RESULTS

1. Inherited Effects of Substerilizing Doses of Gamma Irradiation on some Biological Aspects among Irradiated Pi and Their Fi Generation of the Black Cutworm, *Agrotis ipsilon* (Hufn.):

Adult males previously irradiated as full grown pupal with substerilizing doses of 75 and 150 Gy of gamma irradiation were mated with untreated females. The resulting males and females from irradiated parental males (male line) were used for mating with untreated ones throughout F1 generation to study the inherited effects of irradiation. The inherited effects of the two substerilizing doses of gamma irradiation on some biological aspects of adults as well as immature stages were investigated throughout F1 successive generation.

1.1. Effects on reproduction:

The effect of irradiation on parent males with two substerilizing doses 75 and 150 Gy of czanuria radiation on female fecundity in the parental generation as well as the following F1 generation are given in Table (1). Data show that fecundity of untreated females mated with irradiated parental males did not significantly differ from untreated control at dose level 75 or 150 Gy. However, the fecundity was significantly less than the control at all tested mating combination among Ft generation. Data given in Table (1) show that the egg hatch was gradually reduced by increasing the dose of radiation applied to

umptiatiaD ,	base to Pr male (Gy)	Crosses* Male Female	Average no. of eggs/mated	"A. of Egg hatch	Mating ability	Average no. of sperma-tophores/ mated female	.1/2, Mated female with sperm
ci.-	75	= H E- =	1080.15	56.55	90	1.40	90
a.s.i				21.90		N.S	
cZ	Control	n n	°LILO!	£61L	100	1.05	100
	75	fl	928.90	36.77	90	1.00	80
		11 .1.	810.09	Z0111	100	1.00	100
		E- .T.	591.90	12.67	80	0.80	85
WS"i			111.50	25.50		N.S	

U = Untreated
T = Treated

the parental male. The egg hatchability was sianificantly reduced to 55.93 and 36.22% when Pi males were irradiated (75 and 150 Gy respectively) compared 88.43% in the control.

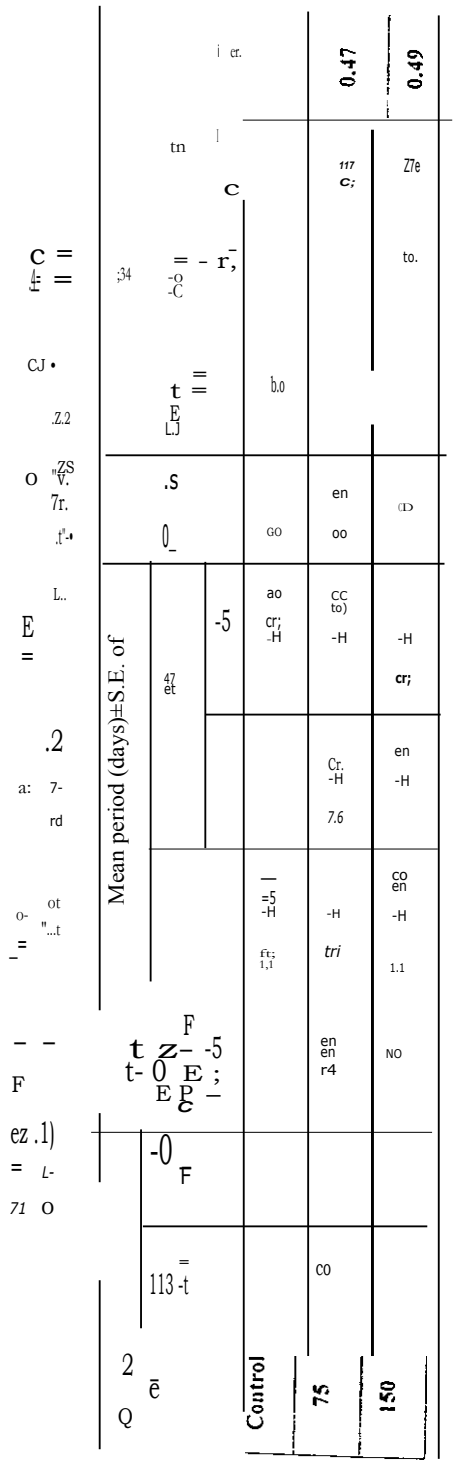
The reduction in egg hatch was more pronounced among F1 generation than their irradiated male parents where it was reduced to 36.77 and 42.02 at mating combination TMxNF and NMxTF. respectively (in case of 75 Gy dose), 2.37 and 12.67/0 at mating combination TMxNF and NMxTF in case of 150 Gy dose, in comparison to 72.93% in the control.

The results in Table (1) also indicate that the mating ability of irradiated PI males was not affected at any tested dose level either in parental generation or in F1 generation. The results also show that irradiation did not clearly affect the average number of spermatophores per mated female among neither parents nor F1 generation.

The success of sperm to reach spermatheca (estimated as percentage of mated females with sperm) was not obviously affected among the females neither in parental generation nor Fi generation.

1.2. Latent effects on certain biological aspects of Fi generation:

Data given in Table (2) indicate that the total mortality percentage (larvae and pupae) of F1 progeny was clearly increased in comparison to untreated control, where it was 68.66% among those insects descendant of irradiate Pi males treated with 150 Gy while it was only 22% between the individuals of control.


Mean period (days)±S.E. of
Control
75
150
0.47
0.49

The average larval duration increased to 35.90 and 39.64 days. respectively at the both two tested doses levels compared to their untreated control.

Also the average developmental period for pupae at the two doses treatment was clearly affected compared to the control treatment.

Table (2) shows slight reduction in the percentage of pupation in F_i progeny, where it was 85.33% and 76% at doses 75 and 150 Gy, respectively, compared to 86% in control treatment.

The results in Table (2) indicate that the percentage of adult emergence among F_i was obviously reduced compared to the control where it was 50% and 41.22% at doses 75 and 150 Gy, respectively, compared with 90.69% in control. The results indicate that the percentage of malformed adults increased by increasing the dose level.

Data given in Table (2) also show that the sex ratio in general was on behalf of male among the progeny of irradiated males and it seemed around normal. It was around (0.56 : 0.44) male:female which was normally obtained in the contsol treatment.

2. Effects of Plant Extracts:

The plant extract is one of the most important methods that influences the insect management. In this part of study, the effects of two aforementioned plant species on some biological activities of the blacic cutworm *A. ipsilon* were studied.

2.1. Biological effects of petroleum ether extracts:

Data in Table (3) show the biological effects of petroleum ether extract of the two plants and its concentrations on the 4th instar larvae of *A. ipsilon.* Results revealed that the highest number of dead larvae (34) resulted from the larvae treated with 5 and 10% concentrations of *M. azedarach* extract and the lowest record was (21) dead larvae in case of treatment with 0.625 and 5% concentrations of *S. terebinthifolius.*

The comparison between the means of different concentrations of each plant extract revealed that *M. azedarach* produced higher average of total mortality percentages (29.8%) than *S. terebinthifolius* (23.4%).

