

The Effects of Zanzalacht on the Gonotrophic cycle of the Adult House fly *Musca Domestica*

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Abstract

Melia azedarach extract were applied by feeding the adult female flies on diets mixed with the extracts at different doses. The concentrations of *Melia azedarach* utilized were 1.8, 2.4 and 3.6% .The gonotrophic cycles of length of 90, 753, 67.6 and 84, 72, 68 hours were obtained after feeding at age 24 hours with diet mixed with doses of 1.8, 2.4 and 3.6% fruit extract; respectively. 98 & 96 hours were the length of gonotrophic cycle in the control groups. The length of 86.7, 72.3, 57.3 and 89.3, 75, 61 hours were obtained after feeding adults at age 48 hours with diets mixed with different doses of fruit extract of the same plant 97.3 and 98.7 hours were the length of the control groups. Proportions of the egg hatching reached 69, 55.3, 49 and 72.9, 64.2, 52 in groups of eggs obtained from 24 hours adults feeding with diets mixed with doses of 1.8, 2.4 and 3.6% fruit extract; respectively. Also 68.7, 53.3, 48.5 and 81.2, 70, 56.3 were the proportions of egg hatching obtained from groups at age 48 hours after feeding with diets mixed with the same doses. 85, 77.6, 62.2 and 92.6, 88.9, 84.9 were the proportions of the egg hatching obtained from groups feeding with diets mixed with doses of 1.8, 2.4 and 3.6% fruit extract of *Melia azedarach*; respectively. The pupae showed larval-pupal intermediates which failed to complete the pupal period and died after emerging from the third larval instar.

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Introduction

The house fly *Musca vicina* is one of the common species found in human habitat in tropical and subtropical regions. It has gained importance as a serious public health hazard. Serious world problems in public health have arisen as insects can develop resistance against insecticides [1]. The discovery of *Melia azedarach* as an insecticide of an entirely new type created quite a stir among entomologists interested in the practical uses of insect researches [2]. It was found of great value to study the effect of crude extracts of fruits of Zanzalacht on *Musca vicina* with the aim of investigating the effect of the *Melia azedarach* extract on the development capacities of the insect. The experiments stressed on the potential these plants have as effective and economic insecticides.

Jatwani and Srivastava [3]; Schmutterer [4] reported that the common species is *Melia azedarach* L as it contains six tetraterpenoids. Chiu [5] mentioned that the evaluation of the petroleum ether extracts of the seed kernels of *Melia azedarach* in the laboratory showed their potential as antifeedants for the control of the nymphs of *Nilaparvata legens*. The ethanol extract of the seed kernels of *Melia azedarach* inhibited feeding by 99.8%. The effect of azadirachtin and *Azadirachta indica* were similar to those of insect growth regulators against the immature stages of the house fly, *Musca domestica* [6].

Hashem and Youssef [7]; Radwan [8] observed the developmental changes induced by methanolic extract of leaves and fruits of *Melia azedarach* L. on the larvae of house fly *Musca domestica vicina* Macq. They noticed that the pupae and the adults displayed morphological abnormalities as well as pronounced anomalies. Heshem *et al.* [9] studied the effect of *Melia azedarach* extract on the larvae of *Spodoptera littoralis* and found that the fruit extract effectiveness depended on the age of the larvae, the concentration of the extract and the period of the treatment on the larval instars. The fruit extract-treatment of the chinaberry tree caused abnormalities in larvae and adults of the insect. Several studies dealt with the effect of azadirachtin on the mortality of different stages of insect species [10]. Azadirachtin increased the duration of the immature stages, length of pupal stages [11-13].

The effects of tri-terpenoid extracted from neem seed were similar to those of insect growth regulators against the immature stages of the house fly, *Musca domestica* [14]. Garcia *et al.* [15] claimed that the triterpenoid azadirachtin strongly interfere with the neuroendocrine control of insect hormone titers. Bidman *et al.* [16] studied the juvenilizing effect of azadirachtin by its injection into the first half of the last larval instar of the blowfly *Calliphora vicina* and found that it caused inhibited adult emergence. In adult insects, the effect of azadirachtin was a retardation of egg maturation [17]. They reported that the inhibition of oogenesis by azadirachtin is discussed on the basis of its interference with the neuroendocrine control of hormone synthesis. Mehrotra and Gujar [18] reported that topical application of 10 Mg azadirachtin reduced adult fecundity in *Spodoptera litura*. Crude neem oil extract was evaluated for their effect on different stages of three fly species, namely, *Musca domestica*, *Haematobia exigua* and *Chrysomya megacephala*, marked reductions in the hatchability of treated eggs of the three fly species were observed [19].

Material and Methods

Musca vicina in this study were all produced from a colony raised at the laboratory of the Department Zoology, Faculty of Science, and University of Alexandria. This colony was initiated by adult flies borrowed from the Entomology Department, Faculty of Agriculture, and University of Alexandria. The original colony of the Faculty of Agriculture was established since 1995. The colony was raised in a constant room temperature maintained at $27 \pm 2^\circ\text{C}$ and $70 \pm 2\%$ RH. The adult flies were kept in breeding cages which were made of wooden frames measuring 38 x 30 x 30 cm. The sides and tops of those cages were fitted with mosquito-proof wire mesh. The front side, measuring 25 cm x 25 cm. had been fitted with a cloth sleeve protected with a wooden cover hinged to the cage. A Petri dish, 9 cm in diameter and 2.5 cm in height, containing a piece of cotton wool moderately soaked in diluted milk (3 volumes of milk added to 1 volume of water) was placed inside the cage to be replaced by fresh ones every 24 hours. The Petri dish was placed in the cage to provide diet for the adult flies. The female flies usually lay their eggs on the milk pads. The pads containing the eggs were transferred to two pound jam

jars containing fresh milk pads to provide food for the newly hatched larvae. The jars were tightly covered with finely perforated tin lids. The fruits and leaves were washed in running tap water and after drying them up in the air for several days they were put in an oven at 60°C to constant weight and then pulverized by means of a hummer mill. Extraction was conducted in a 250 ml Soxhlet apparatus using methanol as a solvent. The extraction period lasted a total of 20 hours over a course of four days until the chinaberry leaves and fruits became colorless. At the end of the extraction process the resulting solution was put in a porcelain dish and placed in an oven (37°C) for evaporation of the solvent from the obtained solution. After removal of the methanol from the elute it is concentrated to a volume of approximately 25 ml of dark green oil. The crushed chinaberry fruit (160 gm) finally produced 40 ml of thick brown oily extract. The thick crude extracts (from the leaves and fruit) were preserved in tightly capped dark glass, vials and stored in the freezer until used for tests. Statistical analysis Data were subjected to student's T-test and least significant difference (LSD) test [20].

Results

The feeding experiments were conducted with the aim of demonstrating the effect of Zanzalacht (*Melia azedarach*) extraction at different concentrations on the gonotrophic cycle of the adult female *Musca vicina*. Two parameters have been taken into account while studying the effect of the different concentrations of *Melia azedarach* extraction on the female *Musca vicina*. These two parameters were; the time required for the completion of the first gonotrophic cycle; the number of hatched eggs. The onset of each larval instar and the time interval between the two successive ecdyses had been taken as a third parameter to demonstrate the effect of the *Melia azedarach* extraction on the instars' growth.

The data obtained from the first set of experiments is represented in tables (1, 1a and 2, 2a). These experiments were conducted at a temperature of $27 \pm 2^\circ\text{C}$ and a relative humidity of $70\% \pm 2$. It is seen from tables (1 and 2) that the time required for completing the first gonotrophic cycle of females at age 24 hours, which were fed on *Melia azedarach* (fruits) extraction at the concentrations of 1.8%, 2.4% and 3.6% had decreased. Table (1) showed that the time

required for completing the first gonotrophic cycle in the female groups I, II and III that fed on the previously mentioned concentrations of *Melia azedarach* fruit extraction was 90, 75.3 and 67.6 hours; respectively as compared with 98 hours for the control group, (Table 1). The time was 84, 72 and 68 hours in group Ia, IIa and IIIa; respectively, as compared with 96 hours for the control group (Table 2). Tables (1 and 2) showed that the number and the percentage of the hatched eggs were decreased in treated groups I, II, III and Ia, IIa and IIIa. Such percentages were found to be 69.0%, 55.3% & 49.1 % for groups I, II and III, respectively, as compared with 98.5% for the control group (Table 1) and 72.9%, 64.5% and 52% for group Ia, IIa and IIIa; respectively, as compared with 98.5% for the control group (Table 2). It is seen from tables (1 and 2) that the metamorphosis of the larvae in groups I, II, III and Ia, IIa and IIIa was retarded. It was noted that the mean duration of the first larval instar was prolonged when compared with the control group (Tables 1 and 2). The onset of the first ecdysis occurred after an average of 88, 97.3 and 102.6 hours for groups I, II and III; respectively as compared with 73.3 hours for the control group (Table 1) and 82.7, 94 and 98.3 hours for groups Ia, IIa and IIIa; respectively as compared with 73.3 hours for the control group (Table 2).

It is indicated from tables (1 and 2) that the mean duration of the second larval instar in groups I, II, III and Ia, IIa and IIIa had been prolonged. The onset of the second larval ecdysis occurred after an average of 137.6, 145 & 155 hours for groups I, II & III; respectively as compared with 122.3 hours for the control group (Table 1) and 130, 136.3 and 147.7 hours for group Ia, IIa and IIIa; respectively as compared with 123.3 hours for the control group (Table 2). The third larval instar had shown retardation in metamorphosis in groups I, II, III and Ia, IIa and IIIa in tables 1 and 2. The onset of the third larval ecdysis occurred after an average of 179.3, 190 & 210 hours for groups I, II & III; respectively as compared with 169.3 hours for the control group (Table 1) and an average of 176.7, 186.7, 205 hours for group Ia, IIa and IIIa; respectively as compared with 168 hours for the control group (Table 2).

