SUMMARY

The present study was carried out to determine the effects of gamma radiation and plant extracts separately or combined on certain biological and histological aspects of the Black cut worm *Agrotis ipsilon* (Hufn.), throughout two successive generations.

This work comprised the study of effects of two low doses (75 and 150 Gy) of gamma irradiation as well as two species of plant extracts (***M. azedarach*** and ***S. terebinthifolius***). Special stress was given to study the reproductive biology and the histological changes in the gonads of the parental adult males, parental adult females and their F_1 generation.

The obtained results could be summerized as follows:

1. Effect of Gamma Irradiation on P_1 and F_1 Generations:

1. When full grown male pupae were irradiated with the doses of 75 or 150, the number of deposited eggs per mated female was not significantly affected among P_1 generations at the two tested radiation doses while it was significantly affected among F_1 generation.
2. The egg hatchability percentage among P_1 and F_1 generations was significantly reduced by increasing the radiation dose applied to P_1 male.
3. The two tested doses of gamma irradiation (75 and 150 Gy) did not clearly affect the percentage of mated females among P_1 and F_1 generations.
4. The average number of spermatophores per mated female was not evidently different from the control.

5. Slight reduction in the percentage of inseminated females was observed at both doses among the two generations.
6. The percentage of total mortality of F_1 larvae reaching adult stage increased as the radiation dose applied to P_1 males increased.
7. The average developmental period from egg hatch to adult emergence obviously increased in F_1 progeny at the two tested irradiation doses.
8. The percentage of pupation was not affected at the tested dose 75 Gy while a slight reduction in the pupation occurred at the dose 150 Gy.
9. There was an adverse relationship between the dose applied to the parental male and the adult emergence percent.
10. The percentage of malformed F_1 adults increased greatly with the increase in the dose applied to parental generation.
11. The sex ratio among the progeny of irradiated males seemed to be about normal, where it was nearly 0.56 : 0.44 (male:female) at the two tested doses.

2. Effect of Plant Extracts on P_1 and F_1 Generations:

A- Effect of petroleum ether (p.t.) extract treatment on certain biological aspects:

1. Petroleum ether (p.t) extract adversely affected total mortality in a concentration dependent manners.
2. Each of the (p.t) extract concentrations under investigation elongated larval duration, depending on concentration and species of plant dependant.

3. On contrast with larvae (p.t) extracts caused non significant changes in pupal period at any of the tested concentration.
4. There was moderate gradient reduction in the pupation percentage of larvae survived after p.t extracts treatments compared to that resulted from the untreated larvae.
5. Percentages of adult emergence were inhibited by increasing the concentrations.
6. During adult emergence, different grades of deformities were noticed in a concentration dependent manner.
7. The previous results indicated that moderate fluctuations recorded by (p.t) extracts among sex ratio.

B- Effect of acetone extracts treatment on certain biological aspects:

1. Tabulated data revealed collinear relationship between the acetone (acet.) extracts concentrations and the total morality percentage. The highest percentage mortality occurred mainly with the ***M. azedarach*** extract.
2. Acetone extract treatments significantly elongated the develop-mental period which was plant species dependent. The highest elongation was recorded at the ***M. azedarach*** applied concentrations compared to moderate to mild elongation at ***S. terebinthifolius.***
3. There was significant reduction in the pupation percentage compared to that resulted from the untreated larvae.
4. Recorded data exhibited slight reduction in the percentage of adult emergence from developed pupae resulted from

treated larvae because considerable larval death was occurred.

5. On the contrary, treating larvae with any of the two plant extracts under investigation showed significant increasing in the percentage of adult malformation.
6. Sex ratio was fluctuated within all tested concentrations.

C- Effect of plant extracts on reproductive biology through P_1 generation:

1. The number of deposited eggs per mated female was obviously affected among the different mating combinations of plant extracts treatments. It was significantly reduced at the combination of treated male with treated female.
2. It was observed that the eggs hatchability percentages were significantly reduced at most mating combinations through both tested plants.
3. The reduction in mating ability percentage increased almost gradually with the increase in the plant extracts concentration. The highest effect occurred when both treated males and females were crossed together.
4. The reduction in the average number of spermatophores per mated female was positively correlated with the concentration of plant extract. The greatest reduction occurred at ***Melia azedarach*** acetone extract when both males and females were treated and crossed together.
5. The percentage of inseminated females decreased by increasing plant extract concentration applied to larvae and

reached its lowest value when both treated males and females at *M. azedarach* extract were crossed together.

D- Effect of plant extracts on the reproductive biology through F_1 generation:

1. The fecundity at different mating combinations among F_1 generation was significantly different from the untreated control, except at the mating combination of F_1 male resulted from P_1 female treated with both extracts of *S. terebinthifolius.*
2. The proportion of eggs that hatched in the different mating combinations of F_1 resulted from P_1 treated with *M. azedarach* was significantly lower compared to the untreated control, except at the mating combination of F_1 male resulted from P_1 female. But this difference was not significant at the mating combinations of *S. terebinthifolius* extract treatments.
3. The mating ability and percentage of mated females with sperm were fluctuated within the all treatments.
4. The average number of spermatophores per mated female was reduced at most of mating combinations compared to the control treatment.

3. The Combined Effects of Irradiation and Plant Extracts:

1. The number of deposited eggs was not significantly affected in P_1 generation at all tested combined treatments.
2. The hatchability percentage of eggs was reduced significantly in the two tested treatments especially at *M. azedarch* extract.

3. The combination of irradiation and plant extract treatments did not affect the mating ability.
4. Also the percentage of inseminated female was not affected at the two tested treatments.
5. Slight reduction was observed in the average number of spermatophores through both combined treatment.
6. Total mortality percentage among F1 was increased in comparison with each treatment separately.
7. The developmental period from egg hatch to adult emergence was not affected at the two treatment.
8. The percentage of pupation slightly decreased than the separately treatments, except when the irradiation was combined with ***M. azedarach*** acetone extract.
9. Adult emergence was did not affected as a result of the combination between the irradiation and the plant extracts.
10. Exposure to both treatments slightly increased the percentage of adult malformation, except in the case of combination between irradiation and ***M. azedarach*** acetone extract where it was lower.
11. The sex ratio at all combined treatments was not affected; being around the normal ratio (0.52 : 0.48 male : female).

4. Histological Effects of Different Treatments on Gonads of Adult Males and Females:

The histological studies on the effects of irradiation treatments and/or plant extracts on the testes and ovaries among P_1 and F_1 male and female could be summarized in the following:

1. The testes showed many symptoms of retardation in their growth; e.g. retardation of spermatogensis, reduction in sperm bundles numbers, degeneration and liquefaction of sperm bundles and spermatides which lead to vacuolization.
2. The effects on testes of F_1 males resulting from different treatments varied and some of them showed some morphological abnormalities and dispersal of sperm bundles.
3. The ovarioles of females among P_1 and F_1 generations showed that the follicular epithelial cells appeared abnormal, besides their limited separation from the developing oocytes which became shrinked, semiabsorbed or completely absorbed leaving vacuoles. Also, the oocyte shape became rectangular or irregular in shape. The nurse cells were reduced or absent in some parts.
4. The severity of the histopathological symptoms through the examined tissues (testis and ovary) was treatment dependent.