FACTORS INFLUENCING THE EFFICIENCY OF GAMMA RADIATION ON *Plodia interpunctella* (Hübner)

By

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Approval Sheet

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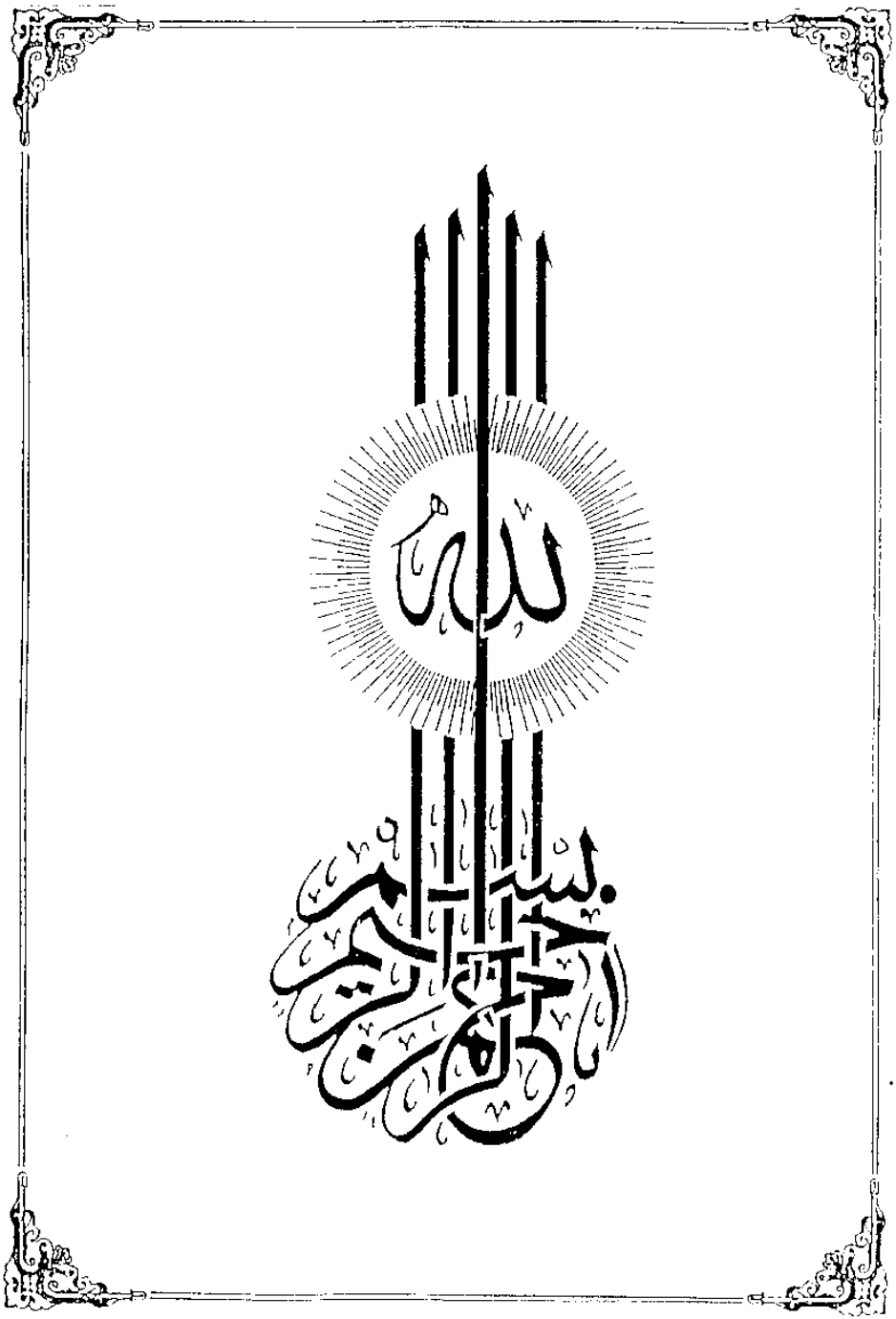

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Abstract

The results of studies could be summarized in the following points:

A. Susceptibility of pupal stage of P. interpunctella to gamma radiation as affected by radiation dose, temperature, sex and age of pupae:

One and 6-days old pupae of both sexes were irradiated with different doses and kept at 15°, 25° and 30°C to study the effect of these factors on some biological aspects.

1- Pupal irradiation prolonged pupal duration while it decreased pupal weight and percentage adult emergence. This effect was increased with the increase of the radiation dose. Gamma irradiation decreased fecundity, fertility and longevity of the resulting adults irradiated as pupae. This effect was positively correlated with the applied dose.

2- The combined effect of irradiation and low temperature of 15°C increased the pupal duration than the higher temperatures (25°, 30°C). Gamma irradiation caused reduction in the pupal weight specially when they were kept at higher temperature. More pronounced reduction in adult emergence was observed

in irradiated pupae kept under higher or lower temperature than 25°C.

The fecundity and fertility of the resulting adults irradiated as pupae were decreased when pupae kept post irradiation at higher and lower temperature than 25°C. Longevities male and female adults emerged from irradiated pupae were negatively correlated with the temperature on which pupae were incubated post irradiation.

3- Females pupae were radiosensitive more then males.

4- There is variation in susceptibility to gamma radiation in relation to age of pupae. Fully grown pupae seemed to be more tolerant to gamma irradiation than one-day-old pupae.

B. Effect of gamma radiation on sexual competitiveness:

1- Irradiated male pupae:

It could be concluded that the competitiveness values increased when the ratio of $I\sigma^{\prime}$: $J\sigma^{\prime}$ increased. At the ratio 25:1:1 ($I\sigma^{\prime}$:$U\sigma^{\prime}$:$J\varphi$) the sterile males were sexually competitive with normal males at both 25° and 30°C.

2- Irradiated male plus female pupae:

The sterile adults are fully competitive with normal adults at high flooding ratio 15:15:1:1 ($I\sigma^{\prime}$:$I\varphi$:$J\sigma^{\prime}$:$J\varphi$) at 25° and 30°C.

C. Effect of gamma irradiation on sperm activity of irradiated males:

Replacing normal males by irradiated ones (irradiated as fully grown pupae) by normal population decreased egg hatchability when pupae were kept at 25° and 30°C. This means that the sterile males have active sperms.

D. Effect of gamma radiation on gonads:

1- Pupal irradiation reduced the number of oocytes in both ovaries and decreased the length of ovarioles of the emerged females from irradiated pupae.

2- Pupal irradiation increased the number of reabsorbed eggs in emerged adults.

3- Irradiation of males as pupae decreased the size of the testes of the emerged moths.

4- The effect of gamma radiation on gonads was increased with the increasing of the dose used. Fully grown pupae were more radioresistant than newly formed pupae.

E. Effect of gamma radiation on amino acid contents:

1- One-day-old pupae:

a) both free and protein amino acid contents were lowered in irradiated pupae with high doses. This effect was increased with the progression time after irradiation.

b) Females were more radiosensitive than males.

2- Fully grown pupae:

a) Pupal irradiation increased free amino acid and in the same time decreased protein amino acid.

b) The ratio of protein to free amino acids (P.A.A./F.A.A.) decreased with an increase in the dose.

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