

AFFECT OF RADIO SENSITIVITY ON *Tyrophagus putrescentiae* (Schr.) AND THEIR F₁ PROGENY

Abdu El-Nour, Bassma M. N. and Wafaa L. F. Ibrahim
Al-Azhar University, Faculty of Science (for Girls).

ABSTRACT

The effect of gamma radiation on *Tyrophagus putrescentiae* (Schr.) was studied. The seven different doses were chosen to expose the adult stage 10, 20, 30, 40, 60, 80 and 100 Krad. Fecundity, egg viability, sterility, oviposition period duration and survival of mature stage, adult lifespan and sex ratio of F₁ progeny as a result of adult stage were determined. Untreated females that were crossed with males exposed at doses 60, 80 krad lay only a few eggs during the initial days of oviposition period stopped producing eggs. Hatchability of produced eggs also decreased with increasing the dose. A complete sterility of eggs occurred when the males and females were irradiated at 80 and 100 doses Krad, respectively. Females mated to irradiated males produced fewer females' progeny. Females exposed to radiation and mated to untreated males produced fewer males' progeny, respectively

INTRODUCTION

The acaroid mites tend to attack cultivated and harvested field and horticultural crops such as corns, legumes, medicinal herbs, bulbs, corms, tubers, dried fruits in addition to stored food products. Stainslaw et al (1983) indicated that untreated females of mold mite *Tyrophagus putrescentiae* (Schr.), crossed with males irradiated with 60, 80 or 100 krad dose laid only a few eggs. Megali (1987) showed that percentage of eggs of hatchability was decreased and incubation period was prolonged by increasing the irradiation dose of the tetranychid mite *Eutetranychus africanus* (Tucker). Goodwin and Wellham (1990); Ignatowicz and dwroblick (1995); Majumder et al (1996); Ignatowicz (1997) and Hallman (2000) They founded that all young eggs were killed and percentage hatch decreased as radiation increase. Dohino and Tanabe (1993); Baptiste et al (2003) and Kozielsk (2004) they observed that the adult females were completely sterilized. The present work aimed to study the effect of gamma radiation on the adult's stages of *T. putrescentiae* and the levels of sterility.

MATERIAL AND METHODS

The cobalt -60 Irradiation units (Gamma cell 220) located at Nuclear physic Department of Atomic Energy Authority, was used for all treatments reported herein.

Effect on adults:

Mated females of mite *T. putrescentia*. Obtained from a laboratory culture transferred to plastic cells, (2 cm. diameter × 1.5cm. in depth) filled with a mixture of plaster of calcareous and charcoal (9:1) for depth of 0.3 cm the bottom. The adults were exposed to irradiation with 10, 20, 30, 40, 60, 80 and 100 Krad for females and males. To study the degree of fecundity, fertility, longevity, F₁ progeny behind the Effects Mortality of immature stages

resulting from irradiated were comparatively measured throughout the four pairing combinations:

Treated males × Normal females

Treated males × Treated females

Normal males × Treated females

And normal male's × normal females (control) at $25 \pm 2^\circ\text{C}$ and $65 \pm \text{RH}$. In each combination, for every dose, 25 replicates were prepared. Statistical analysis of data used Abbotts (1925) and F-test (Snedecor, 1961).

RESULTS AND DISCUSSION

The results in Fig (1) show that when irradiated females of *T. putrescentiae* at 10, 20, 40 and 60 krad, were allowed to mate with normal male, the mean number of eggs laid per female were 39.0, 31.6, 29.2, 25.25, 18.25 and 6.85 Eggs respectively, as compared with 94.4 eggs in the control, while treated males at the same doses, with the normal females were 45.5, 30.0, 21.5, 17.0 and 9.98 eggs, than the control, respectively. The mean number of eggs per female in the treated adults (males and females) at the high doses of irradiation 80 krad was 5.0 eggs. Also; it was found that the treatment of both sexes with 80 krad gave 0.0% of egg hatch. Dohino and Tanabe (1993) showed that the females of *Tetranychus urticae* Koch, irradiated at 0.4 KGY or higher doses did not produce viable eggs, and Majumder *et al* (1996), and Kosielska *et al* (2004) indicated that the minimum dose causing sterility in adult females was 0.2-0.3 KGY. An *Oligonychus biharensis* Hirst and *Rizoglyphus robini* F. et R. Fig (2) indicated that the treated females irradiation mated with normal males longevity shorter than control with highly significant differences at the doses 30, 40 and 60 krad. Also, the related normal males longevity shorter than their control similar results were obtained by Ignatowicz *et al* (1997) on *Tyrophagus putrescentiae* (Schr.) and Hallman (2000) on *Tetranychus urticae* Koch. The females of *Tyrophagus putrescentiae* (Schr.) mated to irradiated males produced fewer female progeny and more none viable eggs as the dosage of 80 krad, there were male progeny but no female progeny Fig (3), females exposed to 20, 30, 40 and 60 krad and mated to untreated males the sex ratio of the progeny produced was in favor of females, however, at the dosage 60 krad there were only female progeny. When either sex was treated and allowed to mate, the percentage of males was found to increase gradually in the progeny as the dosage was to be increased. In Fig. (4) clearly that the gradual increase in the number of mortality immature mites at the dosages received by the male increased. Also, it was found, the percentage of mortality of mites during immature stages increased as the dosages increased to female and mated normal male. The treatment of sexes with 10, 20, 30, 40 and 60 krad, and the percentage of mortality immature stages reached and compared to only in the untreated mites. Such conclusions are supported by doses 80 and 100 krad caused sperm injury. Kosielska *et al* (2004).