Table 1a. The larvae of *Musca vicina*, produced from adult females fed on *Melia azedarach* fruit extract at age 24 hours, reaching the succeeding instar at the standard time:

Records of larvae reaching the next instar at the standard time.						
Feeding medium provided	First instar		Second instar		Third instar	
	After 72 hours		After 120 hours		After 168 hours	
	No.	%	No.	%	No.	%
Standard diet	135	99.2	133	96.3	130	95.5
Standard diet+1.8%Melia azedarach fruit extract.	60	80.4	45	60	40	50
Standard diet+2.4%Melia azedarach fruit extract.	40	76.9	30	57.6	20	38.4
Standard diet+3.6%Melia azedarach fruit extract.	11	70.5	8	51.2	4 2	5.6

Table 2a. The larvae of *Musca vicina*, produced from adult females fed on *Melia azedarach* leaf extract at age 24 hours, reaching the succeeding instar at standard time.

Records of larvae reaching the next instar at the standard time.						
Feeding medium provided	First instar		Second instar		Third instar	
	After 72 hours		After 120 hours		After 168 hours	
	No.	%	No.	%	No.	%
Standard diet	135	98.5	132	96.3	132	96.3
Standard diet+1.8 %Melia azedarach leaves extract.	70	85.3	60	73.1	54	65.8
Standard diet+2.4% leaves Melia azedarach extract.	53	80.3	45	68.1	33	50
Standard diet+3.6%Melia azedarach leaves extract.	33	76.7	23	53.4	18	41.8

Table 1. Shows the data of hatching eggs and the development of the first generation of larvae and pupae producing from feeding of females *Musca domestica vicina* at age 24 hours using different concentrations of *Melia azedarach* fruit extracts.

Feeding medium provided	Repli- cate	Time re- quired for com- pleting gonotrophic cycle	No. Of egg laying	Hatching eggs	First instar		Second instar		Third instar		Normal larvae		Abnormal larvae			Abnormal pupae								Complete emerged adults				Abnormal adults				No. Of normal adults																		
					Hours to first ecdysis (mean x)	Percent mortality	Hours to second ecdysis (mean x)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality	Normal		Small larvae	Pigmented larvae	Hours to the onset of pupa- tion	Normal pupae		Larval- pupal interme- diate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constrict- ed pupae from (P.L.)	Half emerged adult (N.P.)	Normal pupae	Small pupae	No	%	No	%	No	%	No		%	No	%	No	%	No	%											
											No	%				No	%																							No	%	No	%	No	%	No	%	No	%	No
Standard diet	I	98	135	134	99.2	72	1	0.7	122	0	0	166	0	0	0	0	98	133	99.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	99.2	3											
	II	100	140	138	98.5	78	0	0	120	0	0	176	0	0	0	0	100	138	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	100	8											
	III	96	139	136	97.8	70	1	0.7	125	0	0	172	0	0	0	0	96	135	99.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	99.2	5												
Control group	Total avr.	98±1.2	138±1.5	136	98.5±0.3	73.3±2.4	0.6	122.3±1.4	169.3±1.8	0	0	169.3±1.8	0	0	0	0	98±1.2	135.3	99.5±0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	99.5	5												
Standard diet + 1.8% Melia azedarach fruit extract.	I	90	108	78	72.2	88	2	2.5	135	0	0	176	0	0	0	0	110	32	41	3	3.8	2	2.5	29	37.1	10	12.8	5	6.4	27	34.6	2	2.5	2	2.5	9	11.5	27	34.6											
	II	88	110	76	69	90	1	1.3	138	1	0.3	180	0	0	38	50	1	1.3	35	46	120	33	43.3	5	6.5	1	1.3	27	35.5	8	10.5	4	5.2	29	38.1	1	1.3	1	1.3	8	1.5	29	38.1							
	III	92	106	70	66	86	1	1.4	140	0	0	182	0	0	37	52.8	1	1.3	31	44.2	100	33	47.1	4	5.7	1	1.4	24	39.2	7	10	4	5.7	29	41.4	1	1.4	1	1.4	8	11.5	29	41.1							
Group I	Total avr.	90±1.2	108±1.2	74.6	69±1.8	88±1.2	1.3	137.6±1.5	179.3±1.8	0	0	179.3±1.8	0	0	36.6	49.2±2.3	1.3	1.7	35	46.7	110±5.8	32.6	43±1.8	4	5.3±0.7	1.3	1.7±0.3	26.6	35.6±0.7	8.3	11.1	4.3	5.8±0.3	28.3	38±2.0	1.3	1.7±0.4	1	1.7	8.3	11.1±0.3	1	1.7	8.3	11.1±0.3	28	38±1.3	3	96±9	
Standard diet + 2.4% Melia azedarach fruit extract.	I	78	94	54	57.4	90	1	1.8	140	0	0	185	0	0	25	46.2	1	1.8	27	50	104	20	37	5	9.2	1	1.8	19	35.1	8	14.8	4	7.4	16	29.6	1	1.8	1	1.8	7	12.9	16	29.6							
	II	76	98	52	53	100	1	1.9	145	0	0	190	0	0	22	42.3	1	1.9	29	55	145	16	30.7	6	11.5	1	1.9	21	40.3	8	15.3	3	5.7	13	25	1	1.9	1	1.9	6	11.5	13	25							

Feeding medium provided	Replicate	Time required for completing gonotrophic cycle	No. Of egg laying	Hatching eggs		First instar		Second instar		Third instar		Normal larvae		Abnormal larvae				Abnormal pupae						Complete emerged adults						Abnormal adults				No. Of normal adults					
				No	%	Hours to first ecdysis (mean x)	Percent mortality	Hours to second ecdysis (mean x)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality	Normal	%	Small larvae	Pigmented larvae	Hours to the onset of pupation	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constricted pupae from (P.L.)	Half emerged adult (N.P.)	Normal pupae	%	Normal pupae	%	Small pupae	%	Normal pupae	%	Small pupae	%	Adults with abnormal wings	No	%						
																																			No	%	No	%	No
Group II	III	72	90	50	55.5	102	0	0	150	0	0	195	0	20	40	0	30	60	150	16	32	4	8	0	21	42	9	8	3	6	13	26	0	0	7	14	13	26	
	Total avr.	75.3±1.8*	94±2.3*	52	55.3 ±1.0 *	97.3±3.7 ±1.0 *	0	1.2	145±2.9 ±1.0 *	0	190±2.9 ±1.0 *	0	22	42.8 ±1.8 *	0.6	1.2	29	55±2.9 ±1.0 *	145±2.9 ±1.0 *	17.3	33.2	5	9.6±1.3	0.6	1.2	20.3	39.1 ±2.1 *	8.3	16±0.8	3.3	6.4±0.5	14	26	9±1.4 *	1.2	6.6	12.8 ±0.7	14	26.9 ±1.4 *
	I	70	30	15	50	105	0	0	150	0	0	205	0	4	26.6	0	0	11	73.3	180	2	13.3	2	13.3	0	5	33.3	6	40	1	6.6	2	13	0	0	2	13.3	2	13.7
Group III	II	65	38	18	47.3	100	0	0	150	0	0	2010	0	6	36.8	0	0	12	66.7	170	4	22.2	2	11.1	0	6	44.4	6	33.3	1	5.5	3	16	0	0	3	16.6	3	16.6
	III	68	28	14	50	103	0	0	155	0	0	215	0	4	28.5	0	0	10	71.4	180	3	21.4	1	7.1	0	5	35.7	5	35.7	1	7.1	2	14	0	0	2	14.2	2	14.2
	Total avr.	67.6±1.4	32±3	15.6 ±1.5	49.1 ±1.5	102.6±1.5 ±1.5	0	0	155±2.9 ±1.0 *	0	210±2.9 ±1.0 *	0	5	30.6 ±2	0	0	11	70.5±1.9**	176.6 ±3.3**	3	19±2.8	2	10.5 ±1.8 #	0	5.3	37.8 ±0.8	5.6 ±1.6 **	1	1.4±0.5	2.3	14	0	0	0	2.3 ±1#	2.3	14.7 ±1	14.7 ±1	
F-test		95.9	424.3	337.3	3.5	28.7		36.2		52.9		292		0.1	28.5	93.7	0.0	3.6	97.2	0.7	331.8	4.5	0.0	5	3.6	97.2	0.7	82	4	0.1	0.1	6.1	824.4	4	824.4				

L.S.D. test differs significantly as compared with the control group at (p> 0.05)

α Significantly different from group I, II&III.

* Significantly different from group III

§ Significantly different from group II&III

¥ Significantly different from the control group

"" Significantly different from the control group, group I & group II.

¢ Significantly different from the control group & group I

Significantly different from group I

** Significantly different from group I & II

Table 2. Shows the data of hatching eggs and the development of the first generation of larvae and pupae producing from feeding of females *Musca domestica* *vicina* at age 24 hours using different concentrations of *Melia azedarach* leaf extracts.

