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

Submitted By

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B.Sc. of Agriculture Science (Fish Resources), Faculty of Agriculture, Suez Canal University, 1993

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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APPROVAL SHEET

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ABSTRACT

A potato fields experiment ware 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.

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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.	*Bacillus thuringiensis*
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

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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).