

CONTENTS

	Page
LIST OF TABLES	V
LIST OF FIGURES	IX
LIST OF ABBREVIATION	XIII
1. INTRODUCTION	1
2. REVIEW OF LITERATURE	6
1. The efficacy of new and conventional insecticides against sucking piercing insects pests.....	6
1.1. Clothianidin.....	6
1.2. Fipronil	6
1.3. Flubendiamide	7
1.4. Pyridalyl.....	8
1.5. Spirotetramat	8
1.6. Pirimiphos-methyl	10
2. The efficacy of new and conventional insecticides against lepidopteran insect pests	11
2.1. Clothianidin.....	11
2.2. Fipronil.....	12
2.3. Flubendiamide	12
2.4. Pyridalyl.....	15
2.5. Spirotetramat.....	17
2.6. Pirimiphos-methyl	17
3. The efficacy of silver nanoparticles in controlling insects	18
4. The efficacy of bio-insecticides in controlling insects	21
4.1. Emamectin benzoate	21
4.2. Spinetoram.....	24
4.3. Azadirachtin.....	27
5. Compatibility of organophosphate with certain bio-insecticides and efficacy of its mixtures on the target insects	29
6. Effect of the tested insecticides on some biochemical parameters of the tested insects.....	30

6.1. Acetylcholinesterase (AChE)	30
6.2. Adenosinetriphosphatase (ATPase)	31
6.3. Glutathione s-transferases (GST)	32
6.4. Phenoloxidase (PO)	33
6.5. Total calcium (Ca ²⁺)	33
6.6. Total protein (T.P.)	33
3. MATERIALS AND METHODS	35
1. Insecticides used	35
1.1. Chemical insecticides groups	35
1.1.1. Neonicotinoids group.....	35
1.1.2. Phenylpyrazoles group	35
1.1.3. Diamide group.....	35
1.1.4. Phenoxy-pyridaloxo derivative group.....	36
1.1.5. Tetramic acid derivatives (Ketoenol) group	36
1.1.6. Organophosphorus group	37
1.2. Silver nanoparticles	37
1.3. Bio-insecticides groups.....	38
1.3.1. Avermectins.....	38
1.3.2. Spinosyns	39
1.3.3. Tetranortriterpenoid	39
2. Insects maintenance	39
2.1. <i>Bemisia tabaci</i>	40
2.2. <i>Spodoptera littoralis</i>	40
2.3. <i>Agrotis ipsilon</i>	41
3. Experimental techniques.....	41
3.1. Bioassay	41
3.1.1. Determination of the LC values for chemical insecticides group.41	
3.1.2. Procedures	42
3.2. The insecticides co-formulated mixtures	42
3.3. Biochemical assays	43
3.3.1. Preparation of the enzymes sample	43
3.3.2. Determination of enzymes activity.....	44

3.3.2.1. Determination of acetylcholinesterase (AChE) activity	44
3.3.2.2. Determination of adenosinetriphosphatase (ATPase) activity...	44
3.3.2. 3. Determination of glutathione s-transferases (GST) activity	46
3.3.2.4. Determination of phenoloxidase (PO) activity	46
3.3.3. Determination of total calcium content	47
3.3.4. Determination of total protein content	48
3.4. Toxicological study of field strains	49
3.5. Biochemical study of field strains	49
4. Statistical analysis	49
4. RESULTS AND DISCUSSION	50
4. Toxicological and biochemical studies on the laboratory strains	50
4.1. The efficacy of the new chemical insecticides in comparison with pirimiphos-methyl against the tested insects	50
4.1.1. <i>Bemisia tabaci</i>	50
4.1.2. <i>Spodoptera littoralis</i>	53
4.1.3. <i>Agrotis ipsilon</i>	56
4.2. Susceptibility of tested insects to chemically synthesized silver nanoparticles	59
4.3. The efficacy of bio-insecticides against selected insects.....	62
4.3.1. <i>Bemisia tabaci</i>	62
4.3.2. <i>Spodoptera littoralis</i>	64
4.3.3. <i>Agrotis ipsilon</i>	65
4.4. Biochemical studies.....	69
4.4.1. The effects of tested insecticides on acetylcholinesterase in the homogenate of the treated insects	69
4.4. 2.The effects of tested insecticides on adenosinetriphosphatase in the homogenate of the treated insects.....	73
4.4.3. The effects of tested insecticides on glutathione s-transferases in the homogenate of the treated insects.....	76
4.4.4. The effects of tested insecticides on phenoloxidase in the homogenate of the treated insects.....	79