Feeding medium provided	Repl- cate	Time re-quire d for com-pleting gonotrophic cycle	No. Of egg laying	Hatching eggs		First instar		Second instar		Third instar		Normal larvae	Abnormal larvae				Abnormal pupae								Complete emerged adults				Abnormal adults		No. Of normal adults																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
				No	%	Hours to first ecdysis (mean x)	Percent mortality	Hours to second ecdysis (mean x)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality		Small larvae	Pigmented larvae	Hours to the onset of pupa- tion	Normal pupae	Larval- pupal intermed- iate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constrict- ed pupae from (P.L.)	Half emerge d adult (N.P.)	Normal pupae	Small pupae	Small adults	Adults with abnor- mal wings																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
I	standard diet	96	136	134	98.5	70	0	120	0	0	170	0	134	100	0	0	96	134	100	0	0	0	0	134	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Replicate	Time required for completion of gonotrophic cycle	Hatching eggs	First instar		Second instar		Third instar		Abnormal larvae				Abnormal pupae				Complete emerged adults				Abnormal adults		No. Of normal adults																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
			Hours to first ec-dysis (mean x)	Percent mortality	Hours to second ec-dysis (mean x)	Percent mortality	Hours to third ec-dysis (mean x)	Percent mortality	Normal larvae	Small larvae	Pigmented larvae	Hours to the onset of pupation	Normal pupae	Larval-pupal intermediate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constricted pupae from (P.L.)	Half emerged adult (N.P.)	Normal pupae	Small pupae	Adults with abnormal wings																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Group I	Total avr.	112.3±1.55	72.9	82.7	1.15±0.34	130±1.28	176.7	0.3	0	42	±0.5	2	±0.36	3±0.5	44.3	2.8	2.8±0.3	34.1±1.9	8	10.5±0.2	7.15±0.5	8.5±0.4	34.2±1.95	1.6±0.4	6±0.4	9.7±0.4	33.9±1.95																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
			63	94	1.15	135	1	2	182	0	29	46	1	1.5	31	2	1	1.5	23	36.5	8	12.6	4	6.3	15	23.8	0	0	8	12.6	15	23.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
			70	68.6	98	2	2.8	138	0	32	45.7	2	2.8	34	48.5	2	2.8	24	34.2	10	14.2	5	7.1	17	24.2	2	2.8	2	8	12.6	17	24.2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Group II	Total avr.	102.3±1.55	64.5	94±2.36	1.9±0.4	136.3±0.9c	186.7	0.3	0	33	±0.5	1	±0.32	0.2	49±0.2	1.9	±0.32	35.3±0.25	9	13.5±0.5	4.13±0.3	6.5±0.4	23.1±0.7	1.6±0.4	1.4±0.1	12.5±0.1	23.1±0.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
			65	61.9	90	1	1.5	136	0	31	47.6	1	1.5	32	2	1	1.5	23	35.3	9	13.8	4	6.1	14	21.5	1	1.5	1	5	12.3	14	21.5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
			80	50	100	1	2.5	145	0	12	30	0	27	5	67.5	140	8	20	4	10	0	19	47.5	8	20	2	5	2	5	15	2	5																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
Group III	Total avr.	82.6±1.5	44	51.7	95	1	2.2	150	0	13	29.5	0	30	68	150	9	20	45.4	10	22	2	4.5	3	6.8	0	0	0	9	15.9	3	6.8																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
			85	54.2	100	1	2.2	148	0	12	26.6	0	32	71	155	8	17.7	4	8.8	0	23	51.1	9	20	2	4.4	2	4.4	0	0	7	15.5	2	4.4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
			82.6	52±1.2	98.3±1.7	1	2.3	147.7±1.5	0	12	28.7	19.3±0.8	28.7±0.9	0	30	7±0.9	28.7±0.9	0	21	48±1.7*	20.9±0.9**	4.6±0.2	2.3	5.4±0.6	0	0	0	8	15.5±1.6**	2.3	5.4±0.6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
F-test	avr.	235	249		2.02	158.5			2066	2.1	307																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

L.S.D. test differs significantly as compared with the control group at (p> 0.05)

α Significantly different from group I, II&III.

* Significantly different from group III

S Significantly different from group II&III

γ Significantly different from the control group

"" Significantly different from the control group, group I & group II.

¢ Significantly different from the control group & group I

Significantly different from group I

** Significantly different from group I & II

Tables (1 and 2) showed that the onset of the pupation occurred after an average of 110, 145 and 176.6 hours for the larval groups I, II and III, respectively as compared with 98 hours for the control group (Table 1) and 97.7, 125, 148.3 hours in groups Ia, IIa and IIIa; respectively as compared with 96.3 hours for the control group (Table 2). It is indicated in tables (1 and 2) that the percentages of larvae reaching the pupal stages in groups I, II, III and Ia, IIa and IIIa had been decreased, such percentages were found to be 43.8%, 33.2 %, 19% for groups I, II, III; respectively as compared with 99.5% for the control group (Table 1) and a percentage of 46.7%, 38.5% and 19.3% for groups Ia, IIa and IIIa; respectively as compared with 99.7% for the control group (Table 2).

Tables (1a and 2a) demonstrated the retarding effect of the various concentrations of *Melia azedarach* extraction on the adults *Musca vicina*. The number and percentages of the larvae reaching the successive instars at the standard time had been recorded in tables (1a and 2a). The number of molts from the first to the second instar was determined. In the first set of experiments, the percentages of the 1st instar larvae reaching the 2nd instar larvae reaching the standard time were found to be 60%, 57.6% and 51.2 % for groups I, II, III; respectively as compared with 96.3% for the control group (Table 1a) and percentages of 73.7%, 68.1% and 53.4% for groups Ia, IIa and IIIa; respectively as compared with 96.5% for the control group (Table 2a). It should be noted that the percentages of the second instar larvae reaching the third instar were 50%, 38.4% & 25.6% for groups I, II, III; respectively as compared with 95.5% for the control group (Table 1a) and a percentage of 65.8%, 50% & 41.8% for groups Ia, IIa and IIIa, respectively as compared with 96.3% for the control group (Table 2a). It is evident that the time required for the completion of the third larval instars had been prolonged by 11.3, 22 and 42 hours for groups I, II and III, respectively (Table 1a) and 8, 18.6 and 37 hours for groups Ia, IIa and IIIa; respectively (Table 2a) considering that the standard time required for the completion of the third larval instar is 168 hours (Tables 1a and 2a).

Three groups of adult *Musca vicina* at age 48 hours had been treated with three different concentrations of *Melia azedarach* fruit extract. The

three concentrations were 1.8%, 2.4% and 3.6%. The data obtained have been represented in tables (3 and 4). It is seen from tables 3 and 4 that the time required for completing the first gonotrophic cycle of females at age 48 hours which have been exposed to fruits of *Melia azedarach* extraction had decreased. Table (3) showed that the time required for completing the first gonotrophic cycle in the female groups I, II and III that had been exposed to the previously mentioned concentrations of *Melia azedarach* extraction was 86.7, 72.3, and 57.3 hours; respectively, as compared with 97.3 hours for the control group (Table 3) and after 89.3, 75 and 61 hours in groups Ia, IIa and IIIa; respectively as compared with 98.7 hours for the control group (Table 4).

Tables (3 and 4) showed that the number and the percentages of the hatched eggs were decreased in treated groups I, II, III and Ia, IIa and IIIa. Such percentages were found to be 68.7%, 53.3 % and 48.5% for groups I, II, III; respectively as compared with 99.3 % for the control group (Table 3) and 81.2%, 70% and 56.3% for groups Ia, IIa and IIIa; respectively as compared with 99.1% for the control group (Table 4).

It was seen from tables (3 and 4) that the metamorphosis of the larvae in groups I, II, III and Ia, IIa and IIIa was retarded. It was noted that the mean duration of the first larval instar is slightly prolonged when compared with the control groups (Table 3 and 4). The onset of the first ecdysis occurred after an average of 96.7, 120 and 141.6 hours for the groups I, II and III; respectively as compared with 73.3 hours for the control group (Table 3) and after 94, 106.7 and 135 hours for the groups Ia, IIa and IIIa; respectively as compared with 78 hours for the control group (Table 4).

It is indicated from tables (3 and 4) that, the mean duration of the second larval instar in groups I, II, III and Ia, IIa, IIIa had been prolonged. The onset of the second larval ecdysis occurred after an average of 191, 200 & 225 hours for groups I, II and III; respectively as compared with 126 hours for the control group (Table 3) and an average of 189.3, 191.7 and 208.3 hours for group Ia, IIa and IIIa; respectively, as compared with 130 hours for the control group (Table 4). The third larval instar had shown retardation in metamorphosis in groups I, II, III and Ia, IIa and IIIa, in tables (3 and 4). The onset of the third larval

Table 3a. The larvae of *Musca vicina*, produced from adult females fed on *Melia azedarach* fruit extract at age 48 hours, reaching the succeeding instar at standard time.

Records of larvae reaching the next instar at the standard time.						
Feeding medium provided	First instar		Second instar		Third instar	
	After 72 hours		After 120 hours		After 168 hours	
	No.	%	No.	%	No.	%
Standard diet	138	99	136	97.6	135	96.9
Standard diet+1.8%Melia azedarach fruit extract.	56	77.7	40	55.5	36	50
Standard diet+2.4%Melia azedarach fruit extract.	33	72.8	23	50.7	18	39.7
Standard diet+3.6%Melia azedarach fruit extract.	10	66.6	6	40	4	26.6

Table 4a. The larvae of *Musca vicina* produced from adult females fed on *Melia azedarach* leaf extract at age 48 hours reaching the succeeding instar at standard time

Records of larvae reaching the next instar at the standard time.						
Feeding medium provided	First instar		Second instar		Third instar	
	After 72 hours		After 120 hours		After 168 hours	
	No.	%	No.	%	No.	%
Standard diet	136	98.1	134	96.6	134	96.6
Standard diet+1.8%Melia azedarach leaves extract.	78	79.9	56	57.3	51	52.2
Standard diet+2.4%Melia azedarach leaves extract.	57	74	42	54.5	33	42.8
Standard diet+3.6%Melia azedarach leaves extract.	37	68.1	23	42.3	16	29.4

Table 3. Shows the data of hatching eggs and the development of the first generation of larvae and pupae producing from feeding of females *Musca domestica vicina* at age 48 hours using different concentrations of *Melia azedarach* fruit extracts.

