....	63
3.2 Calculation of joint action of the plant extract and Co ₂	65
3.3 Determination of Co ₂ Concentration.....	65
4. Population and weight studies.....	65
5. Grains germination tests	66
6. statistical analysis	67

IV.	RESULTS AND DISCUSSION	68
1.	Effect of some plant extracts on certain insect species infesting maize grains during storage.....	68
2.	Repellency of the various plant extracts to the adults of stored maize grain insects.	83
3.	Effect of modified atmosphere containing $20\pm 5\%$ CO_2 on the various insect species.	89
4.	Effect of plant extracts under modified atmosphere (MA) of $20\pm 5\%$ CO_2 and their combined action with the tested insect species	91
5.	Effect of the acetone plant extracts at 1% (w/w) on the populations of the tested insect species at various storage periods	114
6.	Effect of the acetone plant extracts at 1% (w/w) alone and under MA of 25% CO_2 on the weight loss of stored maize grains.	121
7.	Effect of the tested plant extracts on germination ^a of certain maize varieties and chlorophyll content of their seedings	127
V.	SUMMARY	136
VI.	REFERENCES	142
VII.	ARABIC SUMMARY	

List of Tables

Table	page
(1) Response of some insects infesting stored maize to acetone extract of poinciana seeds <i>Delonix regia</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	73
(2) Response of some insects infesting stored maize to petroleum ether extract of poinciana seeds <i>Delonix regia</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	74
(3) Response of some insects infesting stored maize to acetone extract of cinnamom strip bark <i>cinnamomum zeylanicum</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	75
(4) Response of some insects infesting stored maize to Petroleum ether extract of Cinnamom strip bark <i>cinnamomum zeylanicum</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	76
(5) Response of some insects infesting stored maize to acetone extract of Cloves flowering buds <i>Syzygium aromaticum</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	77
(6) Response of some insects infesting stored maize to petroleum ether extract of Cloves flowering buds <i>Syzygium aromaticum</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	78
(7) Response of some insects infesting stored maize to acetone extract of White Mustard seeds <i>Brassica alba</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	79
(8) Response of some insects infesting stored maize to Petroleum ether extract of White Mustard seeds <i>Brassica alba</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	80

(9)	Response of some insects infesting stored maize to acetone extract of Radish seeds <i>Raphanus sativus</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	81
(10)	Response of some insects infesting stored maize to Petroleum ether extract of Radish seeds <i>Raphanus sativus</i> in the laboratory at $26 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	82
(11)	Response of some insects infesting stored maize grains to modified atmosphere of $20 \pm 5\% \text{CO}_2$ inside the fiberglass bins at varying exposure periods (Grain temperature = $32 \pm 2^{\circ}\text{C}$ and R. H. $60 \pm 5\%$).	90
(12)	Joint action effect of $20 \pm 5\% \text{CO}_2$ and 0.4% (w/w) acetone extract of Poinciana seeds <i>Delonix regia</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	94
(13)	Joint action effect of $20 \pm 5\% \text{CO}_2$ and 0.8% (w/w) acetone extract of Poinciana seeds <i>Delonix regia</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	95
(14)	Joint action effect of $20 \pm 5\% \text{CO}_2$ and 0.4% (w/w) petroleum ether Extract of Poinciana seeds <i>Delonix regia</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	96
(15)	Joint action effect of $20 \pm 5\% \text{CO}_2$ and 0.8% (w/w) petroleum ether extract of Poinciana seeds <i>Delonix regia</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^{\circ}\text{C}$ and $60 \pm 5\%\text{RH}$	97

Table	page
(16) Joint action effect of $20 \pm 5\%$ CO_2 and 0.4% (w/w) acetone extract of Cinnamom strip bark <i>Cinnamomum zeylanicum</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	98
(17) Joint action effect of $20 \pm 5\%$ CO_2 and 0.8% (w/w) acetone extract of Cinnamom strip bark <i>Cinnamomum zeylanicum</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	99
(18) Joint action effect of $20 \pm 5\%$ CO_2 and 0.4% (w/w) Petroleum ether extract of Cinnamom strip bark <i>Cinnamomum zeylanicum</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	100
(19) Joint action effect of $20 \pm 5\%$ CO_2 and 0.8% (w/w) Petroleum ether extract of Cinnamom strip bark <i>Cinnamomum zeylanicum</i> to the adults of ^{some} insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	101
(20) Joint action effect of $20 \pm 5\%$ CO_2 and 0.4% (w/w) acetone extract of Cloves Flowering buds <i>Syzygium aromaticum</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	102
(21) Joint action effect of $20 \pm 5\%$ CO_2 and 0.8% (w/w) acetone extract of Cloves Flowering buds <i>Syzygium aromaticum</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	103

Table	page
(22) Joint action effect of $20 \pm 5\%$ CO_2 and 0.4% (w/w) Petroleum ether extract of Cloves Flowering buds <i>Syzygium aromaticum</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	104
(23) Joint action effect of $20 \pm 5\%$ CO_2 and 0.8% (w/w) Petroleum ether extract of Cloves Flowering buds <i>Syzygium aromaticum</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	105
(24) Joint action effect of $20 \pm 5\%$ CO_2 and 0.4% (w/w) acetone extract of White Mustard seeds <i>Brassica alba</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	106
(25) Joint action effect of $20 \pm 5\%$ CO_2 and 0.8% (w/w) acetone extract of White Mustard seeds <i>Brassica alba</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	107
(26) Joint action effect of $20 \pm 5\%$ CO_2 and 0.4% (w/w) Petroleum ether extract of White Mustard seeds <i>Brassica alba</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	108
(27) Joint action effect of $20 \pm 5\%$ CO_2 and 0.8% (w/w) Petroleum ether extract of White Mustard seeds <i>Brassica alba</i> to the adults of some insects infesting stored maize grains inside the fiberglass bins at $32 \pm 2^\circ\text{C}$ and $60 \pm 5\%\text{RH}$	109