

PROPOSED SURVILLANCE SYSTEM FOR PESTICIDE RESIDUES AND HEAVY METALS IN GRAINS

By

Ghada Adel Ali Abdalla

B.Sc. Science, Ain Shams University, 1993

**M.Sc. Environmental Sciences, Institute of Environmental Studies &
Research, 2002**

A Thesis Submitted in Partial Fulfillment of the
Requirements for the Doctor of Philosophy

In

Environmental Sciences

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2010

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نظام مقترح لمراقبة متبقيات المبيدات والعناصر الثقيلة فى الحبوب

رسالة مقدمة من الطالبة

غادة عادل على عبد الله

بكالوريوس العلوم (كيمياء) جامعة عين شمس 1993

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لاستكمال متطلبات الحصول على درجة الدكتوراة

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باحث بالمعمل المركزى لتحليل متبقيات المبيدات والعناصر الثقيلة فى الأغذية –
مركز البحوث الزراعية

ختم الإجازة

أجيزت الرسالة بتاريخ / / 2010

موافقة الجامعة

2010/ /

موافقة مجلس المعهد

2010/ /

APPROVAL SHEET

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2010

ACKNOWLEDGEMENT

My grateful thanks are due to the many people who have given of their time and assistance towards the completion of this thesis.

I would like to express my deep thanks and gratitude to **Prof. Dr. Maher Abdel Aziz El-Hashash**, Professor of Organic Chemistry, Faculty of Science, Ain Shams University for his kind supervision and continuous encouragement.

My profound gratitude, and my immense appreciation to **Prof. Dr. Mohamed El-Said El-Zemaity**, Professor of Pesticides, Faculty of Agriculture, Ain Shams University, who offered his precious time and reassuring advice for supervising this study. He was very generous with his knowledge. It is actually due to him and his great effort that this work has been fully accomplished.

I do feel indebted to **Prof. Dr. Salwa Mohamed Ali Dogheim**, Professor of Pesticide Chemistry, for her encouragement. She has spared no effort at any time in guiding me patiently by her experience and knowledge.

My deep thanks and gratitude are also to **Dr. Mona Abdel Aziz Khorshed**, Head of Heavy Metals Section, Central Lab. of Residue Analysis of Pesticides and Heavy Metals in Food for her enormous help to start this study and to follow it till completion.

ABSTRACT

Ghada Adel Ali Abdalla. Proposed surveillance system for pesticide residues and heavy metals in grains. Unpublished Ph.D. Thesis in Environmental Sciences, Institute of Environmental Studies and Researches, Ain Shams University 2010.

Wheat plant was treated with malathion which is classified as an insecticide and recommended for use on cereal grains either pre-harvest or post-harvest application. Malathion was applied at the rate of 150g a.i./100L water under the normal field conditions.

Wheat samples appeared to be devoid of any detectable amounts of malathion 28 days after treatment. The pre-harvest interval (PHI) is about 6 days and the half-life time of malathion is 2.9 days.

Monitoring of pesticide residues in cereal grains showed that 3.6%, 32.2%, 10.9%, and 10.5% of barley, wheat, white maize, and yellow maize respectively were contaminated with one or two residues. The residues detected were for eight insecticides (chlorpyrifos, chlorpyrifos-methyl, diazinon, fenitrothion, malathion, permethrin, pirimiphos-methyl, and profenofos), one fungicide (diniconazole), one acaricide (bromopropylate) and one carbamate (carbaryl). Violation was due to chlorpyrifos and malathion residues which exceeded the maximum residue levels by 1.2%, 1.67%, 1.22%, and 3.16% in barley, wheat, white maize, and yellow maize respectively, while no maximum residue levels was established for diazinon, diniconazole, permethrin and profenofos.

Other part of this study concentrated on assessing the pesticide residues levels in some processed products of wheat such as wheat flour and bread. No pesticide residues were detected in any of the bread samples while wheat flour samples showed 14.7% contamination with no violation.

On the other hand, monitoring heavy metal content (Cd, Cu, Pb) of the commodities under investigation showed that 100% of the samples were contaminated with one or more of the studied heavy metals and the violation percentages were 31.4%, 18.3%, 9.8%, and 13.7% in barley, wheat, white maize and yellow maize, respectively.

