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Side effects of certain insecticides on the honey

bee Apis mellifera

(Hymenoptera:Apidae)

By

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CONTENTS

	Page
1.INTRODUCTION	1
2.REVIEW OF LITERATURE	3
2.1. The adverse side effect of pesticides on the honey bee workers and foraging intensity on the treated crop plants	3
2.2. The adverse effect of exposure pesticides residues and/or lower doses on the foraging bees on treated crops	26
3.MATERIALS AND METHODS	37
3.1. Pesticides	37
3.2. Toxicity Tests	42
3.2.1. Surface application Treatment	43
3.2.2. Topical application Treatment	43
3.3. Biochemical studies	43
3.3.1.Determination of acetylcholinesterase (AChE) activity	43
3.3.1.1. <i>Apis mellifera</i> acetylcholinesterase(AChE) preparation	43
3.3.1.2.Assay of acetylcholinesterase activity	44
3.3.2.Determination of adenosine triphosphate(ATPase)activity	44
3.3.2.1. <i>Apis mellifera</i> adenosine triphosphate(ATPase)preparation	44
3.3.2.2.Assay of adenosine triphosphatase (ATPase)	44
3.4. Assay of Protein Activity	45
4.RESULTS AND DISCUSSION	46
4.1.Toxicity of Pesticides	46
4.1.1.Evaluation of the tested insecticides toxicity on <i>Apis mellifera</i>	46
4.1.1.1 Toxicity of the Neonicotinoids insecticide	46
4.1.1.2. Toxicity of Insect growth regulators (IGR) Pesticides	54
4.1.1.3.Toxicity of different group of Pesticide	65
4.2. Biochemical Studied	74
4.2.1. Effect of Protein Concentration	74
4.2.2. Activity of acetylcholinesterase (AChE)	75
4.2.3. Activity adenosine triphosphate (ATPase)	81
5. SUMMARY	88
6. REFERANCES	92
7. ARABIC SUMMARY	103

LIST OF TABLES

Table(1), Toxicity of Thiamethoxam (Actara 25%W.G) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration.....	48
Table(2), Toxicity of Clothianidin Super- Tox48 %S.C) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration...	50
Table(3), Toxicity of Acetamiprid (Setar 20%S.P) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration	52
Table(4), Toxicity of Cyromazine (Cyro 20%S.P) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration.....	55
Table(5), Toxicity of Lufenuron (Sun Ron 5%E.C) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different Concentration	57
Table(6),Toxicity of Lufenuron (Wormatin%E.C) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration.....	60
Table(7), Toxicity of Pymetrozine (Chess 50%W.G) pesticide against<i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration.....	63
Table(8), Toxicity of Abantin (Abamectin 1.8%E.C) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration.....	66
Table(9), Toxicity of Chlorantranilliprole (Coragen 20%S.C) pesticide against <i>Apis mellifera</i> insects after 24,48, and 72 hours of surface and topical application treatment with different concentration	69
Table (10), Toxicity of Organophosphate (Dimethoate40%E.C) pesticide against <i>Apis mellifera</i> insects after 24, 48, and 72 hours of surface and topical application treatment with different concentration.....	72
Table (11), Determination of protein content in honey bee workers after 24 and 72 hours of treatment	74

Table (12), Determination of acetylcholinesterase (AChE) activity <i>in-vivo</i> for honey bee using topical application treatment for neonicotinoid.....	76
Table (13), Determination of acetylcholinesterase (AChE) activity <i>in-vivo</i> for honey bee using surface treatment for neonicotinoid...	76
Table (14), Determination of acetylcholinesterase (AChE) activity <i>in-vivo</i> for honey bee using topical application treatment for growth regulators (IGR).....	78
Table (15), Determination of acetylcholinesterase (AChE) activity <i>in-vivo</i> for honey bee using surface treatment Insect growth regulators (IGR).....	78
Table (16), Determination of acetylcholinesterase (AChE) activity <i>in-vivo</i> for honey bee using topical application for different group..	80
Table (17), Determination of acetylcholinesterase (AChE) activity <i>in-vivo</i> for honey bee using surface treatment of different groups....	80
Table (18), Determination of adenosine triphosphate (ATPase) activity <i>in-vivo</i> for honey bee using topical application treatment for neonicotinoid.....	82
Table (19)., Determination of adenosine triphosphate (ATPase) activity <i>in-vivo</i> for honey bee using surface treatment neonicotinoid	82
Table (20), Determination of adenosine triphosphate (ATPase) activity <i>in-vivo</i> for honey bee using topical application treatment for Insect growth regulators (IGR).....	84
Table (21), Determination of adenosine triphosphate (ATPase) activity <i>in-vivo</i> for honey bee using surface application treatment for Insect growth regulators (IGR).....	84
Table (22), Determination of adenosine triphosphate (ATPase) activity <i>in-vivo</i> for honey bee using topical application for different groups.....	86
Table (23), Determination of adenosine triphosphate (ATPase) activity <i>in-vivo</i> for honey bee using surface treatment for different groups.....	86