Feeding medium provided	Rep-licat-e	Time re-quired for com-pleting lay-ing gonotrophi-c cycle	Hatching eggs	First instar		Second instar		Third instar		Normal larvae		Abnormal larvae				Abnormal pupae								Complete emerged adults				Abnormal adults		No. Of normal adults																
				Hours to first ec-dysis (mean x)	Percent mortality	Hours to second ec-dysis (mean x)	Percent mortality	Hours to third ec-dysis (mean x)	Percent mortality	Small larvae	Pig-mented larvae	Hours to the onset of pupa-tion	Normal pupae	Larval-pupae interme-diate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Con-stricted pupae from (P.L.)	half emerged adult (N.P.)	Normal pupae	Small pupae	Small adults	Adults with abnor-mal wings																								
No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %																									
Standard diet	I	100	140	100	74	1	0.7	128	0	0	174	0	0	0	0	94	139	99.3	0	0	0	0	0	0	0	139	99.3	0	0	0	0	0	13	99.3												
	II	49	145	143	98.6	76	0	0	130	1	0.7	170	0	0	0	100	142	99.3	0	0	0	0	0	0	0	142	99.3	0	0	0	0	0	14	99.3												
	III	98	136	135	99.3	70	0	0	120	0	0	172	1	0.7	134	99.3	0	0	0	0	0	0	0	0	0	134	99.3	0	0	0	0	0	13	99.3												
Control group	Total	97.3±1.8	322.6	99.3±0.3	73.3±1.8		126±3.1	0.3	0.2	172±1.2	0.3	0.2	138.3	99.3	0	95.3±2.4	138	99.3	0	0	0	0	0	0	0	138	99.3	0	0	0	0	0	13	99.3												
	I	97	100	70	70	92	1	1.4	190	1	1.4	184	0	0	30	42.9	2	2.9	36.4	51	25	35.7	5	7.1	2	2.9	27	38.6	9	12.9	4	5.7	21	3	2	2.9	2	9	12.	21	30					
	II	80	110	72	65.5	98	1	1.4	195	1	1.4	186	1	1.4	31	43.1	25	2.8	36	50	25	34.7	6	8.3	2	2.8	28	38.9	8	11.1	5	6.9	20	27.8	2	2.8	2	8	12.	20	27.8					
	III	82	105	74	70.5	100	2	2.7	188	0	0	190	0	0	32	43.2	2	2.7	37	50	26	35.1	6	8.1	2	2.7	28	37.8	9	12.2	6	8.1	20	27	2	2.7	2	7	13.	20	27					
Group I	Total	86.7±5.7	105±2.9	68.7±1.6	96.7±2.4	1.3	1.8	191±2.1	0.7	0.9	186.7±1.8	0.3	0.5	31	43.1±0.2*	2	2.8	±0.36	50	25	35.2±0.2	5	7.8±0.4	2	2.8±0.1	27.6	38.3±0.3	9	12.1	5	±0.4	6	6.9	28.3±2.0	2	2.8	2	8±0.1	13±0.2	20	±0.9	±0.2	9	0.2	20	±0.9
	I	72	90	50	55.5	110	1	2	200	0	0	194	0	0	20	40	1	2	28	56	15	30	5	10	1	2	18	36	9	18	5	10	10	20	1	2	1	2	7	14	10	20				

Feeding medium provided	Replicate	Time required for completion of gonotrophic cycle	No. Of egg laying	Hatching eggs	First instar		Second instar		Third instar		Abnormal larvae				Abnormal pupae				Complete emerged adults				Abnormal adults				No. Of normal adults															
					Hours	Percent mortality	Hours to second ecdysis (mean x)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality	Normal larvae	Small larvae	Pigmented larvae	Hours to the onset of pupation	Normal pupae	Larval-pupae intermediate (N.L.)		Small pupae (S.L.)	Pigmented pupae (P.L.)	Constricted pupae from (P.L.)	half emerged adult (N.P.)	Normal pupae	Small pupae	Small adults	Adults with abnormal wings																	
																No %	No %									No %		No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %
Group II	II	75	83	44	53	120	2	4.5	195	0	0	198	0	0	18	40.9	1	2.2	24	54.5	160	12	27.3	6	13.6	1	2.3	16	36.4	8	18.1	4	9	8	18.1	1	2.2	7	15.9	8	18.1	
	III	70	84	43	51	130	1	2.3	205	0	0	200	0	0	18	41.8	1	2.3	23	53.4	158	13	30.1	5	11.6	1	2.3	16	37.2	7	16.2	4	9.3	9	20.9	1	2.3	7	16.2	9	20.9	
	Total avr.	72.3±1.5*	85.6±2.9*	3±45	120±1.3	120±5.8c	200±2.9	0	2.9±3.14	197.3±1.8c	0	0	197.3±1.8c	0	0	18.40±0.65*	1	2.2±0.1	25	53.4±0.7#	156±3.1c	13.3	29.1±0.8*	5.3	11.7±1.1	1	2.2±0.1	16	36.5±0.3	8	17.5±0.5#	9.4±4.3	19.6±0.7*	2.2±0.1	2.2±0.1	7	15.4±0.6	9	19.7±0.7*			
Standard diet + 0.6% Meia azedarach fruit extract.	I	60	35	18	50	135	0	0	220	0	0	210	0	0	5	27.7	0	0	13	72.2	200	3	16.7	2	11.1	0	0	7	38.9	6	33.3	1	5.6	2	11.1							
	II	58	30	14	46	140	0	0	225	0	0	220	0	0	3	21.4	0	0	11	78.5	190	1	7.1	2	14.2	0	0	6	42.9	5	35.7	1	7.1	0	0	0	0	0	3	16.7	2	11.1
	III	54	29	13	44	150	0	0	23	0	0	225	0	0	3	23	0	0	10	76.9	205	2	15.4	1	7.6	0	0	6	46.2	4	30.8	0	0	2	15.4	0	0	0	3	21.4	0	0
Group III	Total avr.	57.3±1.8	31.3±1.9	15±2	141.6±4.4	225±2.9	0	0	218.3±4.4	0	0	218.3±4.4	0	0	3.6	24.1±1.9	0	0	11	75.9±1.9**	198.3±4.4	2	13.1±0.3	1.7	11±1.9	0	0	6.3	42.7±2.1~	33.3	5	14.4	4.2±0.8	8.8±1.3	0	0	0	2	15.4	2	15.4	
	F-test	29.7	335.261	56.9	107	234.8	42	56.3	1094.4	27.6	127.4	210.3	581.1	2.6	27.6	6.3	136.9	0.99	1774	27.6	4.5	774.2																				

L.S.D. test differs significantly as compared with the control group at (p> 0.05)

♂ Significantly different from group I, II&III.

* Significantly different from group III

§ Significantly different from group II&III

¥ Significantly different from the control group

™ Significantly different from the control group, group I & group II.

♣ Significantly different from the control group & group I

Significantly different from group I

** Significantly different from group I & II

Table 4. Shows the data of hatching eggs and the development of the first generation of larvae and pupae producing from feeding of females *Musca domestica vicina* at age 48 hours using different concentrations of *Melia azedarach* leaf extracts.

Feeding medium provided	Repl- cate	Time re- quired for com- pleting gono- trophic cycle	Hatching eggs	First instar		Second instar		Third instar		Abnormal larvae			Normal pupae			Abnormal pupae								Complete emerged adults			Abnormal adults			No. Of normal adults																																																																																																																																																																																																																																																																																																																																																																																																																																																												
				Hours to first ecdysis (mean x)	Percent mortality	Hours to second ecdysis (mean x)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality	Normal larvae		Small larvae	Pigmented larvae	Hours to the onset of pupa- tion	Normal pupae	Larval- pupal interme- diate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constrict- ed pupae from (P.L.)	half emerged adult (N.P.)	Normal pupae	No %	Small pupae	No %	No %	No %	No %	No %	No %		No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No %	No