Throwing the light on the effect of storage and storage conditions on the levels of pesticide residues and heavy metals, samples of wheat and white maize were withdrawn from lots stored in Imbaba Silos and

analyzed for their content of pesticide residues and heavy metals. Results of pesticide residue analysis showed that all white maize samples were free from any residues, while total contamination and violation percentages were 56% and 4% in wheat samples, respectively. Also results of heavy metals analysis showed that all wheat samples were contaminated with at least two of the heavy metals under investigation (cadmium and copper), while maize samples were contaminated with copper and lead only and no cadmium was detected.

Data obtained from this study was used in designing a model for a surveillance system for assessing levels of pesticide residues and heavy metals in cereal grains.

Key Words: cereal grains, wheat, yellow maize, white maize, corn, barley, wheat flour, bread, monitoring, surveillance, pesticide residues, heavy metals, silos, storage, and monitoring programs.

CONTENTS

#	Title	Page
1	INTRODUCTION -----	1
2	REVIEW OF LITERATURE -----	4
	2.1. Pesticide Residues -----	4
	2.2. Heavy Metals -----	29
3	MATERIALS AND METHODS -----	42
3.1	Pesticide Residues -----	42
3.1.1	Multiresidue analysis of pesticide residues in grains and flour -----	42
3.1.1.1	Samples from local markets -----	42
3.1.1.2	Samples from silos -----	44
3.1.1.3	Sub-sampling -----	45
3.1.1.4	Studied pesticides -----	45
3.1.1.5	Method of analysis -----	47
3.1.1.6	Equipment and Chemicals -----	48
3.1.1.7	Extraction and Clean-up -----	49
3.1.1.8	GC determination -----	50
3.1.1.9	Instrumental analysis -----	50
3.1.1.10	Calculations -----	51
3.1.1.11	Quality assurance procedure -----	52
3.2	Persistence of malathion on and in wheat treated under the normal field conditions -----	57
3.3	Heavy Metals -----	57
3.3.1	Sampling and samples preparation -----	57
3.3.2	Reagents -----	58
3.3.3	Apparatus and Equipment -----	58
3.3.4	Preparation of standard solutions -----	58
3.3.5	Determination -----	59

#	Title	Page
3.3.5.1	Wet digestion -----	59
3.3.5.2	Atomic absorption measurement -----	59
3.3.6	Calculation -----	61
3.3.7	Quality assurance procedure -----	61
4	RESULTS AND DISCUSSION -----	62
4.1.	The current situation of use, production, import and consumption of cereal grains in Egypt -----	62
4.2.	Storage, handling and processing of grains and flour -----	76
4.3.	Sources of chemical pollutants and quality of cereal grains and flour -----	77
4.4.	Pesticides used on field crops in Egypt with special reference to cereal grains -----	82
4.5.	Degradation behavior of malathion residues on and in wheat treated under normal field conditions -----	85
4.6.	Pesticides used for stored grains -----	89
4.7.	The situation of contamination of barley, maize, wheat, flour and bread with pesticide residues and heavy metals under local conditions during a one-year period -----	90
4.7.1	Pesticide residues in grains collected from different markets -----	90
4.7.1.1	Barley samples -----	91
4.7.1.2	Wheat samples -----	93
4.7.1.3	White maize samples -----	96
4.7.1.4	Yellow maize samples -----	96
4.7.1.5	Wheat flour samples -----	101

#	Title	Page
4.7.1.6	Bread samples -----	101
4.7.2	Detected levels of pesticide residues in stored cereal grains -----	110
4.7.2.1	Wheat samples -----	110
4.7.2.2	Maize samples -----	110
4.7.3	Detected levels of heavy metal contaminants in cereal grains -----	115
4.7.3.1	Barley samples -----	115
4.7.3.2	Wheat samples -----	118
4.7.3.3	White maize samples -----	122
4.7.3.4	Yellow maize samples -----	123
4.7.3.5	Wheat flour samples -----	129
4.7.3.6	Bread samples -----	130
4.7.4	Detected levels of heavy metal contaminants in stored cereals -----	137
4.7.4.1	Wheat samples -----	137
4.7.4.2	White maize samples -----	137
4.8.	Proposed program for surveillance of pesticide residues in cereals and reduction of contamination -----	140
4.8.1	Approaches to reduce pesticide residues -----	140
4.8.2	Proposed program for surveillance of grain contaminants -----	142
5	SUMMARY -----	149
6	REFERENCES -----	153
	ANNEXES -----	
	ARABIC SUMMARY -----	

