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STUDY ON THE EFFECTS OF SOME BOTANICAL EXTRACTS AND GRANULOSIS VIRUS (GV) FOR CONTROLING POTATO TUBER MOTHS (PTM) LARVAE OF *Phthorimea operculella* (ZELLER) .

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ABSTRACT

The relative susceptibility of secound and fourth instar larvae of *Phthorimea operculella (Zeller)* to botanieal extrasts of *Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum* spp. and , Granulosis virus (GV) was studied by bioassay laboratory condition. Larval mortality increased with increasing the doses . LC50 values were 0.266- 3.851- 15.23 and 2.111 for the fourth instar larvae of *Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum ,respectively* . LC50 values were 1.905 - 3.714 - 15.23 and 1.977 for the second instar larvae of *Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum* spp, respectively . LC50 values was 0.490 for (GV) fourth instar larvae of Granulosis virus . On the other hand LC50 values was 1.977 for secound larval instar larvae of Granulosis virus (GV) .The bioinsecticide , Granulosis virus (GV) and botanical extract Zygophylum simplex were the most toxic. Percent laraval mortality and that of larvae which failed to pupate increased by increasing the concentrations . While percent pupation and that of emerged adults decreased by increasing the concentrations of the different treatments. Morphological deformities were observed during pupae stage and adults produced from the survived treated larvae .

INTRODUCTION

The potato tuberworm *Phthorimaea operculella* (Zeller) is considered a serious pest of Solanaceous crops. It causes serious damage to potato leaves as well as tubers in the field and in traditional rustic stories. Losses to farmers consist of discards; reduced prices for infested tubers and increased handling costs.

Microbial control agents are considered a good replacement chemical for chemical insecticides due to their usual narrow host range, absence of vertebrate toxicity or pathogenicity , compatibility with beneficial organisms and biodegradability (Barkely *et al.*, 1997 and Ismail *et al.*, 1999) . Plant extracts were used as toxicants either antifedant oviposition repellants grow the reyalation for synergists for several insects. Oviposition repellents, synergists, growth regulators or antifeedants for many insects (Richter, Kleeberg., 1997 ; Ismail, *et al.*,1996 ; Nassar *et al.* 1999 ; Chen, *et al.*, 1996 a , b and Schmidt, *et al.*, 1997) .

The aim of present work was direct to study the toxicity of four botanical extracts (*Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum*) and , Granulosis virus (GV) . on the secound and fourth instar larvae of *Phthorimea operculella Zeller* .

MATERIALS AND METHODS

Colonies of *Phthorimaea operculella* (Zeller) were reared in the laboratory on sweet potato plants at constant temperature of 26 ± 2 °C and 60 ± 5 % R.H. as descaribed by Abbas, 1981). Granulosis virus (GV) *Phthorimaea operculella* diseased larvae were supplied by the International Potato Center (CIP). Twenty diseased larvae were Frieze dried. The material was kept for used. The twenty dried diseased larvae were dissolved in 100 ml water to produce five concentrations of 6, 3, 2, 0.5, and 0.25 ppm. Eatraction was carried out according to the method adopted by Freedman *et al* ., (1979) with minor medification (where ground leaves in the chosen solvent instead of using Soxhlet procedure). The plants were dissolved in 100 ml water to produce five concentrations of 6, 3, 2, 0.5, and 0.25 ppm .

Extraction :

Extraction was carried out according to the method adopted by Freedman *et al.* (1979) .

Toxicity test:

Preliminary tests were done to determine the appropriate concentrations The data were then subjected to probit analysis (Finney, 1971) to give values of LC_{50}

The potato leaves were dipped in each treatment . Then the leaves after drying were offered to the 2rd and fourth instar larvae ofs *Phthorimea operculella (Zeller)* larvae. The following procedures were followed in all experiments.