Feeding medium provided	Time re-quired for com-pleting gonotrophic cycle	No. Of egg laying	Hatching eggs		First instar		Second instar		Third instar		Abnormal larvae				Abnormal pupae				Complete emerged adults				Abnormal adults				No. Of normal adults															
			No	%	Hours to first ecdysis (mean x)	Percent mortality	Hours to second ecdysis (mean)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality	Normal larvae		Small larvae	Pigmented larvae	Hours to the onset of pupa-tion	Normal pupae		Larval-pupal interme-diate (N.L.)		Small pupae (S.L.)		Pigmented pupae (P.L.)		Constrict-ed pupae from (P.L.)		half emerged adult (N.P.)		Normal pupae		Small pupae		Adults with abnormal wings										
											No	%				No	%	No	%	No	%	No	%	No	%	No		%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
II	75	109	75	68.8	105	2	2.7	190	0	0	188	0	0	37	49.5	1	1.3	35	46.7	155	29	38.7	8	10.7	1	1.3	28	37.3	7	9.3	7	9.3	22	29.3	1	1.3	9	12	22	29.3		
III	70	111	76	68.5	115	2	2.6	185	1	3	186	0	0	36	47.4	1	1.3	36	47.4	145	28	36.8	8	10.5	1	1.3	26	34.2	8	10.2	6	7.9	22	28.9	1	1.3	8	10.5	22	28.9		
Total Group II	75±2.9	110±0.6*	77	70±1.4*	106.7±4.3	1	2.2	191.7±4.4	0	0	188±1.2	0	0	37	48.1±0.6*	1	1.7±0.4	36	47.2±0.2	146.7±4.4	29	38.1±0.5*	7.7	10±0.6***	1	1.7±0.4	27	35.9±0.9	8	10.4±0.6*	7	9.1±0.6*	22	29±0.2*	1	1.3	8	10.8±0.3	22	29±0.2*		
Standard diet + 3.6% <i>Melaleuca azadirach</i> leaf extract.	65	98	58	59.2	130	1	1.7	210	0	0	200	0	0	20	34.5	0	0	37	63.8	195	19	32.8	2	3.4	0	0	27	46.6	1	172	4	6.9	15	25.9	0	0	9	15.5	15	25.9		
II	60	95	55	57.9	135	1	1.8	215	0	0	210	0	0	18	32.7	0	0	36	65.5	190	17	30.9	1	1.8	0	0	28	50.9	8	14.5	4	7.3	13	23.6	0	0	1	20	13	23.6		
III	58	96	50	52.1	140	0	0	200	0	0	205	0	0	14	28	0	0	36	2	200	13	26	1	2	0	0	27	54	9	18	3	6	10	20	0	0	1	20	10	20		
Total Group III	61.2.1	96.3±0.9	54.3	56.3±2.2	135±2.9	0	1.2	208.3±4.4***	0	0	205±2.9	0	0	17	31.7±0.3	1.9	0	36	67.1±2.5	195±2.9	16	29.9±2.3	1.3	2.4±0.5	0	0	27	50.5±2.2	9	16.6±1.1**	37	6.7±0.4	12	23.2±1.7	0	0	1	18.5±1.1	12	23.2±1.7		
F-test	38.6	420.3		165.6	76.3		108.5	93	36.7	399.2	4.7	47.2	242.5	540	45.9	4.7	32.7	25.8	11.7	1060.8	12.1	28.1																		1060		

L.S.D. test differs significantly as compared with the control group at (p> 0.05)

✕ Significantly different from group I, II&III.

* Significantly different from group III

§ Significantly different from group II&III

¥ Significantly different from the control group

''' Significantly different from the control group, group I & group II.

¢ Significantly different from the control group & group I

Significantly different from group I

** Significantly different from group I & II

ecdysiast occurred after an average of 186.7, 197.3 and 218.3 hours for groups I, II & III; respectively, as compared with 172 hours for the control group (Table 3) and an average of 183.3, 188 and 205 hours for groups Ia, IIa and IIIa; respectively as compared with 171.3 hours for the control group (Table 4). Tables (3 and 4) showed that the onset of the pupation occurred after an average of 123.3, 156 & 198.3 hours for the larval groups I, II and III; respectively as compared with 95.3 hours for the control group (Table 3) and an average of 108.3, 146.7 and 195 hours for groups Ia, IIa and IIIa; respectively as compared with 98 hours for the control groups (Table 4).

It is indicated in tables (3 and 4) that the percentages of larvae reaching the pupal stages in group I, II, III and Ia, IIa and IIIa, had been decreased. Such percentages were found to be 35.2%, 29.2% and 13.1% for groups I, II, III; respectively as compared with 99.3 % for the control group (Table 3) and an average of 49.5% 38.1% and 29.9% for groups Ia, IIa and IIIa; respectively as compared with 99.3% for the control group (Table 4). The data obtained from the third set of experiments have been represented in tables (5 and 6). It is seen from tables (5 and 6) that the time required for completing the first gonotrophic cycle of females at age 72 hours, which had been exposed to *Melia azedarach* fruits extraction at the concentrations of 1.8%, 2.4% and 3.6% had decreased. Table (5) showed that the time required for completing the first gonotrophic cycle in groups I, II and III that had fed the previously mentioned concentrations of *Melia azedarach* extractions was 85.3, 80.7 and 75.7 hours; respectively, as compared with 97.7 hours for the control group (Table 5). The time required for completing gonotrophic cycle was 86.7, 83.3 and 78 hours in groups Ia, IIa and IIIa; respectively as compared with 96.7 hours for the control group (Table 6). Tables (5 and 6) showed that the number and the percentage of the hatched eggs were decreased in the treated groups namely I, II, III and Ia, IIa and IIIa. Such percentages were found to be 85%, 77.6% and 62.2% for groups I, II & III; respectively as compared with 98.8% for the control group (Table 5) and an average of 92.6%, 88.9% and 84.9% for groups Ia, IIa and IIIa; respectively as compared with 99% for the control group (Table 6). It was seen from tables (5 and 6) that the metamorphosis

of the larvae in groups I, II, III, and Ia, IIa, IIIa was retarded. It was noted that the mean duration of the first larval instar was prolonged when compared with the control group (Tables 5 and 6). The onset of the first ecdysiast occurred after an average of 88.7, 98 and 99.3 hours for groups I, II and III; respectively as compared with 74 hours for the control group (Table 5) and an average of 90, 95.3 and 105 hours for groups Ia, IIa and IIIa; respectively as compared with 75.3 hours for the control group (Table 6).

It is indicated from tables (5 and 6) that the mean duration of the second larval instar in groups I, II, III and Ia, IIa, IIIa had been prolonged. The onset of the second larval ecdysiast occurred after an average of 155, 165 and 195 hours for groups I, II and III; respectively as compared with 122.7 hours for the control group (Table 5) and an average of 144.3, 160 and 185 hours for groups Ia, IIa and IIIa; respectively, as compared with 126 hours for the control group (Table 6). The third larval instar had shown retardation in metamorphosis in groups I, II, III and Ia, IIa, IIIa in tables (5 and 6). The onset of the third larval ecdysiast occurred after an average of 183.3, 190.7 and 198 hours for groups I, II and III; respectively as compared with 172.7 hours for the control group (Table 5) and an average of 176.3, 184 and 190 hours in groups Ia, IIa and IIIa; respectively as compared with 170 hours for the control group (Table 6). Tables 5 and 6 showed that the onset of the pupation occurred after an average of 105, 143.3 & 191.3 hours for the larval groups I, II and III; respectively as compared with 97.3 hours for the control group (Table 5); and an average of 101, 136.7 and 185 hours in groups Ia, IIa and IIIa; respectively as compared with 95.3 hours for the control group (Table 6). It is indicated in tables (5 and 6) that the percentages of larvae reaching the pupal stage in groups I, II, III and Ia, IIa, IIIa had been similarly decreased. Such percentages were found to be 64.3, 59.2 and 37.3% for groups I, II and III; respectively as compared with 99.3% for the control group (Table 5) and an average of 83.9, 72.5 and 70.3% for groups Ia, IIa and IIIa; respectively as compared with 99.1% for the control group (Table 6). The data obtained from these experiments demonstrated that the adults reared on media containing *Melia azedarach* extraction seemed to show some morphological variations of larvae, pupae

Table 5a. The larvae of *Musca vicina*, produced from adult females fed on *Melia azedarach* fruit extract at age 72 hours, reaching the succeeding instar at standard time

Records of larvae reaching the next instar at the standard time.						
Feeding medium provided	First instar		Second instar		Third instar	
	After 72 hours		After 120 hours		After 168 hours	
	No.	%	No.	%	No.	%
Standard diet	139	98.5	138	97.8	137	97.1
Standard diet+1.8 % <i>Melia azedarach</i> fruit extract.	73	79.9	52	56.9	48	52.5
Standard diet+2.4% <i>Melia azedarach</i> fruit extract.	56	72.1	35	45.1	32	41.2
Standard diet+3.6 % <i>Melia azedarach</i> fruit extract.	42	70.4	24	40.2	21	35.2

Table 6a. The larvae of *Musca vicina*, produced from adult females fed on *Melia azedarach* leaves extract at age 72 hours, reaching the succeeding instar at standard time.

Records of larvae reaching the next instar at the standard time.						
Feeding medium provided	First instar		Second instar		Third instar	
	After 72 hours		After 120 hours		After 168 hours	
	No.	%	No.	%	No.	%
Standard diet	138	98.8	138	98.8	136	97.4
Standard diet+1.8 % <i>Melia azedarach</i> leaves extract.	106	81.5	80	61.5	78	60
Standard diet+2.4% <i>Melia azedarach</i> leaves extract.	97	79.3	70	57.2	61	49.8
Standard diet+3.6 % <i>Melia azedarach</i> leaves extract.	85	75.6	58	51.6	55	44.9

Table 5. Shows the data of hatching eggs and the development of the first generation of larvae and pupae producing from feeding of females *Musca domestica vicina* at age 72 hours using different concentrations of *Melia azedarach* fruit extracts.

