



Faculty of Science
Entomology Department

**Biological and Biochemical Studies on *Culex pipiens* L.
(Diptera: Culicidae) Exposed to *Allium sativum*, *Nigella
sativa* Oil Extracts and *Bacillus sphaericus* (Neid)**

A Thesis

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Dedication

*I am pleased to dedicate this
work to my beloved parents,
sister, wife, daughter and
people who I missed them
U. Yousr M. Abdel- Hady
U. Khaled Moustafa Ammar*

﴿ إِنَّ اللَّهَ لَا يَسْتَحْيِي أَنْ يَضْرِبَ مَثَلًا مَّا بَعُوضَةً فَمَا
فَوْقَهَا فَأَمَّا الَّذِينَ ءَامَنُوا فَيَعْلَمُونَ أَنَّهُ الْحَقُّ مِنْ
رَبِّهِمْ وَأَمَّا الَّذِينَ كَفَرُوا فَيَقُولُونَ مَاذَا أَرَادَ اللَّهُ
بِهَذَا مَثَلًا يُضِلُّ بِهِ كَثِيرًا وَيَهْدِي بِهِ كَثِيرًا
وَمَا يُضِلُّ بِهِ إِلَّا الْفَاسِقِينَ ﴾

صدق الله العظيم

الرحمن

بسم الله

(سورة البقرة الآية 26)

الرحيم

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ABSTRACT

Bacillus sphaericus has a larvicidal activity towards *Culex pipiens* larvae. Development of resistance in certain populations of *Culex* sp. is the most common disadvantage of *B. sphaericus* application. During application, pesticide, *B. sphaericus* formulations suffering from long exposure to sun light and UV which turned them impotent. So, the present study was designed to evaluate the larvicidal activity of *Bacillus sphaericus* toxin, *Allium sativum* and *Nigella sativa* oil extracts solitary and in combination against *Culex pipiens* 3rd larval instar. Data revealed that, *Bacillus sphaericus* was the most potent insecticide recording LC₅₀ value as (0.25ppm.) followed by *Allium sativum* and *Nigella sativa* recording (0.45 and 2.46 ppm.), respectively. Addition of *Allium sativum* generally increased the toxic effect of *Bacillus sphaericus*, where LC₅₀ decreased from (0.25 ppm to 0.12 ppm). Addition of *Nigella sativa* to *Bacillus sphaericus* decreased the toxicity of *Bacillus sphaericus* by increasing its LC₅₀ from (0.25 ppm to 0.39 ppm). The biochemical studies using (SDS-PAGE), revealed that there was an increase in number of protein bands due to treatment with (*Bacillus sphaericus* combined with *Allium sativum* and *Bacillus sphaericus* with *Nigella sativa*). These impressive results from combinations proved that when joint-action is considered, the application possibilities for vector control increase significantly.

Keywords: *Bacillus sphaericus*, Plant oil extracts, *Allium sativum*, *Nigella sativa*, *Culex pipiens*, Bioassay test, protein electrophoresis.

LIST OF ABBREVIATIONS

ITEM	Abbreviation
<i>Bacillus sphaericus</i>	<i>B.sphaericus</i>
<i>Bacillus thuringiensis israelensis</i>	<i>B.t.i.</i>
<i>Culex</i>	<i>Cx.</i>
<i>Anopheles</i>	<i>An.</i>
<i>Aedes</i>	<i>Ae.</i>
<i>Allium sativum</i>	<i>A. sativum</i>
<i>Nigella sativa</i>	<i>N. sativa</i>
Lethal Concentration	LC
Lethal Time	LT
Binary Toxin	Bin
World Health Organization	WHO
Part Per Million	ppm.
Kilo Dalton	KDa
Sodium Dodecyl Sulfate	SDS
Poly Acrylamide Gel Electrophoresis	PAGE
Commassie Brilliant Blue	CBB
N,N,N',N'Tetramethylethylenediamine	TEMED
Ploymerase Chain Reaction	PCR
High Performance Liquid Chromatography	HPLC
Thin Layer Chromatography	TLC
<i>Culex pipiens</i> membrane	Cpm
<i>Anopheles gambiae</i> membrane	Agm

Glycosyl-Phosphatidyl-Inositol	GPI
Genetically Engineered Organism	GEO
Brush Border Membrane Fraction	BBMF
Acetyl Choline Esterase	AChE
Hours	Hrs.
Resistance Ratio	RR
Internal transcribed spacer	ITS
Co-toxicity Factor	C.F
Potentiation	P
Additive	A

LIST OF TABLES

TABLE	PAGE
--------------	-------------

Table 1. Essential compounds of garlic essential oils	33
Table 2. Fatty acid composition of the fixed oil of <i>Nigella sativa</i> L.	34
Table 3. Chemical composition of the volatile constituents of <i>Nigella sativa</i> L.	34:35
Table 4: Percentage mortalities of mosquito larvae treated with <i>Bacillus sphaericus</i> toxin.	44
Table 5: Percentage mortalities of mosquito larvae treated with <i>Allium sativum</i> oil extracts.	46
Table 6: Percentage mortalities of mosquito larvae treated with <i>Nigella sativa</i> oil extract.	48
Table 7: Percentage mortalities of mosquito larvae treated with <i>Allium sativum</i> oil and <i>Bacillus sphaericus</i> toxin.	50
Table 8: Percentage mortalities of mosquito larvae treated with <i>Nigella sativa</i> oil and <i>Bacillus sphaericus</i> toxin.	52
Table 9: Lethal concentration values of <i>Allium sativum</i> , <i>Nigella sativa</i> oils and <i>Bacillus sphaericus</i> solitary and in combination used against <i>Culex pipiens</i> larvae.	54
Table 10: Joint action of <i>Bacillus sphaericus</i> mixtures against 3 rd instar <i>Culex pipiens</i> larvae.	55
Table 11: Toxicity of <i>Allium sativum</i> oil extract and <i>Bacillus sphaericus</i> (2362) toxin against 3 rd instar <i>Culex pipiens</i> larvae at different time intervals.	57
Table 12: Toxicity of <i>Allium sativum</i> oil extract against 3 rd instar <i>Culex pipiens</i> larvae at different time intervals.	59