Data given in Table (3) indicate that the percentage of total mortality until adult stage was increased with the increase of concentration comparing to the untreated control. It was increased at 10% concentration to 54 and 67% in *M. azedarach* and *S. terebinthifolius,* respectively. But the lowest mortality percentage (38%) resulted with the application at 1.25% concentration of *S.terebinthifolius.*

The average period of larvae varied within concentrations and ranged from 39.74 days at 10% in case of treatment with *M. azedarach* to 35.36 days at 0.625% in case of treatment with *S. terebinthifolius.*

Results in Table (3) also show that all plant extracts at any concentration had on effect on elongation of larval period comparing to control. _Pupal durations were slightly affected in both males and females at all tested concentrations of both plant extracts in comparison to control.

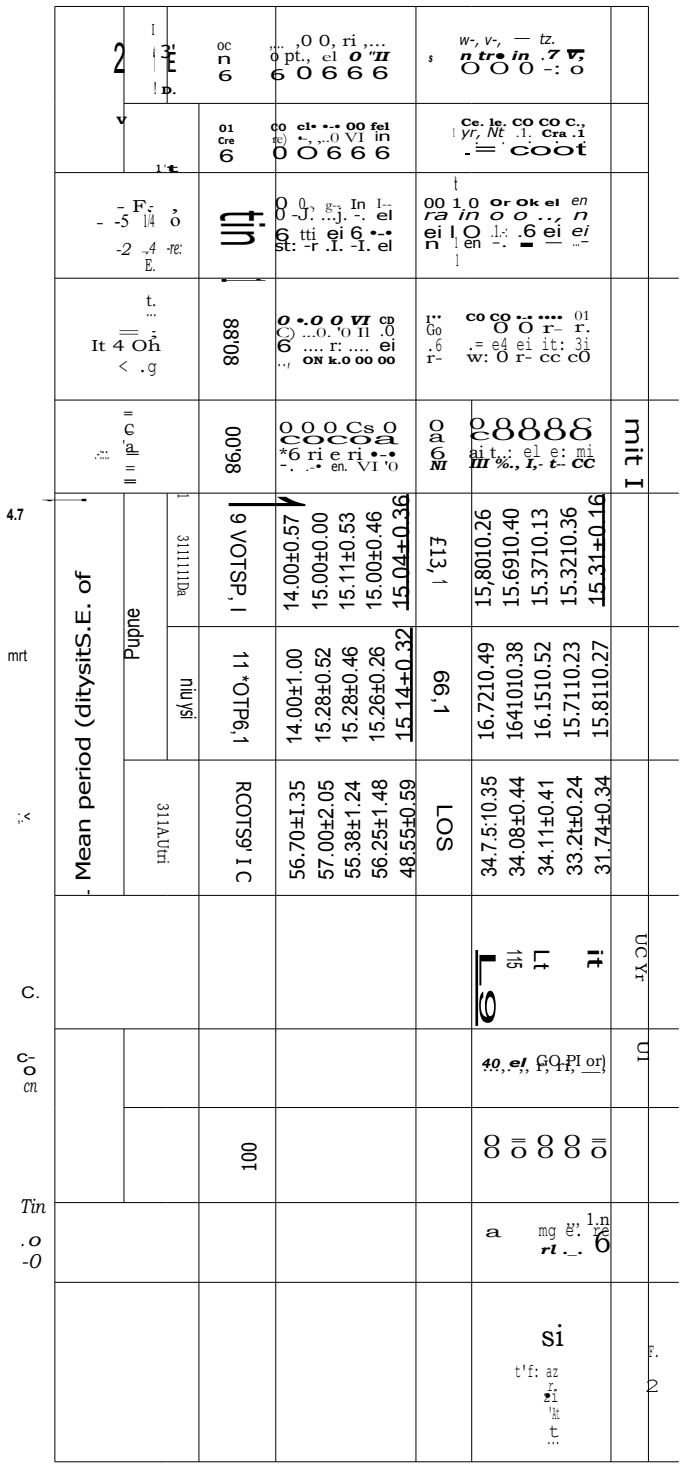
Plant extracts	[illegible]	Number of Tested larvae	Number of Dead larvae	Total mortality from larvae to adult	Mean period (days)±S.E. of [illegible]	Pupae [illegible]	Pupae Female	[illegible]	Adults emergence	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39.7410.26	16.1010.31	15.8410.42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	39.4010.28	16.0010.24	15.6110.36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	39.5010.23	15.8810.31	15.40-10.24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	38.6710.27	15.7810.23	15.3710.29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	38.5510.35	15.5610.23	15.2710.27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	37.2610.31	16.33-10.37	15.9510.16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	36.7810.27	15.9110.33	15.4810.23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	36.8310.26	15.9310.29	15.6010.34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	36.6710.25	15.8210.61	15.6010.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	35.3610.28	15.8710.22	15.4710.19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

The results in the same table indicate that all the treatments with plant extracts produced percentages of pupation lower than control. The data given in Table (3) reveal that the increase in adult emergence related to the decrease of concentrations of both the two tested plant. The production of the highest percentage of malformed adult was given after the exposure of 4th instar larvae to 10% concentration of *M. azedarach* (39.13%) but the lowest percentage of malformed adult was (10.71%) resulted after application with *M. azedarach* at 0.625% concentration.

The results also indicate that the sex ratio was fluctuated, sometime it was shifted in favour of female (as observed in case 1.25 and 0.625% concentration from extract chinaberry) where it was 0.42 : 0.58 and 0.41 : 59 (male : female), respectively. Also the same result was observed at (10 and 0.625% conc. from extract of Brazilian pepper). Where it was 0.36 : 0.64 and 0.41:0.59 (male: female), respectively. While the sex ratio was shifted in favour of male as observed in case *S. terebinthifolius* extract at (1.25% conc.) where it was 0.63 : 0.37 (male : female). Generally the sex ratio was around 0.52 : 0.48 (male : female) as was obtained in control treatment.

2.2. Biological effects of acetone extracts:

Data - in Table (4) reveals the biological effects of acetone extracts on the 4th larval instar *ofAgrotis ipsilon.* Results in this table show that acetone as a solvent was more active than petroleum ether in extracting the toxic components from the plant and this appear in the mortality percentages. Regarding the effects of acetone extracts, mortality among the fed larvae varied from plant extract to another and from concentration to another.



Results show that all the concentrations of the two studied plant's extracts have effect on larvae of *Agrotis* compared to the untreated control. The highest mortality (94%) was obtained with 10%M. *azedarach* extract. All concentrations of *M. azedarach* gave mortality higher than all *S. terebinthifolius* concentrations. The lowest percentage of the total mortality was recorded with *S. terebinthifolius* extract at 0.625 concentration which gave 25%.

The variation between means of larval period at both treatments were very clear, only one concentration (0.625%) of *S. terebinthifolius* kept the larval duration as control period (31.74 day). All other treatments elongated the larval period between 33.22 and 57 days comparing to their control 31.65 days.

The data in the same table showed that pupal durations were slig,htly affected in both males and females at all tested concentrations of both plant extracts in comparison to untreated control.

By comparing means of pupation percentages of both plant extracts (Table 4) it may be concluded that *M. azedarach* produced the lowest mean of pupation 29.8 but in the case of *S. terebinthifolius* it was 71.8% comparing to 86.%, in the case of control treatment.

In regard to the percentage of emergence as shown in Table (4), the lowest percentage of adult emergence resulted from the treatment of *S. terebinthifolius* extract at 10% concentration (56.89 %), while the highest percentage resulted with the application with 0.625% concentration of the same

extract. In case of *M. azedarach* extract it was noticed that the mean of adult emergence percentage was high which could be due to increase of mortality percent.