Feeding medium provided	Replicate	Time required for completing gonotrophic cycle	No. Of egg laying	Hatching eggs	First instar		Second instar		Third instar		Normal larvae		Abnormal larvae				Abnormal pupae				Complete emerged adults								Abnormal adults			No. Of normal adults													
					Hours to first ecdysis (mean x)	Percent mortality	Hours to second ecdysis (mean x)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality	Normal		Small larvae	Pigmented larvae	Hours to the onset of pupation	Normal pupae		Larval-pupal intermediate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constricted pupae from (P.L.) (N.P.)	half emerged adult (N.P.)	Normal pupae	Small pupae	Adults with abnormal wings																				
											No	%				No	%									No	%	No	%	No	%		No	%	No	%	No	%							
Standard diet	I	95	145	143	98.8	76	1	0.7	126	0	0	176	0	0	142	99.3	0	0	0	0	94	14	2	99.3	0	0	0	0	0	0	0	142	99.3	0	0	0	0	142	99.3						
	II	98	143	142	99.3	74	0	0	122	1	0.7	170	0	0	141	99.2	0	0	0	0	98	14	1	99.2	0	0	0	0	0	0	0	141	99.2	0	0	0	0	141	99.2						
	III	100	140	138	98.6	72	0	0	120	0	0	172	1	0.7	137	99.3	0	0	0	0	100	13	7	99.3	0	0	0	0	0	0	0	137	99.3	0	0	0	0	137	99.3						
Control group	Total	97.7±1.5	142.6±1.2	141	98.8±0.2	74±1.2	0	0.2	122.7±1.8	0	0.2	172±1.8	0	0.2	140	99.2±0.02	0	0	0	0	97.3±1.8	14	0	99.2±0.02	0	0	0	0	0	0	0	140	99.2±0.02	0	0	0	0	140	99.2±0.02						
Standard diet + 1.8% <i>Melia azedarach</i> fruit extract.	I	88	105	90	85.7	90	2	2.2	150	1	1.1	185	0	0	68	75.6	2	2.2	17	18.9	100	59	656	9	10	2	2.2	10	11.2	7	7.8	2	2.2	57	63	2	2.2	3	3.3	57	63.3				
	II	86	108	95	88	86	1	1.1	155	1	1.1	180	0	0	65	68.4	2	2.1	26	27.4	110	57	60	99.3	8	8.4	2	2.1	15	15.8	1	11.6	3	3.2	54	56	1	1.1	1	1.1	5	5.3	54	56.8	
	III	82	110	89	81	90	2	2.2	160	0	0	185	1	1.1	70	78.7	3	3.4	13	14.6	105	60	67.4	10	11.2	3	3.4	9	10.1	4	4.5	3	3.4	57	64	2	2.2	2	2.2	2	2.2	57	64		
Group I	Total	85.3±1.8	107.7±1.5	91.3	85±1.5	88.7±1.3	1	1.1	155±1.9	0	0.7	183±1.7	0	0.4	67.7	74.1±3*	2.6±2.3	19	20.3±7	105±3.3	58	64.3±7	99±0.8*	2	2.6±0.4	11	12.4±1.5	7	8±1.7	3	3.4	7	7.8	2	2.9±0.3	56	61	1.7±0.4	1.8±0.4	3.6±0.9	1.8±0.4	56	16.4	±2.3	*
Standard diet + 2.4% <i>Melia azedarach</i> fruit extract.	I	80	102	80	78.4	100	1	1.3	165	1	1.3	188	0	0	58	72.5	1	1.3	19	23.8	140	47	58.8	11	13.8	1	1.3	10	12.5	9	11.3	2	2.5	45	56	0	0	0	0	2	2.5	45	56.3		

[illegible]

L.S.D. test differs significantly as compared with the control group at ($p > 0.05$)

Significantly different from group I, II&III.

* Significantly different from group III

§ Significantly different from group II&III

¥ Significantly different from the control group

Significantly different from the control group, group I & group II.

Significantly different from the control group & group I

Significantly different from group I

Significantly different from group I & II

Table 6. Shows the data of hatching eggs and the development of the first generation of larvae and pupae producing from feeding of females *Musca domestica vicina* at age 72 hours using different concentrations of *Melia azedarach* leaf extracts.

Feeding medium provided	Repl- cate	Time re- quired for com- pleting gono- trophic cycle	No. Of egg laying	Hatching eggs		First instar		Second instar		Third instar		Normal larvae		Abnormal larvae				Normal pupae		Abnormal pupae												Complete emerged adults				Abnormal adults			No. Of normal adults																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
				No	%	Hours to first ecdy- sis (mean x)	Percent mortality (mean x)	Hours to second ecdysis mor- tality (mean x)	Per- cent mor- tality	Hours to third ecdysis (mean x)	Per- cent mor- tality	No	%	Normal larvae	Small larvae	Pigmented larvae	Hours to the onset of pupa- tion	No	%	Larval- pupal interme- diate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constrict- ed pupae from (P.L.)	half emerged adult (N.P.)	Normal pupae	Small pupae	No	%	N	%	No	%	Adults with abnor- mal wings																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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Standard diet I		49	140	139	99.2	79	1	1.4	128	0	0	174	0	0	0	98	137	98.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	98.6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				</

Feeding medium provided	Time required for completion of gonotrophic cycle	No. Of egg laying	Hatching eggs	First instar		Second instar		Third instar		Normal larvae	Abnormal larvae			Abnormal pupae						Complete emerged adults				Abnormal adults			No. Of normal adults																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
				Hours to first ecdysis (mean x)	Percent mortality	Hours to second ecdysis (mean x)	Percent mortality	Hours to third ecdysis (mean x)	Percent mortality		Small larvae	Pigmented larvae	Hours to the onset of pupation	Normal pupae	Larval-pupal intermediate (N.L.)	Small pupae (S.L.)	Pigmented pupae (P.L.)	Constricted pupae from (P.L.)	half emerged adult (N.P.)	Normal pupae	Mormal pupae	Small pupae	Small adults	Adults with abnormal wings																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Group II	II	78	138	125	90.6	96	1	0.8	155	1	0.8	184	0	0	102	81.6	0	0	21	16.8	140																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				

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''' Significantly different from the control group, group I & group II.

¢ Significantly different from the control group & group I

Significantly different from group I

** Significantly different from group I & II

and adults when compared with control groups. These abnormalities could be classified into larval, pupal and adult abnormalities.

Larval abnormalities as small larvae these were larvae which had normal appearance, but they had a comparatively small size. Table (1) showed that this category of the small larvae reached a percentage of 1.7% and 1.2 % in groups I and II; respectively (Table 1) and a percentages of 2.8%, 1.9% in groups Ia, IIa; respectively (Table 2) in the first set of experiments. In the second set of experiments it reached a percentage of 2.8%, 2.2% in groups I, II; respectively (Table 3) reached a percentage of 4.4%, 1.7% in groups Ia, IIa; respectively (Table 4). In the third set of experiments, the percentage of the small larvae reached 2.6%, 2.2% in groups I, II; respectively (Table 5) and a percentage of 0.5% in group Ia (Table 6) the small larvae developed to produce small pupae and small adults. Only adults belonging to groups I, II, Ia and IIa of the first, second and group I of experiments that were reared on diets containing 1.8% and 2.4% of *Melia azedarach* extractions had produced small larvae, small pupae and small adults (Fig 5 and 11).

2-Pigmented larvae, these were larvae of normal size that had inter-segmental patches of brown pigments (Fig. 1). Table (1) showed that the larvae attaining this abnormality had reached a percentage of 46.7%, 55%, 70.5% in groups I, II, III; respectively (Table 1) and percentages of 44.3%, 49%, 68.6% in groups Ia, IIa, IIIa; respectively (Table 2) in the first set of experiments. In the second set of experiments the larvae attained this abnormality were 75.9% in groups III and a percentage of 53.4%, 50.5% in groups II, I (Table 3) and reached a percentage of 44.1%, 47.2% and 67.1% in groups Ia, IIa, IIIa; respectively (Table 4). In the third set of experiments, the percentage of larvae that attained this abnormal pigmentation were 20.3%, 23.6%, 50.9% in groups I, II, III; respectively (Table 5) and a percentage of 9.5%, 16.3%, 20.5% in groups Ia, IIa, IIIa; respectively (Table 6).

Pupal abnormalities, larval-pupal intermediates, the puparia of these abnormal pupae were incomplete with parts of the last larval cuticle were still persisting (Figs. 4 and 5). These larval-pupal intermediates were produced from normal larvae (N.L.), they failed to complete the pupal period. They died after emerging

from the normal third larval instar. Table (1) showed that this category of the larval-pupal intermediates had reached a percentage of 5.3%, 9.6% & 10.5% in groups I, II, III; respectively (Table 1) and the percentage of 4%, 8.1%, 9.3% in groups Ia, IIa, IIIa; respectively (Table 2) in the first set of experiment. In the second set of experiments the percentage of this category had reached. In the third set of experiments, the percentage of pupae that attained this larval-pupal intermediate were 9.9%, 12.8% and 3.4% in groups I, II, III; respectively (Table 5) and a percentage of 5.1%, 9.8% & 9.2% in groups Ia, IIa, IIIa; respectively (Table 6).

2- Constricted pupa; These were fully formed pupae having conspicuous constrictions in their puparia; they were produced from pigmented larvae (P.L), hence failing to have the characteristic shape of the normal pupae and failing to emerge to the adult stage (Fig. 4). (Table 1) showed that this category of abnormal pupae had reached percentages as high as 36.3% in group III, 16% and 11.1% in groups II and I; respectively (Table 1) and a percentage of 10.5%, 13.5% and 20.9% in group I, II and III; respectively (Table 2) in the first set of experiments. In the second set of experiments the percentage of this category of abnormal pupae had reached a percentage of 12.1%, 17.5%, 33.3% in groups I, II, III; respectively (Table 3) and a percentage of 7.8%, 10.4%, 16.6% in groups Ia, IIa, IIIa; respectively (Table 4). The third set of experiment had shown a marked decrease in the percentage of these constricted abnormal pupae, it reached a percentage of 8%, 9.9%, 8.4% in groups I, II, III; respectively (Table 5) and a percentage of 2.3 %, 3.8%, 4.8% in groups Ia, IIa, IIIa; respectively (Table 6).

3- Pigmented pupae, these were pupae with an apparently normal appearance but possessing white pigments they were produced from pigmented larvae (P.L.). Table (1) showed that this category of abnormal pupae had reached a percentage of 35.6%, 39.1%, 37.8% in groups I, II, III; respectively and a percentage of 34.1 %, 35.3% and 48.0% in groups Ia, IIa, IIIa; respectively (Table 2) in the first set of experiments. In the second set of experiments the percentage of this category of abnormal pupae had reached a percentage of 38.3%, 36.5%, 42.7% in groups I, II, III; respectively (Table 3) and a percentage of 36.6%, 35.9% and 50.5% in groups Ia, IIa, IIIa; respectively (Table 4).

