

APPLICATION OF INTEGRATED CROP MANAGEMENT IN POTATO CROP CULTIVATION IN RELATION TO PESTICIDES AND ENVIRONMENTAL IMPACT

Submitted By

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Master of Agricultural Economy, Arab Academy for Science, Technology and
Maritime Transport, 2010

A thesis submitted in Partial Fulfillment
Of
The Requirement for the Doctor of Philosophy Degree
In
Environmental Sciences

Department of Environmental Agricultural Sciences
Institute of Environmental Studies and Research
Ain Shams University

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ABSTRACT

A potato fields experiment were conducted in Egypt at two locations (Gharbia and Behira Governorate) on two-summer crop of two summer successive plantations (2013 and 2014). Experimental design was Split-Split-Plot design with four replications. Six cultivars were used namely (Slaney, Cara, Burren, Banba, Royal and Spunta).

The main objective of this study is to evaluate the implementation of an integrated crop management (IPM) program to manage potato pest and diseases with relation to pesticide and environmental impact. These include the effect of cultivars, locations, treatment by the tested pesticides and their interaction. Different kind of phenology and yield characters were paid attention in this work. The studied traits included plant highest, number of stems /plant, number of tubers /plant, tuber size, dry matter and marketable yield.

Results showed that there were significant differences between potato cultivars, treatment by the tested pesticides and their interaction in tuber yield, and no-significant differences between location and interaction between location and cultivar in tuber yield. Also, results founded that Slaney cultivar had the highest tuber yield (29.3 ton/feddan) while Royal had the lowest tuber yield (16.1 ton/feddan) compared with other cultivars. Royal cultivar had the highest tuber dry matter content (20.6%) in all locations and treatments in two summer seasons. Since, Royal is stable cultivar in terms of high dry matter content, it can be potentially used for processing purpose. While the lowest tuber dry matter was Burren cultivar (16.4%). Also treatment with bio pesticides had given higher tuber yield (18.1 tons/feddan, 22.6 tons/feddan) in two tested summer seasons, respectively compared with

treatment with chemical pesticide (15.8 tons/feddan, 18.5 tons/feddan) in two seasons, respectively. Results clarified that the highest yielding cultivars (Slaney – Banba) were obtained from Bio-pesticides treatments. Without any kind of pesticides residue.

On the other hand, the results founded that concerning to the tested of Bio pesticides. In 87% of potato samples residues were not detected, 13% of potato samples contained residues (Abamectin) lower than the Maximum Residue levels (MRLs). On the other hand concerning to the tested of chemical pesticides .In 73% of potato samples residues were not detected ,19% of potato samples contained residues lower than the MRLs and 8% of potato samples contained residues (Chlorantraniliprale and Azoxystrobin) were exceeded the Maximum Residues Level (MRLs).

Keywords: Potato, Cultivar, Location, Bio Pesticide, IPM, Dry Matter, Pesticides, Environmental Pollution, Residue Level.

CONTENTS

LIST OF TABLES	VI
LIST OF FIGURES	VIII
ABBREVIATIONS	X
INTRODUCTION.....	1
REVIEW OF LITERATURE	3
1. Application of IPM program for potato crop.....	3
2. Determination of some horticultural traits	8
2.1. Cultivar resistance	11
2.2. Difference of location	12
2.3. Treatment by chemical and biochemical control ...	13
3. Residue levels of pesticides	17
MARTIALS AND METHODS	
1. Effect of some application in IPM program for potato	23
1.1. Effect of cultivar	23
1.2. Effect of location	24
1.2.1. Soil analysis.....	25
1.3. Effect of treatment by the tested pesticide	27
1.3.1. Chemical and Biological control.....	27
1.4. Cultural practices	33
1.4.1. Date of plantation.....	33
1.4.2. Seed bed-preparation.....	35
1.4.3. Seed quality and treatment.....	35
1.4.4. Fertilizer program.....	35
1.4.5. Irrigation system.....	38
1.4.6. Crop rotation.....	42
2. Determination of some horticultural traits	42
2.1. Sampling	42
2.2. Vegetative growth characters	42
2.2.1. Plant height	42
2.2.2. Number of stem per plant	42
2.3. Yield and its components	42
2.3.1. Number of tubers per stem	42
2.3.2. Number of tuber per plant	43
2.3.3. Tuber weight	43
2.3.4. Tuber size	43

2.3.5. Marketable yield	43
2.4. Quality parameters	43
2.4.1. Dry matter content	43
2.5. Statistical analysis	43
3. Detection of pesticides residues.....	44
3.1. Sampling.....	44
3.2. Extraction and clean up.....	44

RESULTS AND DISCUSSION

1. Application of IPM program for potato crop	48
2. Determination of imported horticultural traits	48
2.1. Effect of C, L, T and (C x L x T)	48
2.1.1. Vegetative growth characters	48
2.1.1.1. Plant height	48
2.1.1.2. Number of stems per plant	54
2.1.2. Yield and its components	60
2.1.2.1. Number of tubers per stem	60
2.1.2.2. Number of tubers per plant	66
2.1.2.3. Tuber weight	72
2.1.2.4. Tuber size	78
2.1.2.5. Marketable yield	84
2.1.3. Quality parameters	90
2.1.3.1. Dry matter content	90
3. Detection of pesticide residues.....	96
3.1. p.p.m. residue for the tested pesticides	96