As shown in Table (4), acetone extract of *M. azedarach* at all concentrations gave higher percentages of adult malformation (43.28%) more than acetone extracts of *S. terebinthifolius* (18.27%). Compared to 6.84% at control treatment.

The data given in Table (4) show that the sex ratio among the concentrations of Barazilian pepper extract seemed about normal which was 0.52:0.48 (male:female), while there was flactuation in the sex ratio among the concentrations of chinaberry extract. Sometimes it was shift in favour of female where it was 0.33:0.67 (male:female) at 10% concentration. In another case the sex ratio was shifted in favour of male as resulting at 5 and 2.5% concentration, where it was 0.64:0.36 and 0.61:0.39 (male:female), respectively.

2.3. Effect of plant extracts on the reproductive biology of Pi adults:

Table (5) shows the effect of various plant extracts on average number of egg hatch, mating ability, average of spermatophores per mated female and percentage of mated female with sperm of emerged moths.

Reduction in average no. of eggs/mated female was more obvious when both sexes were treated with the acetone extract of *M. azedarach* at concentrations of 10 and 5% succeeded to prevent egg laying completely. The average munber of laying eggs was 302.4, 509.8 and 493.6 egg at 2.5, 1.25 and 0.625%,

Solvents		Acetone					troleum ether				
[illegible]	[illegible]	Average no. of eggs/ mated female	% of Egg hatch	[illegible]	Average no. of spermato-phores/ mated female	% Mated female with sperm	Average no. of eggs/ mated female	[illegible]	[illegible]	Average no. of spermato-phores/ mated female	[illegible]
Control		1591.8	118.57	100	1.60	100	1591.80	88.57	100	1.60	100
Solvent		1134.2	85.59	100	1.20	100	1209.20	[illegible]	100	1.60	100
M. azetlarach	[illegible]	0.00	0.00	[illegible]	0.00	0	656.80	[illegible]	[illegible]	0.60	[illegible]
		0.00	0.00	[illegible]	0.00	0	686.00	[illegible]	[illegible]	0.60	60
		302.40	[illegible]	[illegible]	0.60	60	793.20	[illegible]	[illegible]	0.60	[illegible]
		509.80	[illegible]	[illegible]	0.80	60	743.20	[illegible]	[illegible]	0.60	60
		493.60	[illegible]	[illegible]	0.80	60	957.00	[illegible]	[illegible]	1.00	80
a.S.					[illegible]		[illegible]	[illegible]			[illegible]
terebittiMfolus	[illegible]	469.80	[illegible]	[illegible]	0.60	60	585.20	[illegible]	60	0.60	[illegible]
		695.80	[illegible]	[illegible]	0.60	60	849.110	[illegible]	[illegible]	0.60	[illegible]
		694.60	[illegible]	[illegible]	0.80	60	764.80	[illegible]		0.80	[illegible]
		726.00	[illegible]	[illegible]		100	878.40	[illegible]	80	0.80	[illegible]
		973.00	[illegible]	[illegible]	[illegible]	100	945.00	[illegible]	[illegible]	0.80	[illegible]
		[illegible]	[illegible]		0.66	[illegible]	[illegible]	[illegible]		N.S.	[illegible]

oNlaiing tombinalion (treated male X Irenied female)

respectively compared to 1591.8 eggs in the untreated control and 1134.2 eggs/ female in the_treatment with solvent alone.

ln the case of treatment with petroleum ether extracts of the same plant, the average number of deposited eggs was 656.8, 686.0, 793.2, 743.2 and 957.0 egg at (10, 5, 2.5, 1.25 and 0.625% concentrations, respectively. The results, indicated that all concentrations of *M. azedarach* extracts caused reduction in laying eggs per mated female in comparison with untreated ones, (1591.8 eggs) or relevant solvents (1134.2 eggs) in the case of acetone and (1209.2 eggs) with the petroleum solvent.

Also, data in the same table show that all *Schinus terebinthifolius* extracts at all concentrations had a reduction effect on the average eggs number per female compare to control. The least number of eggs laid per one female was 469.8 and 585.2 eggs at 10% concentration of acetone and petroleum ether extracts, respectively, while the highest number of eggs laid per one female was 973 and 945 eggs at the concentration 0.625% of the same extracts.

Concerning fertility, the results represented in Table (5) showed that adult fertility was also adversely affected as a result of treatment. These effects depend on the type of plant and also the type of solvent. The normal percent hatchability without any treatment was 88.57%, but it was 85.59% and 85.69% in the _treatment with acetone and petroleum ether, respectively. Hatchability percentage was severely reduced to 26.93, 20.77 and 35.4:7% when the larvae were treated with 2.5, 1.25 and 0.625% concentrations of acetone extract of *M. az,edarach.* The percent hatchability decreased to 18.36, 27.69, 33.79, 46.23 and

64.34 at 10, 5, 2.5, 1.25 and 0.625 concentrations of petroleum ether extract of the same plant, respectively.

Fertility of deposited eggs was also affected by S. *terebinthifolius* extracts treatments, the data in Table (5) show that the highest concentration (10%) of both solvents was the most effective in the reduction of hatchability producing, only 14.87 and 18.16%, in acetone and petroleum ether, respectively.

In general, fertility was highly reduced in adult emer2ing fi-om treated immature stages in comparison to untreated ones.

The mating ability was 100% when moths developed from untreated immature stage. But it averaged 0, 0, 60, 60 and 60% if the larvae had been treated with 10, 5, 2.5, 1.25 and 0.625% concentrations, respectively of *M. azedarach* acetone extracts. VVhile mating ability of treated moths resulted from treated larvae with petroleum ether extract of *M. azedarach* averaged 40, 60, 40, 60 and 80% at the same forementioned c oncentrations.

The ability of males to mate with females also decreased when the moths were treated through larval stage with *S. terebinthifolius* extracts to 60, 60, 80, 100 and 100% in case of acetone extract and to 60, 40, 40, 80 and 40% in case of petroleum ether extract at the previous concentrations, iespectively. The data on mating frequency and sperm transfer are included in Table (5). The results indicated that significant reduction occurred in sperm transfer and the number of spennatophores per mated female as a result to treatment with acetone extract of both *M. azedarach* at all concentrations and *S. terebinthifolius* at 5 and 10% concentrations. Also, the reduction in the sperm transfer or the number of spermatophore per mated

female was variable between the different concentrations and the control treatment through the petroleum ether extract of both tested plants.

The data in Table (6) summarize the effects on the fecundity, the percentage of egg hatch and the mating for male moths resulting from 4fil larval instar treatment with different concentrations of both plant extracts. The resulting males were mated with untreated females, data of the previous mating show that the fecundity in all *M. azedarach* acetone extract concentrations are significantly different compared to the untreated control groups. But the results indicate that no clear reduction occurred in fecundity at all concentrations of petroleum ether extract of the same plant.

As shown in Table (6) the average number of eggs/mated female among different concentrations of all treatments of *S. terebinthifollus* were not significantly different from the control. Sig,nificant reduction in the percentages of egg hatch of deposited eggs; being 0, 0, 31.41, 42.52 and 46.59% occurred when mating males were treated with 10, 5, 2.5, 1.25 and 0.62.5`)/0 concentrations of *M. azedarach* acetone extract, respectively. Also, significant increase in inhatchability was noticed when the males were treated with the mentioned concentrations of petroleum ether extracts of the same plant.