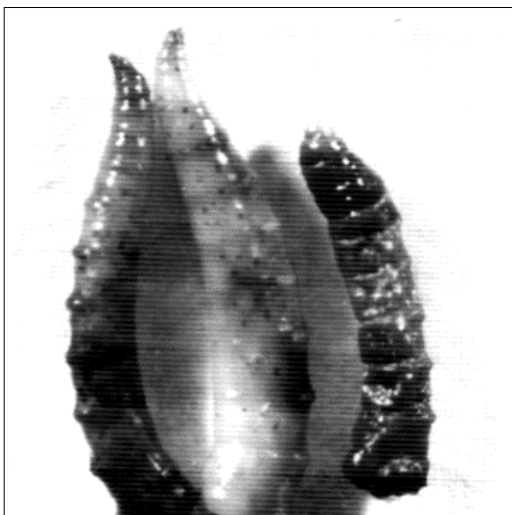


Figure 1. howing larvae with normal size but having brown pigments. X 26.1.

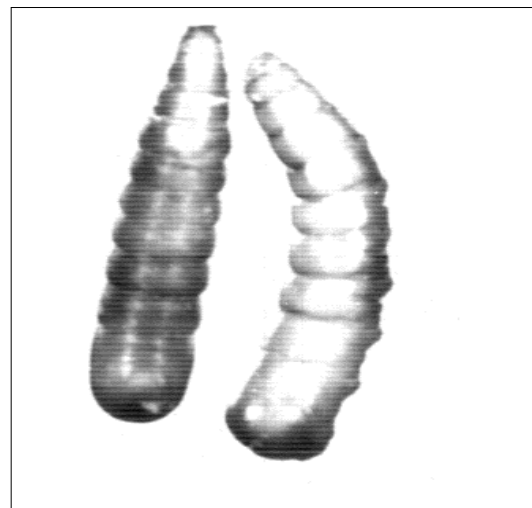


Figure 2. Showing larval-pupal intermediates. X30.5.

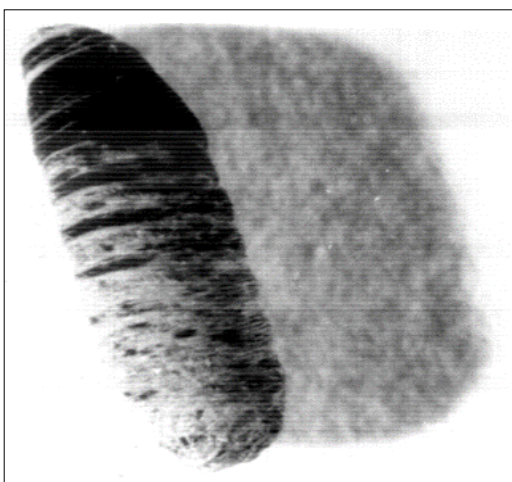


Figure 3. Showing larval – pupal intermediates. X31.2.

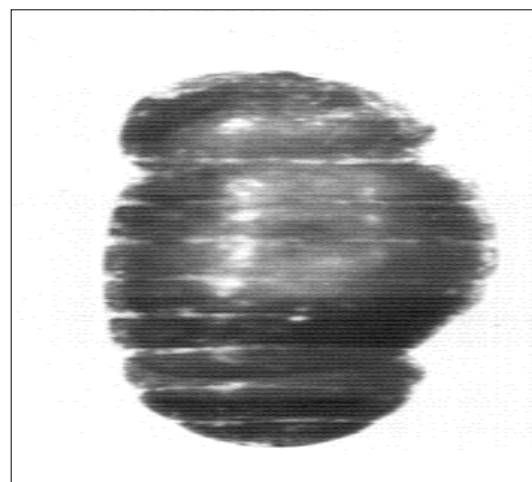


Figure 4. Showing a constricted pupa. X34.7.



Figure 5. Showing; a- Small pupa, b-Crumpled pupa, c-Normal pupa with normal size. X53.3.



Figure 6. Showing adult house fly *Musca vicina* that remains attached to its puparium. X32.

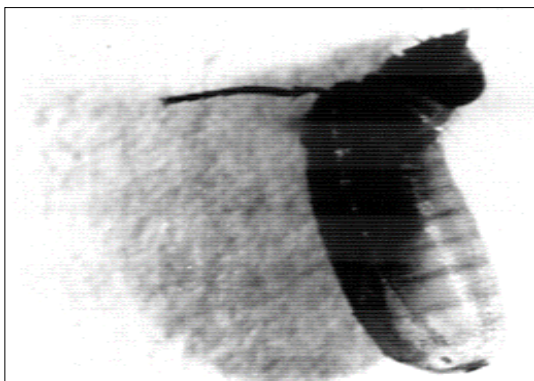


Figure 7. Showing: Head and a leg of the adult fly *Musca vicina* that remains attached to its light X 63.

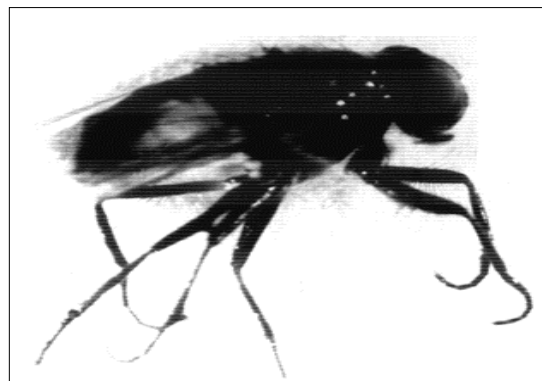


Figure 8. Shows adult house fly *Musca vicina* with incomplete bent wings and abnormal prolonged legs.



Figure 9. Showing adult with incomplete broken wings. X31.



Figure 10. Showing adult house fly *Musca vicina* of almost normal size.



Figure 11. Showing small adult house fly *Musca vicina* with incomplete bent wings. X 30.



Figure 12. Showing adult *Musca vicina* of normal size with long crumpled wings and reduced abdomen. X 28.2.

The third set of experiments had shown a marked decrease in the percentage of these pigmented pupae, it reached a percentage of 12.4 %, 13.8%, 42.5% in groups I, II, III; respectively (Table 5) and a percentage of 7.2%, 7.9%, 8% in groups Ia, IIa, IIIa; respectively (Table 6) .It must be noted here that the larval-pupal intermediate and the constricted pupae were produced from the normal larvae. The pigmented pupae were produced from the pigmented larvae.

Small pupae were produced from small larvae (S.L.) they reached as high as 4.4% in group Ia (Table 4).

Adult abnormalities; certain morphological abnormalities were evident in the adults produced after treatment in groups I, II, III and Ia, IIa, IIIa.

These abnormalities seem to fall into two main categories:

1- Half emerged adults were produced from normal pupae (N.P.), they were adults that could not emerge completely and remain trapped in their puparia until they die (Figs. 6, 7), they reached in the first set of experiments a percentage of 5.8%, 6.4% and 6.4% in groups I, II and III; respectively (Table 1) and a percentage of 8.5%, 6.5% and 4.6% in groups Ia, IIa, IIIa; respectively (Table 2). In the second set of experiment it reached a percentage of 6.9%, 9.4% & 4.2 % in groups I, II, III; respectively, (Table 3) and a percentage of 10.2% , 9.1% & 6.7% in groups Ia, IIa, IIIa; respectively (Table 4). In the third set of experiments, the percentage of this abnormal adults were 2.9%, 2.1% and 1.1% in groups I, II, III; respectively (Table 5) and percentages of 10.8%, 9% & 9.8% in group Ia, IIa and IIIa; respectively (Table 6)

2-Adults of relatively small size and possessing different shapes of wings they were produced from small larvae and small pupae. Figures (8- 13) and tables (1-6) demonstrated emerging one winged adults in addition to variety of abnormalities ranging from adults with crumbled incomplete bent to adults with broken wings.

Discussion

The results obtained from the experiments conducted herein indicated the retarding effect of the fruits and leaves extracts of *Melia azedarach* on the house fly *Musca vicina* at different ages 24, 48 and 72 hours, when they were treated with various

concentrations of *Melia azedarach* extracts mainly 1.8% 2.4% and 3.6% .The results represented in tables (1- 6) indicated the effect of *Melia azedarach* extracts on the different ages of females *Musca vicina* which accelerated egg deposition thus the time required for completing the first gonotrophic cycle was decreased and the number of deposited eggs was slightly decreased. It is noticed that *Melia azedarach* extracts at the different doses used; affect the hatchability of eggs which was decreased. Similar observations were obtained by Riddford and Williams [21] in their work on Silk-worm *Hyalophora cercropi* by using JHa. Keller [22] reported that the reproductive potential of *Diaprepes abbreviatus* was reduced by aerial application of JH-6040, plus oil. The JHa reduced the hatchability of eggs and the oil detached them from the leaves of the litters.

