

## Interaction of Substerilizing Gamma Radiation and Thiodicarb Treatment for Management of the Tobacco Caterpillar *Spodoptera litura*

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The F<sub>1</sub> sterility technique (inherited sterility using substerile insects) has been proposed for reproductive suppression of lepidopteran pests. Management of lepidopteran pests using F<sub>1</sub> sterility may be greatly influenced by other possible strategies, including chemical control measures. Within this context, a laboratory investigation was undertaken of the tobacco caterpillar *Spodoptera litura* (Fabricius) (Lepidoptera: Noctuidae) to assess the bioefficacy of a substerilizing dose (70 Gy) of gamma radiation on bio-characteristics (*viz.*, adult survival, fecundity, egg hatch, F<sub>1</sub> larval weight, F<sub>1</sub> pupation, F<sub>1</sub> sex ratio); to establish the median lethal dose (LD<sub>50</sub>) of an oxime carbamate insecticide, thiodicarb (Larvin<sup>®</sup>75 WP), to *S. litura*; and determine the interaction of thiodicarb with the F<sub>1</sub> insects derived from a substerilizing gamma dose. A dose of 70 Gy administered to 7-day-old male pupae reduced the the eclosion by ~ 10%. When the eclosed males (derived from treated pupae) were mated with normal females, the fecundity and fertility were decreased as compared with control (0 Gy). Analysis of body weight of the F<sub>1</sub> larvae showed no significant influence of radiation, *i.e.*, growth was comparable to that of normal progeny, which is a positive factor in the sterile-insect technique. Bioassay on newly molted 6th instar larvae with thiodicarb (Larvin<sup>®</sup>75 WP) showed that the LD<sub>50</sub> of the insecticide was 6.76  $\mu\text{g g}^{-1}$  in the combined treatment (radiation to P<sub>1</sub> male pupae + thiodicarb to F<sub>1</sub> larvae), as compared with 28.67  $\mu\text{g g}^{-1}$  in the chemical treatment (thiodicarb), indicating that the toxicity of the insecticide to the F<sub>1</sub> progeny was increased 4.24 times by the radiation treatment, which is a markedly pronounced effect. Further studies of the combined effect of radiation and insecticide on pupation and sex ratio of F<sub>1</sub> progeny showed that pupation was affected more by the combined treatment than by the insecticide alone, whereas the sex ratio was skewed in favor of males in both the combined treatment and the chemical treatment, indicating that thiodicarb was selectively more toxic to females. The possible interaction and potential and the feasible approaches of integrating F<sub>1</sub> sterility and thiodicarb treatment are discussed for management of the lepidopteran pest *S. litura*.  
KEY WORDS: *Spodoptera litura*; gamma radiation; F<sub>1</sub> sterility; reproduction suppression; sex ratio; thiodicarb.

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