Egg hatch percentages indicate that there are significant differences in reduction between untreated control and all concentrations of either acetone or petroleum ether extracts of *S. terebinthifolius*.

Data in Table (6) show that the mating ability percentage was reduced to 0, 60, 80, 80 and 80% at concentrations 10, 5,

Plant extracts		Acetone					Petroleum ether				
		Average no. of eggs/ mated female	% of Egg hatch	[illegible]	Average no. of spermato-phores/ mated female	% Mated female with 1 sperm	Average no. of eggs/ mated female	[illegible]	[illegible]	Average no. of spermato-phores/ mated female	[illegible]
Control		1591.80	[illegible]	100	1.60	100	1591.80	88.57	100	1.60	100
Solvent		1346.60	86.11	100	1.40	100	1476.00	[illegible]	100	1.60	100
[illegible]	[illegible]	397.20	0.00	[illegible]	0.00	0	1187.00	[illegible]	[illegible]	1.00	[illegible]
		426.60	0.00	[illegible]	0.60	0	1244.60	[illegible]	[illegible]	1.00	[illegible]
		430.40	[illegible]	[illegible]	0.60	60	1326.60	[illegible]	[illegible]	1.00	[illegible]
		599.40	[illegible]	[illegible]	0.80	80	1402.60	[illegible]	[illegible]		[illegible]
		892.60	[illegible]	[illegible]	1.00	80	1414.80	[illegible]	[illegible]	1.10	[illegible]
[illegible]		[illegible]	[illegible]		[illegible]		[illegible]				
[illegible]		[illegible]	[illegible]	[illegible]	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					1.00						
					1.00						

2.5, 1.25 and 0.625% of *M. azedarach* acetone extracts respectively. There is a. significant reduction in the number of spermatophores per mated female using the same plant extract at the same concentrations.

The results in the previous table indicate that mating ability and the number of spermatophores per mated female were insignificantly different comparing *M. azedarach* petroleum ether treamients at all concentrations to the control m oups.

Data of mating frequency and average number of spermatophores per mated female are included in Table (6). The results indicate that no obvious reduction occurred at all concentrations of neither acetone nor petroleum ether extracts of *S. terebinthifolius.*

Sperm transfer was 100°A when both sexes developed from untreated larvae, but it averaged 0, 0, 60, 80 and 80% if they had been treated with 10, 5, 2.5, 1.25 and 0.625% of *M. azedarach* acetone extract, respectively.

Sperm transfer of treated male with *M. azedarach* petroleum ether extract at the mentioned concentrations reduced and averaged 60, 60, 60, 100 and 100%, respectively.

Data also showed that there was no substantial differences in the percentage of mated inseminated females among all concentrations of various extracts of *S. terebinthifolius.*

Table (7) presents the data of the average number of eggs/mated female of emerged moths, egg hatch, mating ability, average number of spermatophores per mated female and percentage of mated female with sper m, when the 4th larval

oistar of females was treated with various plant extracts then the resulted females paired with untreated males.

Average number of eggs of the emerged moths (Table 7) was reduced when the 411 larval instar of resulted females was treated with 10, 5, 2.5, 1.25 and 0.625% concentrations of *M. azedarach* acetone extract, the eggs laid averaged 307.2, 414.8, 415.2, 512.8 and 827.0 eggs, respectively. The obtained results indicate that a significant reduction in female egg production. while this reduction in the eggs laid was not significant in case of petroleum ether extract of the same plant.

It was noticed that eggs laid by untreated females mated with untreated male reached 1591.8 eggs and recorded to 1256.8 eggs when female treated with acetone only. This average was significantly reduced to 830.0, 853.6 and 878.4 when untreated male were paired with female previously treated in larval stage with 10, 5 and 2.5% concentrations of acetone extracts of *S. terebinthifolius,* respectively.

In the case of the petroleum ether extract of *S. terebinthifolius,* the average numbers of eggs laid / female recorded was 1154.0, 1155.4 and 1187.0 eggs, respectively after the treatment with the forementioned concentrations respectively. On the other side the average numbers of deposited eggs/female in the control and the treatment with the petroleum ether only were 1591.8 and 1374.0 , respectively.

The results given in Table (7) also show that the eggs hatch was significantly reduced when the females resulted from larvae treated with either acetone extract or petroleum ether extract of *M. azedarach.*

Extracts	Conc.	Acetone: Average no. of eggs/ mated female	Acetone: Egg hatch %	Acetone: Mating ability %	Acetone: Average no. of spermatophores/ female	Acetone: Mated female with sperm %	Petroleum ether: Average no. of eggs/ mated female	Petroleum ether: Egg hatch %	Petroleum ether: Mating ability %	Petroleum ether: Average no. of spermatophores/ female	Petroleum ether: Mated female with sperm %
Control		1591.80	88.57	100	1.60	100	1591.80	88.57	100	1.60	100
Solvent		1256.80	87.60	100	1.40	100	1374.00	88.10	100	1.60	100
M. azedurach	10	307.20	0.00	60	0.60	0	905.70	43.62	60	1.00	60
	5	414.80	0.00	60	0.60	I 0	1095.20	45.89	60	1.00	60
	2.5	415.20	30.45	80	0.80	60	1081.00	48.57	80	1.00	80
	1.25	512.80	46.62	80	0.80	80	107320	77.26	100	1.40	100
	0.625	827.00	67.95	80	0.80	80	1130.20	79.03	100	1.60	100
L.S.D		342.10	29.00	--	0.66	--	N.S.	34.00	--	N.S.	--
S. terebinthifolus	10	830.00	52.58	80	1.20	80	1154.00	42.74	100	1.00	80
	5	85160	45.59	100	1.20	80	1155.40	66.65	100	1.20	100
	2.5	878.40	58.92	100	1.20	100	1187.00	74.72	100	1.40	100
	1.25	959.60	70.69	100	1.60	100	1338.40	77.85	100	1.40	100
	0.625	1335.20	71.42	100	1.60	100	1444.80	82.47	100	1.40	100
L.S.D		551.60	N.S.	-	N.S.	--	N.S.	38.00	--	N.S.	--

Also, data indicate that the egg hatch was affected by crossing females previously treated through larval stage with extracts of A'. *terebinthifolius* with normal male, where the percent of egg hatch decreased to 52.58, 45.59, 58.92, 70.69 and 71.42')/0 at the concentrations 10, 5, 2.5, 1.25 and 0.625% respectively of acetone extract of *S. terebinthifolius.*

The difference between hatchability percentage in moths treated with petroleum ether extract of *S. terebinthifolius* and non treated moths groups was significant.

Table (7) shows the effect of various plant extracts on the mating ability. It dependent on the type of plant extract, the solvents and the concentrations. The mating ability was 100% in the control treatinent, but it recorded 60, 60, 80, 80 and 80% and 60, 60, 80, 100 and 100% when the moths was treated with acetone extract or petroleum ether extract from *M. azedarach,* at the concentrations 10, 5, 2.5, 1.25 and 0.625 %, respectively.