Mehrotra and Gujar [18] found that azadirachtin reduced fecundity and reproduction of *Spodoptera litura*. Heyde *et al.* (1984)[23] observed a marked reduction in the fecundity of hemipterous rice pests when adults were treated with 3% neem oil .Chiu *et al.* [24] noticed that oviposition deterrence by extracts of *Melia toosendan* for a number of Lepidopteran species. Coudriet *et al.* [25] found that ethanolic extracts of neem seed reduced oviposition of sweetpotato fly, *Bemisia tabaci*. Wilps [26] studied the effect of azadirachtin on larval development, pupation of *Musca domestica*. He found that the number of eggs deposited on azadirachtin treated substrate was much less than on the control. Also, he noticed damaging in *Musca*'s larvae and adults. He indicated that azadirachtin seed kernel extracts (NSKE) could be used as effective inhibitors of growth and development in autogenously insects . Akhter *et al.* [27] observed the egg laying capability after using two preparations of Nicotine dusts against the 3rd instar larvae of the house fly *Musca domestica*. They found that the egg laying capabilities ranged from 30.4 to 35.8 egg/ fly at the highest doses of Nicotine whereas the same concentrations inhibit the hatching of at least 96.6 and 64.2 egg/fly.

Sterility was indicated by Sukumar [28] when using the extracts of air dried leaves and roots of *Catharanthus roseus* in both males and females *Musca domestica* .Rice and Coat [29] treated adults of *Musca domestica* and their eggs with mono-terpenoids to determine the topical fumigant and ovicidal activity of

each compound. Structural activity relationships were evaluated with the toxicity data and comparisons were made between monocyclic, aromatic, a cyclic aliphatic, monocyclic aliphatic to determine the toxicity differences involving the skeletal structure amount of saturation, and associated functional groups of monoterpenoids. They found that ketones were less toxic than an analogous aldehyde, in the topical, fumigant and ovi-cidal bioassays. Saxena *et al.* [30] noticed that topical treatment of *Musca domestica* L. with the phytochemical plumbagin in doses of 0.005-5 Mg, prevented oocyte development and drastically affected fecundity and fertility in adults. Also, treatment of "Wandering" larvae was less effective as the compound only affected fertility, not fecundity. It is clear from the data cited in tables (Ia-6a) that oral administration of *Melia azedarach* to the adult house fly causes prolongation in the life span of the larval instar of the first generation. Similar observations were obtained by Supavarn *et al.* [31] in their work on *Aedes aegypti*. Jhansi Rani [32] observed a delay in development of larval-pupal and pupal-adult intermediates of *Corcyra cophalonica* when insects were treated with lower concentrations of kernel. Koul [33] found that application of Azadirachtin on various stages of *Dysdercus koenigii* and *Spodoptera littura* larvae caused prolongation in the developmental period wing deformities, development of wingless adults and larval mortality. Koul [34] studied the effect of azadirachtin on blowfly *Calliphora vicina* by injection. They found that azadirachtin prolonged the 3rd larval instar and the pupae had a lower body weight than in the control also many of the pupae showed malformations. Higher doses caused mortality both in larvae and pupae and only a few adults emerged.

Hashem and Youssef [7] studied the effect of methanolic extracts of leaves and fruits of *Melia azedarach* L. on the house fly *Musca vicina* Macq. They found that the reaction of various instars to the concentrations of *Melia azedarach* extractions is doses dependent. The metamorphosis was retarded and the developmental periods of the larval stages were prolonged. They showed that the younger instars were strongly affected by lower concentrations while the older ones were less affected. They noticed that the fruit extract was more effective on the larvae than that of

leaves. They also recorded that the larvae, pupae, and the adults displayed morphological abnormalities as well as pronounced anomalies. It may be reported here that the *Melia azedarach* extract was considered as the main factor controlling the period of the larval stages. It was evident that the prolongation in the larval life span which occurred as a result of the exposure to *Melia azedarach* extraction had made a number of workers make use of *Melia azedarach* extractions as larvicides.

The insect growth regulating properties of petroleum ether extracts of 10 indigenous Indian plants (*Acorus calamus*, *Adhatoda*, *Vasica*, *Aristolochia indica*, *Artemisia vulgaris*, *Azadirachta indica*, *Boerhavia diffusa*, *carum carvi*, *carum copticum*, *Ocimum basilicum* and *Ocimum sanctum* were tested at 0.01 - 10 ppm against 3rd instar larvae of *Culex pipiens fatigans*, and *Musca domestica* by Deshmukh and Renapurkar [35]. They found that *Acorus calamus* and *Ocimum Sanctum* inhibited the full development of 20% of the larvae of *Musca domestica* at 0.1 ppm. Also at 10 ppm extracts of all (10) plants produced 20-80% inhibition in *Musca domestica* with *Acorus calamus* and *Azadirachta indica* being the most potent.

El Sayed [36]; Naqvi *et al.* [37] found that the effects of azadirachtin, a triterpenoid extracted from neem (*Azadirachta indica*) seed were similar to those of insect growth regulators against the immature stages of the horn fly, *Haematobia irritans* the stable fly, *Stomoxys calcitrans* and the house fly, *Musca domestica*. They noticed that, when an ethanolic extract of ground seed was blended into cow manure, the LC50 and LC90 were 10.5 and 20.2 ppm; respectively for house flies larvae. The pesticidal properties of juliflorine and Margosano were determined against 3rd instar larvae of *Musca domestica* by Jahan *et al.* [38]. The teratogenic effects of these pesticides on larvae, pupae and adults were observed. The LC50 was found to be 0.05% and 0.0018% for juliflorin and Margosan-o, respectively. The toxicity and abnormalities produced by neem fraction and deltamethrin against second instar larvae of *Musca domestica* L. were recorded by Naqvi *et al.* [39]. They found that LD20 of deltamethrin (25 WP) and a neem extract after 24 hours treatment were 1.56% and 13.5%; respectively. Naqvi *et al.* [40] studied the toxicity of the pyrethroid Coopex 25 EC (permethrin) and a neem extract N-7 against the 3rd instar larvae of the

house fly. They found that the LD50 values of both compounds were 0.029% and 3.8%, respectively, which revealed that pyrrthroid was more toxic than N-7. Both compounds caused morphogenic effects on various stages of *Musca domestica* including weight reduction and abnormal development. The first record of abnormality was the appearance of pigmented larvae. The nature of this pigmented area was uncertain. Chiu Shin-Foon [2] noticed appearance of black spots on the body of cabbage larvae soon after treatment with pure compounds isolated from the root bark. Shalaby *et al.* [41]; Radwan [8] observed abnormal pigmentation in the second and the third larval instars of the house fly *Musca domestica vicina*. The second abnormality was the appearance of small larvae.

Naqvi [42] found that treated larvae of *Aedes aegypti* with neutral fraction of winter neem leaves (NFD) produced larval-pupal intermediates. The appearance of small, pigmented and constricted pupae were additional abnormalities observed with various concentrations of *Melia azedarach*. Wilps [26] found that reduction in pupal weight of *Musca domestica* and pupal malformations were found to occur more frequently with increasing azadirachtin concentration in the diet. Koul [34] studied the effect of azadirachtin on blowfly *Calliphora vicina* by injection. They found that azadirachtin prolonged the 3rd larval instar and the pupae had a lower body weight than in the controls, also many of the pupae showed malformations. Shalaby *et al.* [41] noticed a dark pigmentation in pupae of *Musca domestica vicina* when larvae of 2nd and 3rd instars treated with JH-1. The appearance of constricted pupae was another observed abnormality, the pupae were fully formed but had constrictions in their puparia, so that they failed to emerge to the adult stage.

It became obvious that the exposure of house fly females to *Melia azedarach* extracts in the treated groups I, II, III and Ia, IIa, IIIa, produced abnormal larvae which gave rise to abnormal pupae (Fig. 5) and emerged producing abnormal adults, small adults of normal appearance (Fig. 11) adults of normal size with broken wings and abnormal legs which could not deposit eggs and adults that could not emerge completely and remain concealed in the puparia until they died (Figs. 8-13). Koul [33] reported that azadirachtin caused a prolonged development period, wing deformities,

non-plasticisation of wing lobes, development of wingless adults, and larval mortality on application to various stages of *Dysdercus koenigii* F. and against *Spodoptera littura* larvae.

Koul [34] found that the injection of azadirachtin to the larvae of the fly (*Calliphora vicina*) led to inhibition of adult emergence and the adults which succeeded to emerge were smaller and their wings, legs, and proboscis showed typical malformation and their abdomens were often very short. Jahan *et al.* [38] used petroleum ether extracts of (*Clerodendrum inerme*) leaves which afforded a compound that matched the clarodan compound (-)-3-epicaryoptin in physical spectral characteristics. They observed that the tested compound inhibited the development of larvae of *Musca domestica* and *Culex quinquefasciatus*. Hashem and Youssef [7] studied the effect of ethanolic extractions of leaves and fruits of *Melia azedarach* on the house fly *Musca vicina*. They found that the reaction of various instars to the concentrations of *Melia azedarach* extractions is dose dependent.

The insecticidal performance of neem products against most insects is not as dramatic as that of the synthetic insecticides and for equivalent effectiveness, considerably higher doses are required. Evidently the (JH-like substance) or the fruit and leaves extracts of *Melia azedarach* seems to be responsible for the normal development of the larvae, the appearance or disappearance of the larval characters and their normal or abnormal pupation. It became obvious from the results presented herein and which had been confirmed by the work of other authors, that the presence of *Melia azedarach* fruit and leaves extracts during the period of pupation interferes with the normal process of pupation and induces abnormal pupae and the emergence of anomalous pupal forms. These forms were found to attain some of the larval characters, in addition to the inhibition of the melanization process. The employment of the fruit extract of *Melia azedarach* is disrupting the course of morphogenesis and preventing the normal development of insects of medical and economic importance would point their importance as unharmed insecticides to human being. House flies *Musca vicina* are still the world's number - one vectors of human and domestic animals diseases. Today, we depend almost entirely on synthetic chemical pesticides. The

appearance of pesticide resistance had diminished our confidence in conventional chemical methods. It is clear that the fruit and leaves extracts of *Melia azedarach* are effective against house flies *Musca vicina*.

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