Table 13: Toxicity of <i>Bacillus sphaericus</i> (2362) toxin against 3 rd instar <i>Culex pipiens</i> larvae at different time intervals.	61
Table 14: Toxicity of <i>Nigella sativa</i> oil extract against 3 rd instar <i>Culex pipiens</i> larvae at different time intervals.	63
Table 15: Effect of <i>Nigella sativa</i> oil extract and <i>Bacillus sphaericus</i> (2362) toxin against <i>Culex pipiens</i> third larval instar at different time interval.	65
Table 16: Values of LT ₅₀ of different treatments against mosquito larvae.	67
Table 17: Protein configuration of <i>Culex pipiens</i> larvae treated with <i>Bacillus sphaericus</i> toxin.	69
Table 18: Protein configuration of <i>Culex pipiens</i> larvae treated with <i>Allium sativum</i> oil.	71
Table 19: Protein configuration of <i>Culex pipiens</i> larvae treated with <i>Nigella sativa</i> oil.	73
Table 20: Protein configuration of <i>Culex pipiens</i> larvae treated with <i>Bacillus sphaericus</i> toxin and <i>Allium sativum</i> oil.	75
Table 21: Protein configuration of <i>Culex pipiens</i> larvae treated with <i>Bacillus sphaericus</i> toxin and <i>Nigella sativa</i> oil.	77

LIST OF FIGURES

Figures	Pages
Figure 1: Regression line of relation between <i>Bacillus sphaericus</i> application and percentage mortalities.	45
Figure 2: Regression line showing the relation between <i>Allium sativum</i> oil concentrations and percentage mortalities of <i>Culex pipiens</i> larvae.	47
Figure 3: Regression line showing the relation between <i>Nigella sativa</i> oil concentrations and percentage mortalities of <i>Culex pipiens</i> larvae.	49
Figure 4: Regression line showing the relation between <i>Allium sativum</i> oil with <i>Bacillus sphaericus</i> concentrations and percentage mortalities of <i>Culex pipiens</i> larvae.	51
Figure 5: Regression line showing the relation between <i>Nigella sativa</i> oil with <i>Bacillus sphaericus</i> concentrations and percentage mortalities of <i>Culex pipiens</i> larvae.	53
Figure 6: Lethal concentration values of <i>Allium sativum</i> , <i>Nigella sativa</i> and <i>Bacillus sphaericus</i> solitary and in combination used against <i>Culex pipiens</i> larvae.	54
Figure 7: Mortality percentages of <i>Culex pipiens</i> larvae treated with <i>Bacillus sphaericus</i> at different time interval and different concentrations.	57
Figure 8: Mortality percentages of <i>Culex pipiens</i> larvae treated with	59

<i>Allium sativum</i> at different time intervals and different concentrations.	
Figure 9: Mortality percentages of mosquito larvae treated with <i>Nigella sativa</i> at different time intervals and different concentrations.	61
Figure 10: Mortality percentages of mosquito larvae treated with combination of <i>Bacillus sphaericus</i> and <i>Allium sativum</i> at different time interval and different concentrations.	63
Figure 11: Mortality percentages of mosquito larvae treated with combination of <i>Bacillus sphaericus</i> and <i>Nigella sativa</i> at different time interval and different concentrations.	65
Figure 12: Lethal time values of <i>Allium sativum</i> , <i>Nigella sativa</i> and <i>Bacillus sphaericus</i> solitary and in combination against <i>Culex pipiens</i> larvae used against <i>Culex pipiens</i> larvae.	67
Figure 13: SDS-PAGE of Protein patterns of <i>Culex pipiens</i> larvae treated with <i>Bacillus sphaericus</i> toxin.	68
Figure 14: Histogram illustrates different band frequencies in lanes (M,1,2)	68
Figure 15: SDS-PAGE of Protein patterns of <i>Culex pipiens</i> larvae treated with <i>Allium sativum</i> oil.	70
Figure 16: Histogram illustrates different band frequencies in lanes (M,1,2)	70
Figure 17: SDS-PAGE of Protein patterns of <i>Culex pipiens</i> larvae treated with <i>Nigella sativa</i> oil.	72
Figure 18: Histogram illustrates different band frequencies in lanes (M,1,2)	72

Figure 19: SDS-PAGE of Protein patterns of <i>Culex pipiens</i> larvae treated with <i>Bacillus sphaericus</i> toxin and <i>Allium sativum</i> oil.	74
Figure 20: Histogram illustrates different band frequencies in lanes (M,1,2)	74
Figure 21: SDS-PAGE of Protein patterns of <i>Culex pipiens</i> larvae treated with <i>Bacillus sphaericus</i> toxin and <i>Nigella sativa</i> oil.	76
Figure 22: Histogram illustrates different band frequencies in lanes (M,1,2)	76