Three replicates of ten larvae, each into a cup (6x7 cm) were fed potato leaves contaminated with (GV) or botanical extracts for a period of 48 hours. After treatment, the surviving larvae were fed on clean untreated potato leaves till pupation and mortalities were recorded daily also. The percentage of pupation and emerged adults were observed .Before introducing the larvae to treated food , they were starved for six hours in order to obtain rapid simultaneous ingestion of the offered food. The control tests were conducted using potato leaves in water only and left to dry .The experiments were carried out under laboratory conditions of 26 ± 2 °C and 60 ± 5 % R.H. . The LC_{50} determined according to Polio-PC (Leora Software, 1994) , and the data were subjected to the probit analysis (Finney, 1971) .When necessary control mortality was adjusted across concentrations within the probit procedure by Abbott's formula (Abbott , 1925).

RESULT AND DISCUSSION

Results represented in table (1& 2) were show the effect of *Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum* leaves extracts and Granulosis virus (GV) on the secound and fourth instar larvae ofs larvae of *Phthorimea operculella (Zeller) .Meli azedarch L* and Granulosis virus (GV) were the most toxic highest mortality % pesticides against secound and fourth larval instar larvae ofs of *P. operculella*, respectively. It caused considerably high percentage of mortality, while those of *Chinaberry fruits , Ajuga mpponeratic* and *Zygophylum* were slight effective against secound and fourth larval instar larvae of of *P. operculella*. Percentage of

larval mortality ranged between 67.2 to 22.4% for concentrations of 6 - 0.25 ppm respectively of Granulosis virus (GV) against secound larval instar larvae of , compared to 80.4 - 33.4% for concentrations of 6 - 0.25 ppm against fourth larval instar larvae of .In case of the botanical extracts of *Meli azedarch L, Chinaberry fruits , Ajuga mpponeratic* and *Zygophylum* at concentrations of 6 - 0.25 ppm the range of larval mortality ((89.7-45.1)_ (69.3-23.1)_(49.5-19.5)_(78.8-37.8%)) respectively against secound larval instar larvae of Table (1) compared to no mortality for control larvae. On the other hand results ,also were showed percentage of larval mortality ranged between ((68.2-25.1)_ (64.2-9.3)_(39.8-6.3)_(68.3-19.7%)) against fourth larval instar larvae of of *Meli azedarch L, Chinaberry fruits , Ajuga mpponeratic* and *Zygophylum* at concentrations of 6 - 0.25 ppm respectively.

Table (1) Efficacy of (GV) granulosis virus and Some Botanical extractions against the 2nd instar larval of *Phthorimea operculella Zeller.*

Treatment	Concentration	% Larval Mortality	% Deformed Larvae	% Pupation	% Deformed pupation	%Emerged Moths	% Deformed Moths	% Hatchabiliy
Meli azedarch	6	89.7	07.4	17.7	7	10.7	0	10.7
	3	82.4	04.4	13.2	5	14.2	0	14.2
	2	77.5	03.5	19.0	4	15.0	0	15.0
	0.5	66.2	08.4	25.4	3	22.4	0	22.4
	0.25	45.1	15.8	39.1	1	38.1	0	38.1
Chinaberry fruits	6	69.3	15.1	15.6	6	09.6	0	09.6
	3	57.4	12.3	30.3	5	25.3	0	25.3
	2	49.5	11.1	39.4	5	34.4	0	34.4
	0.5	37.8	10.2	52.0	3	49.0	0	49.0
	0.25	23.1	08.4	69.5	0	69.5	0	69.5
Chinaberry fruits	6	49.5	14.1	36.4	7	29.4	0	29.4
	3	38.4	13.8	47.8	6	41.8	0	41.8
	2	31.2	12.4	56.4	6	50.4	0	50.4
	0.5	24.1	09.8	66.1	3	63.3	0	63.3
	0.25	19.5	04.5	76.0	2	74.2	0	74.2
Zygophylum	6	78.8	17.2	04.0	1	04.0	0	04.0
	3	68.9	15.2	15.9	5	10.9	0	10.9
	2	59.7	14.3	26.0	2	24.0	0	24.0
	0.5	48.2	09.1	42.7	1	41.7	0	41.7
	0.25	37.8	04.2	58.0	1	57.0	0	57.0
GV	6	80.4	10.8	08.8	0	08.8	0	08.8
	3	75.9	14.5	09.6	0	09.6	0	09.6
	2	68.4	10.9	20.7	0	20.7	0	20.7
	0.5	59.7	09.7	30.6	0	30.6	0	30.6
	0.25	33.4	08.8	57.8	0	57.8	0	57.8
T. with methyl		0	0	99.4	0.6	99.4	0	99.4
Control		0	0	100	0	100	0	100