Also, data in Table (7) show that' treatment with all extracts of *S. terebinthifolius* did not affect percentage of mated females. Also, these treatments of females moths did not clearly affect neither inseminated females nor the average number of spertnatophores per mated female

Significant reduction in the average number of spennatophores per mated -female and sperm transfer were recorded between all *M. azedarach* acetone extract concentrations and treatment with solvent or blank control. On the other side the results showed that no obvious reduction in these parameters took place in case of the petroleum ether extract of the same plant.

3. The Combined Effects of Irradiation and Plant Extracts Treatment:

3.1. Effect of combined treatment on reproduction:

In this part of study, the 4th larval instar of F1 progeny, resulted from irradiated firll-grown male pupae, were treated with 2.5% concentration of both plant extracts to investigate the combined effect of garruna radiation and plant extracts on the reproduction and biological aspects of the resulting Fi adults.

Table (8) presents combined effect *M. azedaraC h* extracts and gamma irradiation on average number of eggs/mated female, egg hatch percentage, mating ability, average number of spermatophors per mated female and percentage of inseminated females. It was noticed that the eggs laid by untreated females mated with untreated males reached 1591.8 eggs. This average of eggs number was significantly reduced to 498.4 and 348 when untreated moths mated with males or females, respectively, previously irradiated in the pupal stage with 75 Gy and the resulting fourth instar larvae of their progeny were treated with 2.5% concentration of acetone extract of *M. azedarach.*

In the case of the resulting fourth instar larvae heated with the same concentration of petroleum ether extract of the same plant, this value was 635.6 when treated males mated with normal females while it was reduced to 569 when treated f-emales mated with normal males. But no significant differences was observed between the number of eggs laid per female after this treatriient and the treatment with plant extract only and this may explain that the reduction in the average number of egg/mated female due to plant extracts only and this means that

irradiated ((-1y) 2.5%	Crussing Malt, Foiliale		no. of eggs/ mated female	%		ofsperniato- !Mores/ mated female	female wit sperm	no. of eggs/ mated female	%		of spermato- !Mores/ mated female	
[illegible]	U	U	1591.80	88.57	100	1.60	100	1591.80	118.57	100	1.61	100
Solvent	1	N	1306.60	86.73	100	1.90	100	1476.00	88.33	100	1.60	100
	fl		1256.80	84.60	100	1.110	100	1374.00	88.10	100	1.60	100
04542	1	II	430.40	31.61	60	0.60	60	1269.60	15.33	80	1.00	60
	fl		415.20	30.65		0.80	60	1081.00	18.57	80	1.00	80
(S,0)	.1,	fl	928.90	36.77	100	1.00	100	928.90	36.77	100	1.00	100
	II	J.	810.05	20.14	90	1.00	50	810.50	24.02	90	1.00	80
			498.40	15.09	60	0.60	60	635.60	[illegible]	80	1.00	
			553.90	[illegible]				682.00	[illegible]			

no combined effect of irradiation and plant extract appeared in this point.

Egg hatch of deposited eggs was highly affected by plant extract combined with gamma rays. Data in the same table show that fertility was reduced either with the use of acetone on petroleum ether extract and the reduction was more appearance due to the combined effect.

Table (8) summarizes the effect of combined *M. azedarach* extracts with gamma irradiation on the mating behavior. There was no clear effect on neither the percentage of mating nor the number of spermatophores per mated female through all mating combinations of both the two *M. azedarach* extracts. Data also, indicate that the percentage of mated inseminated females was not clearly affected.

To determine the combined effect of gamma radiation and *S. terebinthifolius* extracts, the results obtained (Table 9) show that the combination of 75 Gy and 2.5% concentration of acetone extract of *S. terebinthifollus* reduced fecundity and fertility of *A. ipsilon* at both crossing combinations.

The same result was found at the treatment with the combination between the gamma irradiation and petroleum ether extract of *S. terebinthifolius.*

Average number of spermatophores/mated female are included in Table (9) which show that no obvious reduction occurred among the tested mating combinations of both acetone extract and petroleum ether extract of *S. terebinthifolius* when were combined with 75 Gy of gamma irradiation. Moreover the combination of gamma irradiation with both tested extracts

Treatment irradiated (Gy) 2.5%.		Acetone					*[illegible]* tinalmad				
		Average no. of eggs/ mated female	[illegible]	[illegible]	Average no. of spermato- phores/ mated female	% Mated female with sperm	Average no. of eggs/ mated female	[illegible]	[illegible]	Average no of spermato- phores/ mated female	[illegible]
Control	[illegible]	1591.60	88.57	100	1.60	100	1631.80	88.57	100	1.60	100
Solvent	[illegible]	1316.60	[illegible]	100	1.40	100	1476.00	88.63	100	1.60	100
	[illegible]	1266.80	[illegible]	100	1.40	100	1374.00	88.10	100	1.60	100
[illegible]		1008.60		80	1.00	80	1320.00	[illegible]	100		100
	[illegible]	878.40	68.92	100		100	1187.00	[illegible]	100	1.40	100
[illegible]	[illegible]	921.90	16.77	100	1.00	100	928.90	36.77	100	1.00	
	[illegible]	810.06	42.12	90	1.00	50	810.50	[illegible]	90	1.00	80
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		1.00	

induced more decrease in fecundity and the percentaae of egg hatchability of A. *ipsilon* than either gamma ray or plant extract alone (Tables 8 and 9).

3.2. Effect of combined treatment on biological potential:

The results in Table (10) show that the combined effect of irradiation and chinaberry plant extracts was higher than when using each of them alone this may be attributed to latent the effect of inadiation which can be accumulated in the larval and pupal stages increasing the mortality rate particularly in case of petroleum ether extract (72.00%).

The developmental time of larvae and pupae was not affected by the combination of irradiation and either both solvents, however it was lower than the developmental time of larvae and pupae when every treatment was applied separately.

The percentages of pupation and the adult emergence as shown in Table (10) were clearly reduced compared to the control. The percentage of pupation was 40 and 45% in case of the two combinations of (2.5% acetone extract & 75 Gy) and (2.5% petroleum ether extract & 75 Gy), respectively, compared to the control.

The percentage of adult emergence was reduced to 54.0 and 6 1.4% on the two mentioned previous combined treatments.

Data also show that the percentage of malformation was obviously increased at the combination between 75 Gy and petroleum ether extract, (31.42%) while it was 12.5 and 22.0% when radiation or petroleum ether extract were applied alone. On the other hand the percentage of malformation was 43.47% in case

Treatments	Number of		[illegible]	Mean period (days)±S.E. of						Sex ratio	
	Tested larvae	Pupae		Larvae	Pupae						
					[illegible]	Female					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	37.67±0.47	14.94±0.17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

of acetone extract alone. It was higher than that combination between 75 Gy and 2.5°/0 acetone extract where it was 40.74%.

Sex ratio was slightly affected towards male in the combined treatment compared to untreated control.

Results concerning the effect of radiation (75 Gy) and Barazilian pepper extracts at concentration 2.5% used separately or together are tabulated in Table (11). The combined effect on the mortality which produced from irradiation with 75 Gy and treating the resulting 4th larval instar with concentration 2.5% of the petroleum ether extract was higher than that produced from 75 Gy with the same concentration of the acetone extract. Where they were 59.2 and 53.17, respectively.