LIST OF TABLES

Table #	Title	Page
Table (1)	Samples of the commodities under investigation collected from different Egyptian governorates -----	42
Table (2)	Average recoveries & coefficients of variation obtained with different spiking levels for the different pesticide residues -----	52
Table (3)	List of organophosphorus, organonitrogens, organochlorines and pyrethroid residues and their Limits of Quantification (LOQs) -----	55
Table (4)	Area, yield and production of main cereal crops in Egypt -----	63
Table (5)	Yield percentage of Wheat, Maize and Barley corresponding to the cultivated area during the period 2001-2006 -----	70
Table (6)	Local yield and imported quantities (in tons) of important cereals during the period 2001-2006 -----	71
Table (7)	Standard specifications for the Egyptian wheat kernels -----	78
Table (8)	Registered pesticides based on target pest on the main crops in Egypt -----	83
Table (9)	Recommended pesticides for using on the main cereal crops in Egypt -----	84
Table (10)	Residues and percentage rate of loss of Malathion on treated wheat -----	86
Table (11)	Statistical evaluation of Malathion residues degradation on wheat -----	87
Table (12)	Recommended pesticides for stored grain pests in Egypt -----	89
Table (13)	Minimum, maximum, mean values of pesticide residues as well as frequencies, numbers and percentages of contaminated and violated barley samples collected from different Egyptian governorates during the period of the study (2005) ----	92

Table #	Title	Page
Table (14)	Minimum, maximum, mean values of pesticide residues as well as frequencies, numbers and percentages of contaminated and violated wheat samples collected from different Egyptian governorates during the period of the study (2005) ----	94
Table (15)	Minimum, maximum, mean values of pesticide residues as well as frequencies, numbers and percentages of contaminated and violated white maize samples collected from different Egyptian governorates during the period of the study (2005) ----	97
Table (16)	Minimum, maximum, mean values of pesticide residues as well as frequencies, numbers and percentages of contaminated and violated Yellow Maize (Corn) samples collected from different Egyptian governorates during the period of the study (2005) -----	99
Table (17)	Minimum, maximum, mean values of pesticide residues as well as frequencies, numbers and percentages of contaminated and violated Wheat Flour samples collected from different Egyptian governorates during the period of the study (2005) ----	102
Table (18)	Breakdown of the total samples analyzed as free, contaminated with one pesticide and contaminated with two pesticides -----	104
Table (19)	Situation of cereal crops contamination -----	107
Table (20)	Minimum, maximum, mean values of detected pesticide residues as well as frequencies, numbers and percentages of contaminated and violated wheat and maize samples collected from Imbaba Silos at different time periods during 2006 -----	111
Table (21)	Total number of collected samples to the number and percentage of different contaminated cereal crops per governorate -----	113

Table #	Title	Page
Table (22)	Minimum, maximum, mean values of heavy metals together with the frequency, number and percentage of contaminated and violated barley samples collected from different Egyptian governorates during the period of the study (2005) -----	116
Table (23)	Minimum, maximum, mean values of heavy metals together with the frequency, number and percentage of contaminated and violated Wheat samples collected from different Egyptian governorates during the period of the study (2005) -----	120
Table (24)	Minimum, maximum, mean values of heavy metals together with the frequency, number and percentage of contaminated and violated white maize samples collected from different Egyptian governorates during the period of the study (2005) -----	125
Table (25)	Minimum, maximum, mean values of heavy metals together with the frequency, number and percentage of contaminated and violated yellow maize (corn) samples collected from different Egyptian governorates during the period of the study (2005) ----	127
Table (26)	Minimum, maximum, mean values of heavy metals together with the frequency, number and percentage of contaminated and violated wheat flour samples collected from different Egyptian governorates during 2005 -----	132
Table (27)	Minimum, maximum, mean values of heavy metals together with the frequency, number and percentage of contaminated bread samples collected from different Egyptian governorates during the period of the study (2005) -----	134
Table (28)	Minimum, maximum, mean values of heavy metals as well as frequencies, numbers and percentages of contaminated and violated Wheat and Maize samples collected from Imbaba silos at different time periods during 2006 -----	138