Table (2) the results of that percentage of larvae mortality was directly gree with those finding bt (Mamdouh *et al.* 1999 a and Dandag *et al.* 1998) .

Percentage of deformed larvae ranged between 10.8-8.8% for concentrations of 6 - 0.25 ppm respectively of Granulosis virus (GV) against secound larval instar larvae of , compared to 2 - 0 % for concentrations of 6 - 0.25 ppm against fourth larval instar larvae of . Compared to percentage of deformed larvae ranged between ((7.4-15.8)_ (15.1-8.4)_(14.1-4.5)_(17.2-4.2%)) respectively against secound larval instar larvae of .Compared to no deformed larvae for control .

Table (2): Efficacy of (GV) granulosis virus and Some Botanical extractions against the 4th instar larval of *Phthorimea operculella Zeller.*

Treatment	Concentration	% Larval Mortality	% Deformed Larvae	% Pupation	% Deformed pupation	%Emerged Moths	% Deformed Moths	% Hatchability
Meli azedarch	6	68.2	11	20.8	10.3	10.5	0.3	10.2
	3	57.4	10	32.6	11.2	21.4	0.0	21.4
	2	44.3	9.0	46.7	07.4	40.2	0.0	40.2
	0.5	35.2	6.0	58.8	06.5	52.3	0.0	52.3
	0.25	25.1	4.0	70.9	04.3	66.6	0.0	66.6
Chinaberry fruits	6	64.2	18	27.8	3.0	24.8	0	24.8
	3	42.9	20	37.1	0	37.1	0	37.1
	2	32.6	19	45.4	0	45.4	0	45.4
	0.5	11.9	10	78.1	0	78.1	0	78.1
	0.25	9.3	9	83.7	0	83.7	0	83.7
Chinaberry fruits	6	39.8	12	48.2	5.4	42.8	0	42.8
	3	23.6	12	64.4	3.8	60.6	0	60.6
	2	17.3	9	73.7	2	71.7	0	71.7
	0.5	10.2	7	82.8	4	78.8	0	78.8
	0.25	6.3	2	91.7	0	91.2	0	91.2
Zygophylum	6	68.3	25.3	6.4	1.8	4.6	0	4.6
	3	57.6	22.6	19.8	7.9	11.9	0	11.9
	2	45.3	17.8	31.8	8.9	22.9	0	22.9
	0.5	32.8	11.3	55.9	3.4	52.1	0	52.1
	0.25	19.7	9.8	70.5	2.2	68.3	0	68.3
GV	6	67.2	2	30.8	0	30.8	0	30.8
	3	54.6	3	42.4	0	42.4	0	42.4
	2	42.8	0	57.2	0	57.2	0	57.2
	0.5	31.6	0	68.4	0	68.4	0	68.4
	0.25	22.9	0	77.1	0	77.1	0	77.1
T. with chloroform		0	0	100	0	100	0	100
Untreated		0	0	100	0	100	0	100

On the other hand results ,also were showed percentage of larval mortality ranged between ((11-4)_ (18-9)_(12-2)_(25.3-9.8%)) respectively against fourth larval instar larvae of of *Meli azedarch L, Chinaberry fruits* ,

Ajuga mpponeratic and *Zygophylum* at concentrations of 6 - 0.25 ppm extracts respectively, compared to no deformed larvae for control.On the other hand in cas of chinabing of the concentration 3pmm recable the highest defomation %.

