

Combined Effects of Gamma Irradiation And Insecticides on Certain Stored-Product Insects



A Thesis

Presented For The Award Of Ph. D. Degree

By



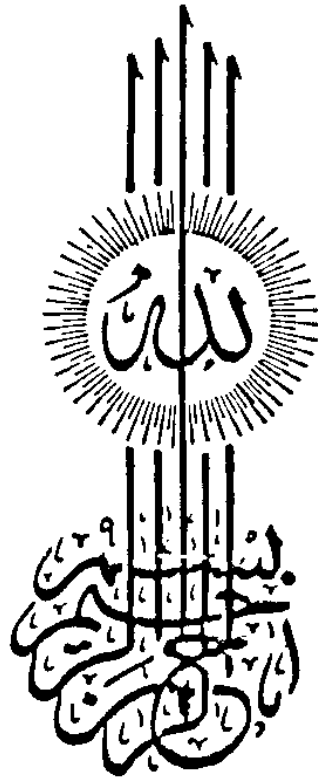
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وَقُلْ اَعْمَلُوا فَسَيَرَى اللّٰهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ
سَدَقَ اللّٰهُ الْعَظِيمُ



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Introduction

Introduction

Corcyra cephalonica (Stanton) , commonly known as the rice moth , is a cosmopolitan pest attacking a number of stored products .The commodities attacked include rice ,sorghum, dates, cashew nuts, raisins and millet .(Adeyemi1968 , Hodges 1979) .

The use of insecticidal control in the last years became widely used . However, the application of such chemicals caused great environmental pollution and insects had developed resistance against large numbers of the common insecticides used for larval control .

Recently, research on the possibility of controlling the rice moth was directed towards the use of sterile insect technique using gamma radiation. Sterility method depends on the success of application of gamma radiation for inducing sterility without affecting adult survival or male vigors .

The combined effects of gamma radiation and certain insecticides on the rice moth was investigated during this study . The present investigation aimed to study the following :

- 1- Effect of irradiated full grown pupae on some aspects of the biology of the first generation .
- 2- Effect of contact insecticides to 20-day old larvae on some biological aspects of the first generation .
- 3- The combined effects of insecticides and irradiation on the F1 progeny of irradiated full grown pupae .
- 4- The competitiveness value of sterile males treated with larvicides and irradiated as full grown pupae .

- 5- The competitiveness value of sterile adults treated with larvicides and irradiated as full grown pupae .
- 6- Histopathological changes by using insecticides , gamma radiation and their impact on the fecundity and fertility of both sexes .

Review of Literature

II Review of Literature

1- The combined effect of gamma irradiation and insecticides on some insects

Hough (1963) , exposed eggs of the codling moth , *Carpocapsa pomonella* (L) to gamma radiation to determine their response to insecticides . It was found that susceptibility of the adults to D D T and lead arsenate was not altered by irradiating eggs less than 1 day-old , while susceptibility to weak concentrations of azinphosmethyl or carbaryl was not affected .

Varzandeh and Moos (1963), conducted studies dealing with the effects of X- radiation on the longevity , emergence and DDT-susceptibility of the house fly , *Musca domestica* (L) . They concluded that flies from pupae irradiated with the higher dosages exhibited less tolerance to D D T than those from lower dosages.

Guenthener and Ware (1967) , mentioned that , irradiation of the pupal stage of *M. domestica* (L.) increased toxicity of heptachlor to males and females . They also found that the toxicity of temik to males was significantly reduced by irradiation , while no effect was noticed on females. They stated that irradiation of adults had no evident effect with malathion, but increased significantly the toxicity of temik to both sexes at 150 gray (15 K.rad) .

Keiser and Schneider (1969) , reported an increase in the resistance of D D T in adult melon fly *Dacus cucurbitae* (Coquillett) and Mediterranean fruit fly , *Dacus dorsalis* (Hendel) were exposed as pupae to 100 gray (10 K.rad) of gamma radiation.

Rush and Ware (1969) investigated the toxicity of DDT, azinphosmethyl and carbaryl to adults emerging from gamma irradiated pupae of the pink bollworm, *Pectinophora gossypiella* (Saunders). They found an increase in susceptibility to azinphosmethyl in pink bollworm adults emerging from pupae irradiated with 10 K rad compared with adults from untreated pupae, but they found no changes in susceptibility to DDT or carbaryl.

Whitacre and Ware (1970) , studied the effects of gamma and X - irradiation on the toxicity of malathion to house flies. Dosage-mortality studies on the combined effects of 5 K rad (50gray) of gamma irradiation and malathion which was topically applied to adult house flies , *Musca domestica* (L) , indicated that newly pupated males , irradiated 4- day before emergence were significantly more tolerant to malathion than when irradiated 2 or 3 days before emergence, while female pupae irradiated 2 days before emergence are more tolerant to malathion than irradiated at any other time .

Wolfenbarger and Graham (1970) , investigated the toxicity of azinphosmethyl, monocrotophos, carbaryl, malathion and methyl parathion for unirradiated and irradiated pink bollworm moths. They found that no significant differences in the LC₅₀ values of irradiated 25 K rad and unirradiated pink bollworm moths treated with the 5 insecticides used .

Cogburn and Speirs (1972) , determined the effect of combining treatments of malathion and gamma radiation applied to adults of *Tribolium castaneum* (Herbst). Radiation was applied

before the chemical treatment on *T. castaneum* . The dosage of 5 k rad did not produce any mortality when applied alone and actually afforded some protection to the insects against the malathion . At dosages of 10 K rad or more, however, radiation combined with malathion at the rate 0.05 ug / insects was slightly more lethal than either malathion or radiation alone . Combination treatments produced earlier mortalities than did radiation alone .

Robert et al.(1972) , evaluated the effect of combining treatments of malathion and gamma radiation applied to *Tribolium castaneum* (Herbst) adults . Radiation was applied before the chemical treatment , the dosage of 5 K rad did not produce any mortality when applied alone and actually afforded some protection to the insects against malathion. At dosages of 10 K rad or more, however , radiation combined with malathion at the rate 0.05 ug / insects was slightly more lethal than either malathion or radiation alone, combination treatments produced earlier mortalities than did radiation alone.

Bhatia & Sethi (1979) , studied the combined effect of gamma radiation and insecticides on the adults of *Tribolium castaneum* (herbst). Observations revealed that when the insects were first irradiated with 10 K rad dose of gamma radiation and then exposed to different concentration of lindan , DDT and malathion , which were applied as films , both irradiated and non irradiated insects showed no significant difference in their degree of susceptibility . They indicated that pretreatment with gamma radiation did not alter the response of *T. castaneum* to the insecticidal treatment .