4.4.5. The effects of tested insecticides on total calcium in the homogenate of the treated insects	83
4.4.6. The effects of tested insecticides on total protein content in the homogenate of the treated insects	86
5. Toxicological studies on field strains	90
5.1. The efficacy of the tested insecticides to the field strains of <i>B.tabaci</i> and <i>S.littoralis</i>	90
5.2. Resistance ratio of the tested insecticides to the field strains of <i>B.tabaci</i> and <i>S.littoralis</i>	99
6. Insecticides co-formulated mixtures	102
6.1. The efficacy of pirimiphos-methyl alone or in mixtures with the tested bio-insecticides against laboratory strains of tested insects	103
6.1.1. <i>Bemisia tabaci</i>	103
6.1.2. <i>Spodoptera littoralis</i>	105
6.1.3. <i>Agrotis ipsilon</i>	107
6.2. The efficacy of pirimiphos-methyl alone or in mixtures with the tested bio-insecticides to the collected field strains	109
6.2.1. Qalubia Governorate field strains	109
6.2.2. Sharkia Governorates field strains	111
6.3. Biochemical studies for insecticides co-formulated mixtures	116
6.3.1. Biochemical study for individual tested insecticides and their mixtures against tested laboratory strains	116
6.3.2. Biochemical study for individual tested insecticides and their mixtures against tested field strains	126
5. SUMMARY	134
6. REFERENCES	145
ARABIC SUMMARY	

ABSTRACT

Rasha Ahmed Ahmed Seleem: Toxicological Effects of Some New Insecticides against Certain Insects on Tomatoes. Unpublished Ph.D. Thesis, Department of Plant Protection, Faculty of Agriculture, Ain Shams University, 2019.

The object of the present study is to through light on alternatives ways in pest management using novel insecticides with new mode of action such as (neonicotinoids, phenylpyrazoles, diamide, phenoxy-pyridaloxo derivative, and tetramic acid derivatives) in addition, study the role of nanotechnology as an innovative technology using recently in pest control. The five novel insecticides namely (clothianidin, fipronil, flubendiamide, pyridalyl and spirotetramat) and chemically prepared of silver nanoparticles using sodium citrate reduction method were evaluated in comparison with conventional insecticide pirimiphos-methyl against three insects attacking tomatoes cultivation under Egyptian conditions (*Bemisia tabaci*, *Spodoptera littoralis* and *Agrotis ipsilon*). The toxicological and compatibility effects and biochemical analysis were done against laboratory and field strains of target insects after 48 hours. The obtained results indicated that the most chosen insecticides and silver nanoparticles exhibited effective against different insects and were superior than conventional insecticide .The co-formulated mixture study between organophosphate and bio-insecticides at LC₂₅ recorded a potentiation effect on two levels laboratory and field strain after 24&48 hours except the mixture between organophosphate and bio-insecticide azadirachtin. The novel insecticides and silver nanoparticles didn't show any resistance ratio to field strain except insecticide pyridalyl in Sharkia Governorate recorded high resistance against *S.littoralis*. The organophosphate insecticide pirimiphos-methyl recorded moderate and high resistance in case *B.tabaci* Qalubia strain and *S.littoralis* in Sharkia strain, respectively. Regarding, the biochemical study (acetylcholinesterase, adenosine triphosphatase, glutathione s-transferases

, phenoloxidase , total calcium ,and total protein) the results found differences in the enzymatic and non-enzymatic components activity on two levels laboratory and field strains.

Keywords: Novel insecticides, Nano insecticides, Co-formulated mixtures, Biochemical study, *B.tabaci*, *S.littoralis*, *A.ipsilon*, tomato.