Table (3) shows that the LC_{50} values after 72 hours of treatment . LC50 values were 0.266- 3.851- 15.23 and 2.111 for *Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum ,respectively* for the fourth instar larvae of . LC50 values were 1.905 - 3.714 - 15.23 and 1.977 for *Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum* ,respectively for the scound instar larvae of .LC50 values was 0.490 for Granulosis virus (GV) fourth instar larvae of . On the other hand LC50 values was 2.167 for Granulosis virus (GV) secound larval instar larvae of.

Table (3) Toxicity of (GV) granulosis virus and Some Botanical extractions against *Phthorimea operculella Zeller.*

Instar	Extractions and GV	LC_{50}	95% Conf. Limits		99% Conf. Limits	
			Lower	Upper	Lower	Upper
2nd Instar	Meli azedarch L.,	1.905	1.359	2.822	1.217	3.302
	Chinaberry fruits ,	3.714	2.830	5.300	2.621	6.120
	Ajuga mpponeratic	15.23	8.564	43.05	7.478	74.14
	, Zygophylum	1.977	1.472	2.776	1.340	3.162
	GV	2.167	1.560	3.218	1.415	3.778
4th Instar	Meli azedarch L.,	0.266	0.144	0.397	0.110	0.440
	Chinaberry fruits ,	3.851	3.125	5.060	2.816	5.607
	Ajuga mpponeratic,	15.23	8.560	43.05	7.478	74.14
	Zygophylum	2.111	1.490	2.830	1.350	3.200
	GV	0.490	0.298	0.697	0.231	0.767

The present study revealed that the botanical extracts, had morphogenic effects against *P. operculella*.. These include many deformities, larval – pupal intermediates and pupal – adult intermediates. From the results obtained it was noticed that larval and pupal mortalities after secound and fourth instar larvae ofs larvae fed on potato leaves treated with *Meli azedarch L., Chinaberry fruits , Ajuga mpponeratic , Zygophylum* leaves extracts and Granulosis virus (GV) . Some larvae and pupae were died resulted due to the morphogenic effects. Similar deformities were obtained by botanical extracts on different insects were reported by many authors (Mamdouh *et al.* 1999 b and Dandag *et al.* 1998).

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تاثير بعض المستخلصات النباتية و الجرانيولس فيرس (GV) لامكانية مكافحة دودة درنات البطاطس

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تم دراسة تاثير اربع مستخلصات نباتية على يرقات العمر الثانى والرابع لحشرة دودة درنات البطاطس , *Meliazedarch L., Chinaberry fruits , Ajuga mpponeratic* و المركب الحيوى Granulosis virus وكانت النتائج : *Zygophylum* spp.

١- كان لنباتى *Meliazedarch L., Chinaberry fruits* و المركب الحيوى Granulosis virus هم الاكثر تاثيرا على درجة السمية بعد معاملة العمر الثانى و الرابع اليرقى حيث انه سجل اعلى معدل وفيات .

٢- كان لنباتى *Meliazedarch L., Chinaberry fruits* تاثيرا معنوى على قصر عمر ونسبة خروج الاطوار اليافعة الناتجة بعد معاملة العمر الثانى و الرابع اليرقى .

اثبت الدراسة الى ظهور تشوهات مرفولوجية ناتجة عن تاثير العاملة المستخلصات النباتية لطور العمر الثانى و الرابع اليرقى خاصة مع *Meliazedarch L., Chinaberry fruits*

تلخيصا لما سبق اوضحت الدراسة انه من الممكن استخدام المستخلصات النباتية و المركب الحيوى Granulosis virus فى برنامج المكافحة المتكاملة لدودة درنات البطاطس .