Data in Table (11) indicate that the combined effect did not affect the average developmental periods from egg hatch to adult emergence, at the two tested treatinents in either males or females among FI progeny. The percentages of pupation and adult emergence were clearly decreased.

The percentage of malformation in the Fi generation increased to reach 29.31 and 25.49% in the combination betw-een irradiation and either acetone extract or petroleum ether extract respectively.

The sex ratio of F1 adults among the tvvo tested treatinentS did not differ from the normal ratio where it was around 0.52 : 0.48 (male : female) as observed in the control.

	Number of		[illegible]	Pupae			[illegible]	[illegible]	[illegible]	Sex ratio	
	Tested larvae	pupae		[illegible]	[illegible]	[illegible]					
2.51Y0 Sch+P.E	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75+2.5 Sch+A Gy + "A,	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75+2.5 Sch.P.E Gy + "A,	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The data presented in Table (13) clarifies the inherited effect in F1 progeny resulting from parental males and females treated with 2.5% concentration from the both extracts of S. *terebinthifolius*. It was found that the number of eggs/female was drastically reduced at either male line or female line.

On the other hand, egg hatch of both lines was slightly reduced at all treatrnent. As shown in (Table 13) the percentage of mating, the number of spermatophores per mated female and the percentage of mated female with sperm were reduced through all treatments but those reductions were not significant. However, only exception occurred in Fi male of female line where that average number of spermatophores per mated female significantly was reduced.

5. Histological Effects of Irradiation and/or Plant Extracts on the Gonads of Adult Males and Females:

5.1. Histological studies of the virgin male testis:

The male testes forms a spherical white yellowish, two fused organs composed of 4 follicles; each open in two vasa deferentia, each composed of upper and lower parts. They unite together to form a cominon ejaculatory duct which terminates at the base of aedeagus. Examination of transverse sections through the untreated testes showed that, as in other Lepidopterous insects, there are various stages of sperm development can be found within the adult testes. Spermatogonial cells occupy the outer periphery region of the testes. The growth zone is formed of cysts of- primary and secondary spermatocytes, then the mature spermatids found near the centre mixed with sperm

Parental generation	F_1 generation	Treatments	Average no. of eggs/mated female	% of Egg hatch	% Mating ability	Aveage no. of spermatophores/ mated female	% mated female with sperm
	Control	0	1275.00	83.77	100	1.60	100
P_1 treated male	F_1 male of male line	Sc.+ A	761.20	43.33	60	0.80	60
		Sc.+ P.E.	727.20	38.53	80	1.00	60
		L.S.D	303.90	n.s.	--	n.s.	--
	F_1 female of male line	Sc.+ A	785.00	51.34	60	0.80	60
		Sc.+ P.E.	588.00	47.26	80	1.20	80
		L.S.D	430.09	n.s.	--	n.s.	--
P_1 treated female	F_1 male of female line	Sc.+ A	709.60	67.44	100	1.20	100
		Sc.+ P.E.	1096.20	47.57	60	0.60	60
		L.S.D	n.s.	n.s.	--	0.69	--
	F_1 female of female line	Sc.+ A	504.20	68.75	100	1.40	100
		Sc.+ P.E.	843.00	49.59	80	1.20	80
		L.S.D	417.40	n.s.	--	n.s.	--

*Sc.+ A = *Schinus terebinthifolius* acetone extract
Sc.+ P.E. = *Schinus terebinthifolius* petroleum ether extract

bundles which occupy a large areas in the centre of the adult testis (Fig. 1).

As more spermatogonia (SG) are produced from the mother cell of each follicle, they push those which have developed earlier down the follicle towards the vas deferens. So each follicle consists of a gerrnarium in which the primary spermatogonia are enclosed in cysts dividing and increasing in size to form the spermatocytes (Sc). There is a zone of maturation in which sperinatocytes transform by two meiotic divisions to spermatides which develop again to spermatozoa. (Fig. 2 A,B).

Two types of sperm bundles can be easily differentiated. These sperm bundles are: eupyrene which are long, nucleated and densely stained by eosin and apyrene sperm bundles which are short, anucleated and relatively faintly stained by eosin. These bundles are usually present near the opening of the seminal vesicle.

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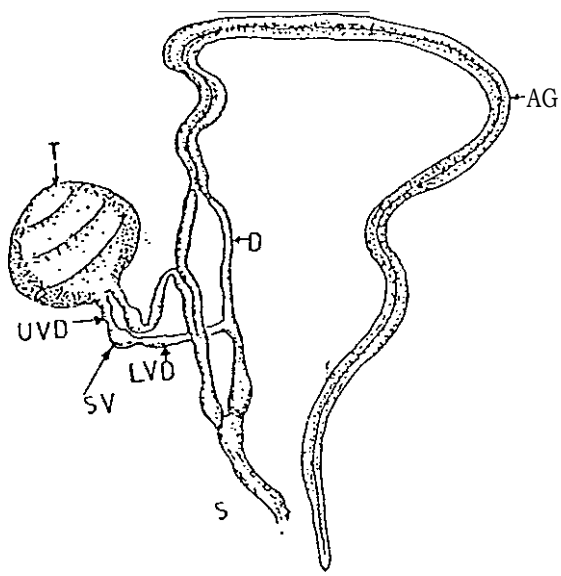


Fig.(1): Diagramatic drawing of a part of the reproductive system of Lepidoptera male.

(AG): Accessory gland
(LDV): Lower vas deferens
(SV) : Seminal vesicle
(UVD): Upper vas diferens
(D): duplex
(S) : Simplex
(T) : testis