LIST OF FIGUERS

Figure (a), Standard Curve for Protein determination.....	45
Figure (1,a), Thiamethoxam LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration	49
Figure (1,B), Thiamethoxam LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration	49
Figure (2,a), Clothiandin LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration	51
Figure (2,b), Clothiandin e LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration	51
Figure (3,a), Acetamiprid LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration	53
Figure (3,b), Acetamiprid LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with ml & pesticide concentration	53
Figure (4,a), Cyromazine LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration	56
Figure (4,b), Cyromazine LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration	56
Figure (5,a), Lufenuron LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration.....	58
Figure (5,b), Lufenuron LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration	58
Figure (6,a), Lufenuron LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration.....	61

Figure (6,b), Lufenuron LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration	61
Figure (7,a), Pyrimetrozine LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration.....	64
Figure (7,b), Pyrimetrozine LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration.....	64
Figure (8,a), Abamectin pesticide LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration	67
Figure (8,b), Abamectin pesticide LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration	67
Figure (9,a), Chlorantraniliprole LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration	70
Figure (9,b), Chlorantraniliprole LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration.....	70
Figure (10,a), Dimethoate LD-P line on probit paper after three interval times 24 , 48 and 72 hours from topical application treatment with 1µl & pesticide concentration	73
Figure (10,b), Dimethoate LC-P line on probit paper after three interval times 24 , 48 and 72 hours from surface treatment with 1ml & pesticide concentration.....	73

5- SUMMARY

Pesticides are used to control pests that attack different types of plants to maintain their efficiency and quantity of production while taking into account the non-damage to the environment or other non-target organisms. Honey bees are one of the non-target organisms in the environment, which is exposed during their activity of pollination different plants and at the same time collecting honey, which is one of the economic outputs. Ten insecticides commercial formulated were used from three different chemical groups: three of neonicotinoid compounds (Thiamethoxam (Actara), Clothianidin (Super Tox-1), Acetamiprid (Setar)); Four compounds from Insect growth Regulators IGR group (Cyromazine (Cyro), Lufenuron (Sun Ron and Wormatin) Pymetrozine (Chess)); one compound from group Bio pesticide (Abamectin (Abantin), and one compound from group Diamid (Coragen), and the Organophosphate one (Dimethoate), to determine their acute oral toxicity and indirect oral toxicity against honey bee workers.

Bioassay was conducted to evaluate the toxicity of tested insecticides on *Apis mellifera* by Surface or Topical application treatment. The data was collected after 24, 48 and 72 hours and analyzed using LD-p Line program.

1- Evaluation of the toxicity of the tested pesticides.

The active honey bees, which have a similar age, were obtained from honey bee cells found in the plant of the Agricultural Research Station in Sabahia - Abis - Alexandria during the two seasons of the spring 2015, 2016.

The experiments were carried out by the worker of the honey bee with each pesticide tested in either the contact method or the local application method. The readings were taken after 24, 48, 72 hours in each of these treatments, which were performed with three replicates. The values of LD₅₀ and LC₅₀ were calculated to determine which were more or less toxic.

The results obtained are as follows:

Bioassay pesticides was conducted of three neonecotinoid compounds was evaluated; The results showed that clothianidin (super tox -1) was highest, with values of LC₅₀ (0.088, 0.031.0 and 0.0084ppm, and LD₅₀ values (0.033 , 0.017 and 0.013 ppm) after 24, 48 and 72 hours of application Respectively . Acetamiprid (setar) was the least toxic due to high values LC₅₀

15.842, 11.716 and 6.521ppm) and LD₅₀ (11.427, 6.517 and 4.428 ppm) values after 24, 48 and 72 hours of application respectively. This indicates that there is an option in naming neonicotinoid compounds Honey bee.

Bioassay pesticides was conducted of four insect Growth Regulators (IGR)The results showed that Syromazine (Cyro) was the highest toxicity of the LC₅₀ values (0,284, 0.082 and 0.038 ppm) and the LD₅₀ values (0.126, 0.04 and 0.019 ppm) followed by toxicity Lufenuron (Sun Ron, Wormatin ,Whatever pymetrozine the least effect on toxicity in this group either directly or indirectly LC₅₀ values (>10, 9.306 and 5.369ppm) and LD₅₀ value (13,938, 8,598, and 3.262 ppm) after 24, 48 and 72 hours of application respectively. It is indicated that the compounds of the total growth regulators have a slow and low toxic effect due to the low tendency of the toxic line due to their low effect on the brain hormones PTTH, the reciprocal glands and hormonal activity processes within the insect.

