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Efficacy of Gamma Radiation on the Productivity of Bactrocera oleae Gmelin (Diptera: Tephritidae)

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Abstract : The olive fruit fly, Bactrocera oleae Gmelin (Diptera: Tephritidae), is one of the most serious pests in olive orchards in growing province in Iran. The female lay eggs in green olive fruit and larvae hatch inside the fruit, where they feed upon the fruit matters. One of the main ecologically friendly and species-specific systems of pest control is the sterile insect technique (SIT) which is based on the release of large numbers of sterilized insects. The objective of our work was to develop a SIT against B. oleae by using of gamma radiation for the laboratory and field trial in Iran. Oviposition of female mated by irradiated males is one of the main parameters to determine achievement of SIT. To conclude the sterile dose, pupae were placed under 0 to 160 Gy of gamma radiation. The main factor in SIT is the productivity of females which are mated by irradiated males. The emerged adults from irradiated pupae were mated with untreated adults of the same age by confining them inside the transparent cages. The fecundity of the irradiated males mated with non-irradiated females was decreased with the increasing radiation dose level. It was observed that the number of eggs and also the percentage of the egg hatching was significantly (P < 0.05) affected in either IM x NF crosses compared with NM x NF crosses in F₁ generation at all doses. Also, the statistical analysis showed a significant difference (P < 0.05) in the mean number of eggs laid between irradiated and non-irradiated females crossed with irradiated males, which suggests that the males were susceptible to gamma radiation. The egg hatching percentage declined markedly with the increase of the radiation dose of the treated males in mating trials which demonstrated that egg hatch rate was dose dependent. Our results specified that gamma radiation affects the longevity of irradiated B. oleae larvae (established from irradiated pupae) and significantly increased their larval duration. Results show the gamma radiation, and SIT can be used successfully against olive fruit flies.

Keywords : fertility, olive fruit fly, radiation, sterile insect technique
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