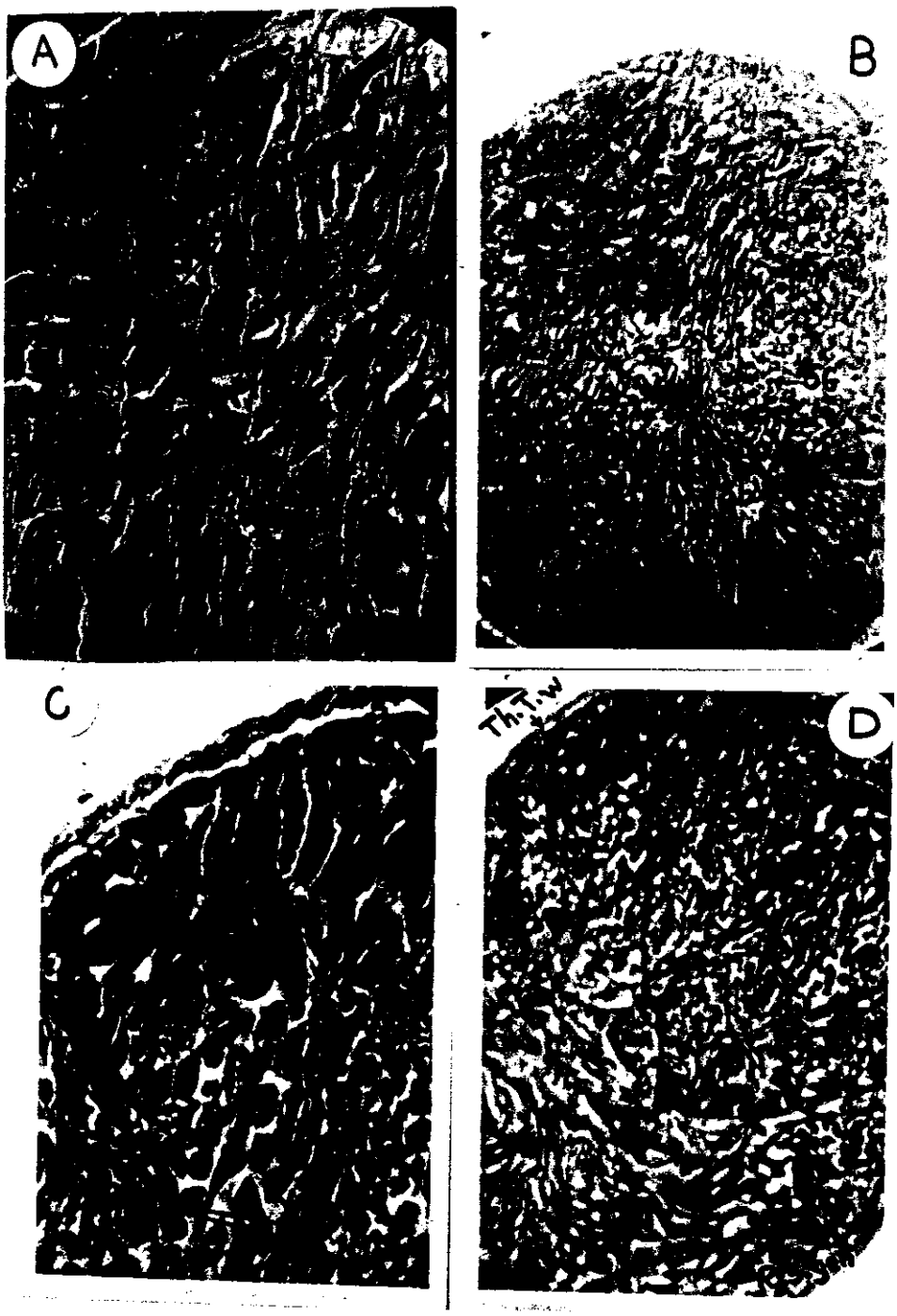
5.1.1. Effects of irradiation on male testes:

Examination of transverse sections through a testis of parent male, irradiated as full grown pupae with 75 Gy, showed a minute effect on the structure of testis content. Most of sperm bundles appeared abnormal and liquaficated, in many areas the sperm bundle were degenerated and spaces appeared beneath the thin follicular tissues as the result of follicular tissue shrinkage. (Fig.2 C.D). Retardation of spermatogenesis was observed and vacuoles were found (Fig.2 C,D).

In the testes of F1 male resulted from Pi male (treated as full grown pupae with 75 Gy) and mated with normal female, the testicular wall became thin and some sperm bundles were completely absent in many areas, damaged bundles changed to degenerated or liquefied material (Fig.3 C,D). At the same time, spermatocytes appeared abnormal in shape and showed retardation in their maturation.

5.1.2. Effect of plant extracts on male testes:

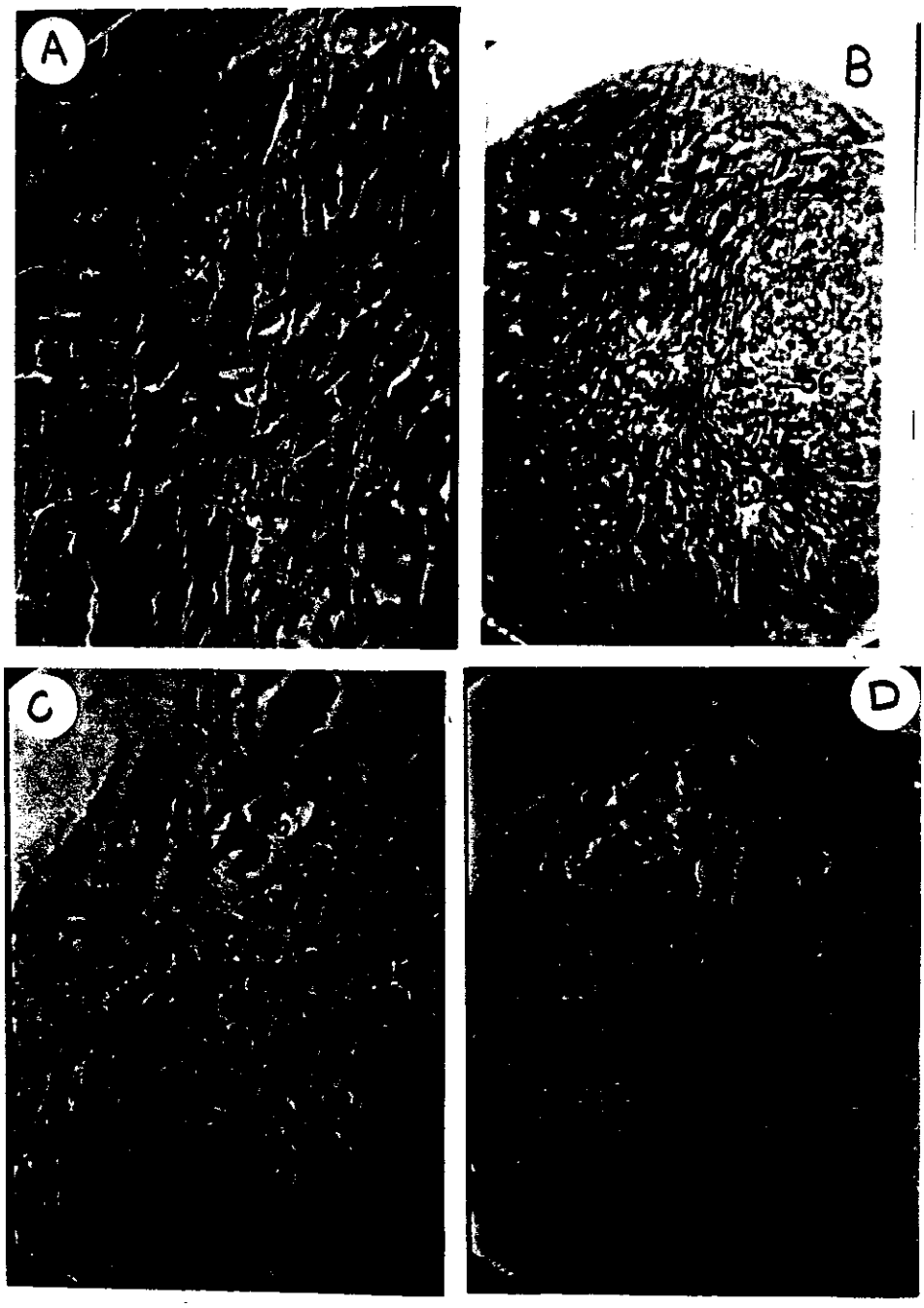
Examination of transverse section through the testis of parental male resulted from fourth instar larvae which had been fed on the castor bean leaves treated with 2.5% Petroleum ether of *Melia Azedarach* showed a large vacuoles in the middle of the section and retardation in some spermatogensis in comparison to control. Some bundles were completely damaged in many areas, these damaged bundles changed to liquefied material (Fig.4 C, D). Also, spermatocytes and younger sperniatides groups were _abnormal in their appearance. (Fig. 4 C,D).