The results showed that Chlorantraniliprol (diamide group) was given a low toxic effect, with values LC₅₀(210.744, 83.325, 36.505 ppm) and LD₅₀ (71.13, 40.251 and 22.877 ppm) followed by In the toxicity, the two groups of the abamectin group compared with the dimethoate of the organic phosphorus group, which gave high toxicity either directly or indirectly. The values of LC₅₀ (0.034, 0.014 and 0.011 ppm) and LD₅₀ values (0.012, 0.0071 and 0.0045 ppm) after 24 and 48 72 hours of application respectively.

A comparison of the previous results indicated that the least toxicity to honey bees is acetamiprid (setar) of the group of neonicotinoid with direct or indirect treatment. Followed by the thiamethoxam and then clothianidin, which showed a higher increase in toxic effects; while the pymetrozine (Chess) of the group of growth regulators was given a control followed by Sun ron and Wormatin from the group of lufenuron, and the most named in this group is cyromazine (Cyro). Chlorantraniliprol compounds have been shown to be the safest in environmental use during bee activity compared with the group of organic phosphorus (dimethoate), which has been shown to be the most toxic to bees.

2-Study the effect of enzymes activity.

a-Effect of acetylcholine activity.

The effect of acetylcholine enzyme activity in transmitting the neural signals within the body of the organism on the pesticides of the different groups in this study was studied whether the compounds within the group or the comparison between the other groups.

The results showed that thiamethoxam was the most effective. The activity of the enzyme (41%, 54%), (50%, 40%) compared to the lowest effective acetamiprid (80%, 46%), (64%, 35%) after 72, 24 hours of Treatment of live insects directly or indirectly. In general, there was a correlation between toxicity and ability to inhibit the enzyme, indicating that enzyme activity could be used as evidence of toxicity in the environment.

The effect of insect growth regulators groups (IGR) was low on enzyme activity. It was found that lufenuron with sun ron compounds, wormatin had an enzymatic activity (78%, 73%), (68%, 59%), Followed by (75% ,85%)and (68% ,67%) followed by pymetrozin (78%,69%) In direct treatment; cyromazine (cyro) decreased enzyme activity (90%, 80%) indirect treatment.

The results showed that the decrease in enzyme activity was found in the group of organic phosphorus (77%, 56%), (37%, 43%) followed by the two groups of the abamectin group (68%, 37%), (58%, 62%). The chlorantranilipirrol of the diamide group gave a higher effect on the activity of the enzyme (83%, 78%), (70%, 83%) after 24, 72 hours in the method of direct or indirect application, respectively.

b-Effect of the activity of adenosine triphosphate enzyme ATP.

The effect of the groups of pesticides studied within the group or the comparison between the other groups on the activity of adenosine triphosphate enzyme was studied as one of the energy enzymes within the body of the living organism

The results showed that clothianidine gave the lowest rate of enzyme activity (80%, 88%), (82%, 73%) followed by thiamethoxam (84%, 93%), (80%, 76%) and acetamiprid (83%, 93% , (83%, 75%) after 24, 72 hours by treating insects live in an indirect manner or directly,

respectively. In general, neonicotinoid compounds were found to be equally inhibitory for ATP activity.

For the group of insect growth regulators (IGR), the treatment of lufenuron with compound (sun ron, wormatin) resulted in increased enzyme activity (76%, 76%), 92% (95%), 76%, 77% (76%, 76%, 76% and 76%, respectively)) After 24, 72 hours with direct or indirect treatment. Followed by cyromazine (cyro), which caused more activity of the enzyme (92%, 91%) after 72, 24 hours with indirect treatment, while the 24, 72 hours with the direct treatment

For the three other groups used in this study, the results obtained showed the high activity of the enzyme in the treatment of the organic phosphorus group after 24, 72 hours either directly or indirectly, followed by the two groups of the abamectin group (67%, 56%) in the direct treatment; Followed by chlorantiraniliprol from the group of diamide (53%, 60%) in indirect treatment.

The results showed that adenosine triphosphate showed very low inhibition rates due to the non-specialization of pesticides used to inhibit this enzyme.

In general, the effect of different pesticides tested in this study shows that pesticide applications in the environment affect the non-target organism with the various factors already present, such as lack of food sources; Environmental pollution with pesticides; Intervention in biological and other processes.

The effect of pesticides against bees is very dangerous not because it is deadly, but because the lower concentrations are more dangerous during bee sowing due to its effect on fertilization, which improves crop production and quality, and the ability of the female workers to recognize and return to the cell again, which affects the efficiency of intracellular work.