SUMMARY AND CONCLUSION 99

REFERENCES..... 110

ARABIC SUMMARY

ARABIC ABSTRACT

LIST OF TABLES

No.	Title	Page
1	Physical and chemical analysis of the soil of experimental site	25
2	Average temperatures, actual RH and ET0 during the growing periods (A-B)	26
3	Types and recommended doses of the chemical tested pesticide (A-B)	29-30
4	Types and recommended doses of the tested bio-pesticide (A-B)	31-32
5	Timing, type of fertilizer, units at - El-Delta location	36
6	Timing, type of fertilizer, units at El-desert location – wade El-Natron	37
7	Irrigation scheduling at the Desert location during summer season 2013 and 2014	40-41
8	Random samples of potato tuber	44
9	Effect of cultivar , location , treatment by the tested pesticides and their interaction on plant height (cm)	50
10	Effect of cultivar , location , treatment by the tested pesticides and their interaction on average of no of stems/plant	56
11	Effect of cultivar , location , treatment by the tested pesticides and their interaction on average of no of tubers/stem	62
12	Effect of cultivar , location , treatment by the tested pesticides and their interaction on average of no of tubers/plant	68
13	Effect of cultivar, location, treatment by the tested pesticides and their interaction on average of tuber weight	74
14	Effect of cultivar, location, treatment by the tested pesticides and their interaction on average of tuber size (mm)	80
15	Effect of cultivar, location, treatment by the tested pesticides and their interaction on marketable yield	86
16	Effect of cultivar, location, treatment by the tested	92

No.	Title	Page
	pesticides and their interaction on dry matter content	
17	Detection of pesticide residue and keywords of samples (A-B)	96-97

LIST OF FIGURES

No.	Title	Page
1	Threshold curve in relation with diseases	27
2	Sex Pheromones traps	28
3	Planting way at El-Delta location during 2013-2014	34
4	Irrigation flow meter at El-Desert location during 2013-2014	39
5	Samples extraction and clean up	47
6	Effect of interaction between cultivar, location and treatment by the tested pesticides on plant height (cm) during summer season 2013	52
7	Effect of interaction between cultivar, location and treatment by the tested pesticides on plant height (cm) during summer season 2014	53
8	Effect of interaction between cultivar, location and treatment by the tested pesticides on number of stems /plant during summer season 2013	58
9	Effect of interaction between cultivar, location and treatment by the tested pesticides on number of stems /plant during summer season 2014	59
10	Effect of interaction between cultivar, location and treatment by the tested pesticides on number of tubers /stem during summer season 2013	64
11	Effect of interaction between cultivar, location and treatment by the tested pesticides on number of tubers /stem during summer season 2014	65
12	Effect of interaction between cultivar, location and treatment by the tested pesticides on number of tubers/plant during summer season 2013	70
13	Effect of interaction between cultivar, location and treatment by the tested pesticides on number of tubers/plant during summer season 2014	71
14	Effect of interaction between cultivar, location and treatment by the tested pesticides on average tuber weight during summer season 2013	76
15	Effect of interaction between cultivar, location and treatment by the tested pesticides on average tuber weight during summer season 2014	77

No.	Title	Page
16	Effect of interaction between cultivar, location and treatment by the tested pesticides on average tuber size (mm) during summer season 2013	82
17	Effect of interaction between cultivar, location and treatment by the tested pesticides on average tuber size (mm) during summer season 2014	83
18	Effect of interaction between cultivar, location and treatment by the tested pesticides on average marketable Yield during summer season 2013	88
19	Effect of interaction between cultivar, location and treatment by the tested pesticides on average marketable Yield during summer season 2014	89
20	Effect of interaction between cultivar, location and treatment by the tested pesticides on average dry matter content during summer season 2013	94
21	Effect of interaction between cultivar, location and treatment by the tested pesticides on average dry matter content during summer season 2014	95

ABBREVIATIONS

C	Cultivar
L	Location
T	Treatment
C x L x T	Interaction between cultivar, location and treatment
IPM	Integrated pest management
PTM	Potato tuber moth
G X E	Genotype x environment interaction
N, P	Notes point
B.t.	<i>Bacillus thuringiensis</i>
HPLC	High performance liquid chromatography
PTW	Potato tuber worm
EIQ	Environmental impact quotient
PPP	Plant protection product
MRLS	Maximum residue levels
RH	Relative humidity
ETO	Evapotranspiration
GC	Gas chromatograph
FPD	Flame photometric detector

INTRODUCTION

INTRODUCTION

Potato is one of the most important food crops worldwide. It ranks fourth major food crop of the world, exceed only by the grasses such as wheat, rice, and corn as major food source. Potato is cultivated almost all-over the world. In general, potato is mostly cultivated in cool, temperate regions, in the beginning to get very strong foliage then it requires cold nights and well-drained soil with adequate moisture during growing season. Moreover, potatoes are one of the most cultivated vegetable crops worldwide after tomato.

In Egypt, potatoes are one of the most important exporting vegetable crops. The total harvested areas are almost 350.000 Fadden. It gives about 4.800.000 million Ton on 2013 instead of 2.039.351 million ton on 2003 with 135 % difference (FAO STAT, 2014)

Commercial production of most potatoes is primarily through vegetative propagation by means of lateral buds formed on the tuber, a modified stem .Trough such vegetative propagation Many diseases are transmitted from generation to another generation .suppression of such diseases and reduction of yield losses due to diseases are a necessary part of increasing the food supply.

Integrated pest management (IPM) may supply effective control of the potato pest and diseases including aphids (vector of some viruses), pectobacterium spp., common scab, rhizoctonia, late blight, early blight, pythium and finally PTM (potato tuber moth).