[B, D (100X)] [A, C (250X)]

Fig.(3): A cross section in the testes of 1-day-old *Agrotis* (A,B) unirradiated male (C,D) F1 male descendant of Pi male treated with 75 Gy.

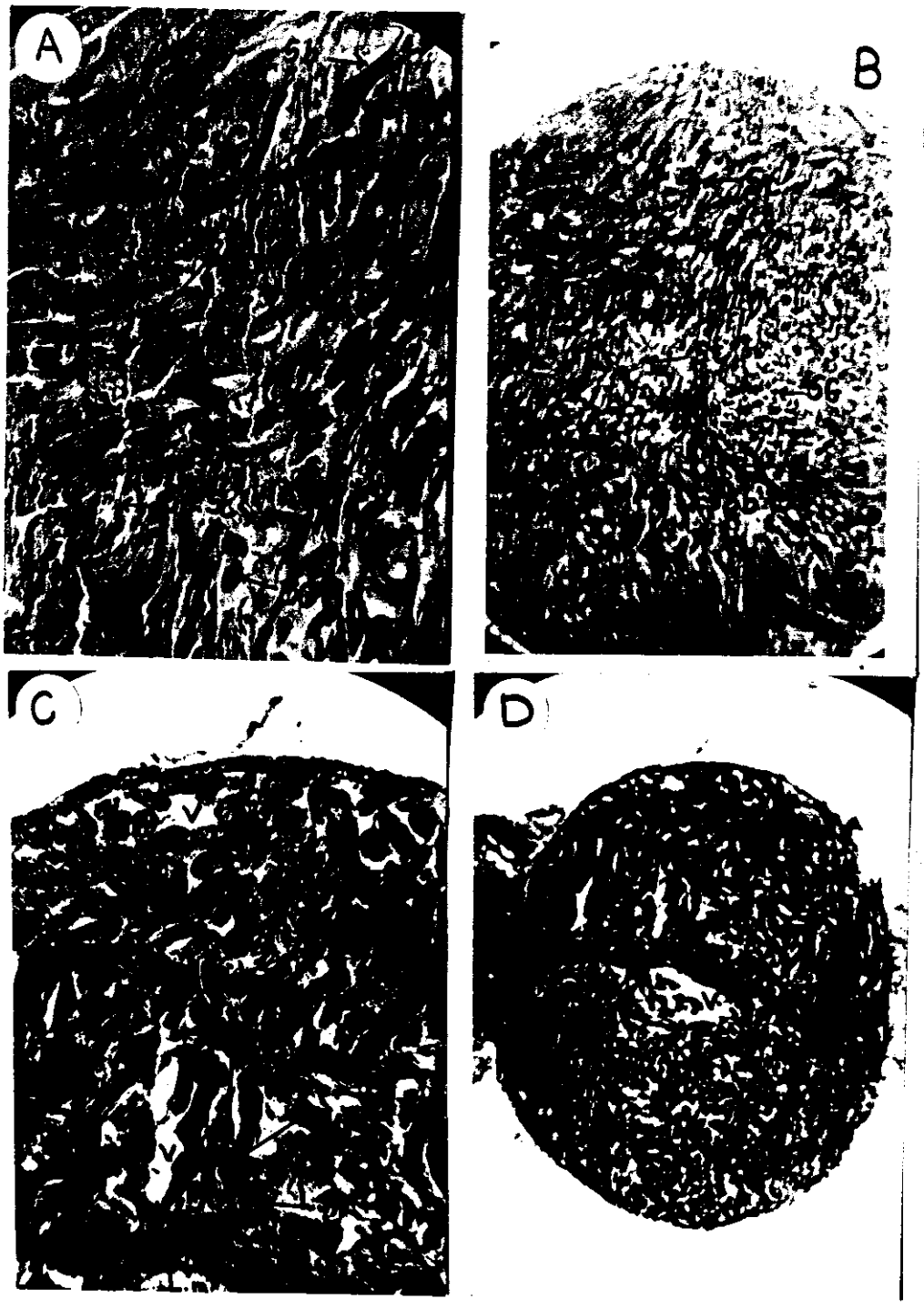
Abs. St.	= Absorbed spermatide.
L. m.	= Liquefied material.
R.S. gen	= Retardation in spermatogensis.
R.S.m.	= Retardation in sperm maturation.
Sb.	= Sperm bundle.
Sb.b.	= Sperm bundle being broken.
Pr.	= Primary spermatocytes
Se. Sc.	= Secondary spermatocytes.
SG.	= Spermatogonia
St.	= Spermatide.
V.	= Vacuole.



[B, D (100X)] [A, C (250X)]

Fig.(4): A cross section in the testes of 1-day-old *Agrotis ipsilon* (A, **B)** unirradiated male (C, **D)** male treated with 2.5% of *Melia azedarach* petroleum ether extract.

Abs. St. = Absorbed spermatide.
L. m. = Liquefied material.
R.S. gen = Retardation in spermatogensis.
Sb. = Sperm bundle.
Sb.b. = Sperm bundle being broken.
Se. Sc. = Secondary spermatocytes.
SG. Spermatogonia.
St. = Spermatide.
V. = Vacuole.



113, D (100X)I IA. C (250X)I

In the testis of PI male descendant from fourth instar larvae treated with 2.5% petroleum ether extract of *Sehinus terebinthifolius* the testis became abnormal in shape and inhibition in gowth of spermatides was observed (Fig.5 C,D). In addition, a separation of follicular epithelium took place in comparison the testis of untreated control. The most obvious effects were the breakage, of sperm bundles and few absence of some sperm bundles, due to its liquefication. The spermatids showed sians of liquefaction and large vacuolated area appeared (Fig.5 C,D).

A transverse section in the Pi male testis resulting from treated 41 larval instar with 2.5% concentration from *Melia azedarach* acetone extract showed a reduction in the size of testis and many spermatogonia, spermatocytes failed to develop to the next stage which lead to retardation in sperm maturation and speim bundles formation (Fig.6.D). Also, spemi bundles still had some breakage, absorption or completely disappeared in many areas, as a result of their liquefaction. Shrinkage of follicular tissues were also observed and vacuoles on both sides of follicular septa appeared. (Fig.6 C,D).

The damage occurred in the testes of Pi males resulted from 4th instal- larvae which had been fed on treating castor bean leaves with 2.5% concentration of *S. terebinthifolius* acetone extract was exhibited as an obvious effect on the structure of testis contents. The testis became irregular in shape and rapture of follicular tissue was observed (Fig.7 C,D). Most of sperm bundles showed retardation of spermatogenesis and less number of sperm bundles appeared. Besides, inhibition in growth of speimatids was also observed.

Fig.(6): A cross section in the testes of 1-day-old *Agrotis ipsilon* (A, **B)** unirradiated male (C, **D) Pi** treated with 2.5"/0 of *Melia azedarach* acetone extract.

D.Sb. = Degenerated sperm bundle.
m. = Liquefied material.
R.S. gen = Retardation in spermatogensis.
R.S.m. = Retardation in speim maturation.
S. = Space.
SU = Sperm bundle.
Sb.b. = Sperm bundle being broken.
Se. Sc. = Secondary spennatocytes.
SG. = Spermatogonia.
Sh.F.t. = Shrinkage of foll cular tissue.
St. = Spermatide.
Th.T.W. = Thin testicular wall.
V. = Vacuole.