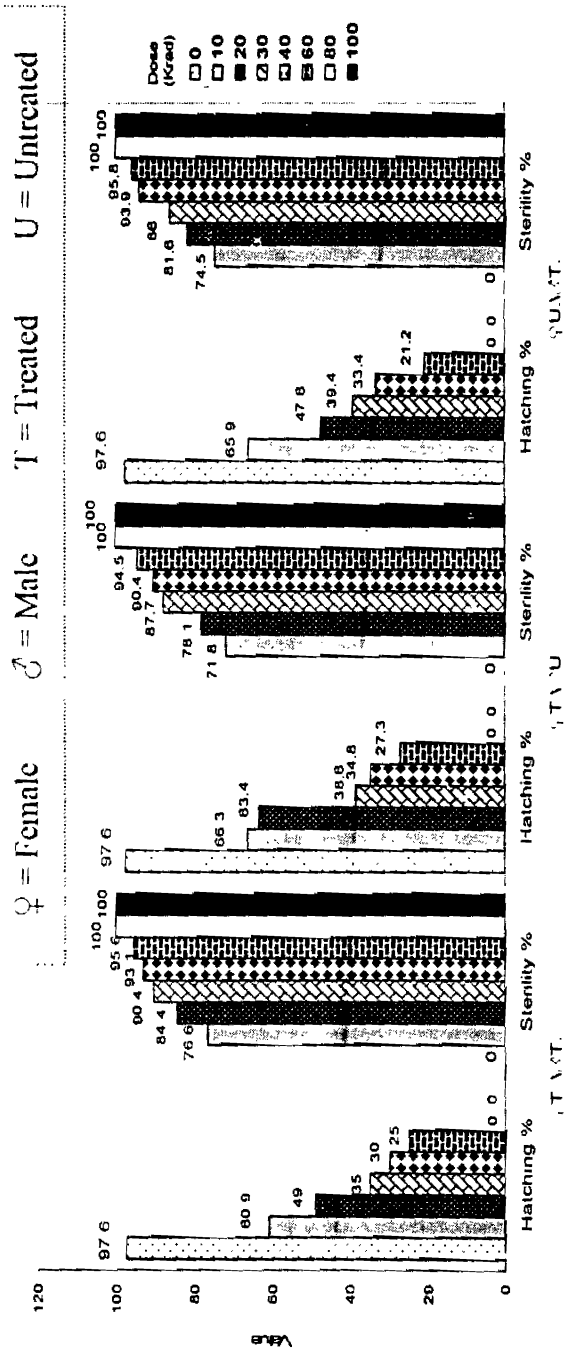


Fig. (1): Effect of gamma irradiation on hatchability and sterility of eggs of *Tyrophagus putrescentiae* treated as newly emerged adults at 28 ± 2 °C and 62 ± 5 % R.H.

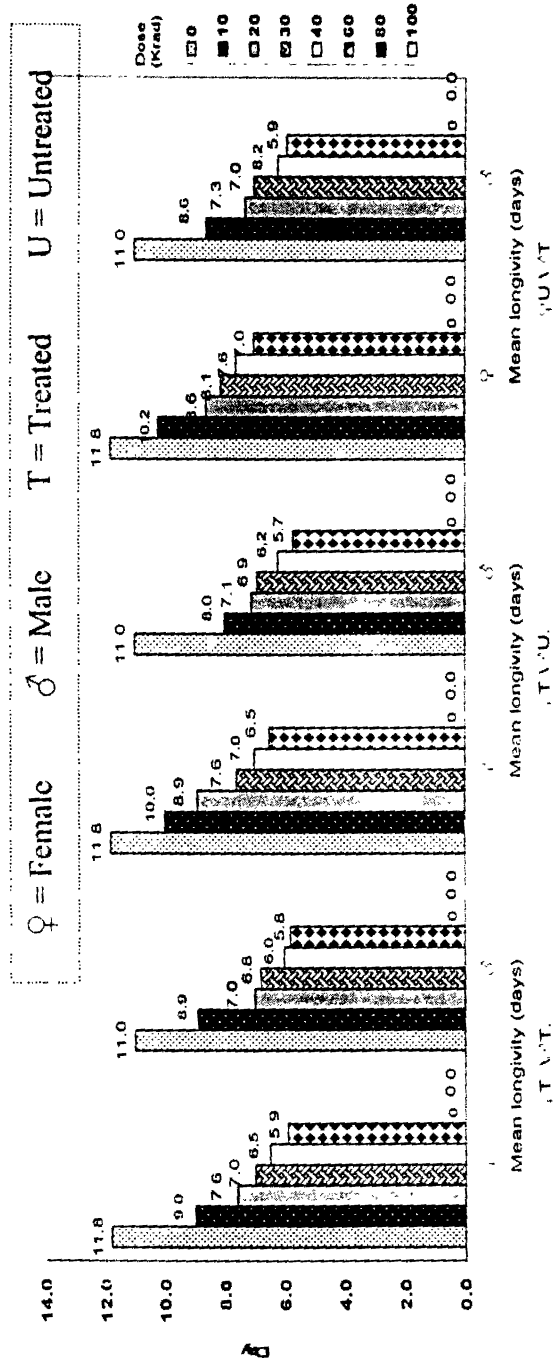


Fig. (2): Effect of gamma irradiation on longevity of *Tyrophagus putrescentiae* treated as newly emerged adults at $28 \pm 2^\circ\text{C}$ and $62 \pm 5\%$ R.H.

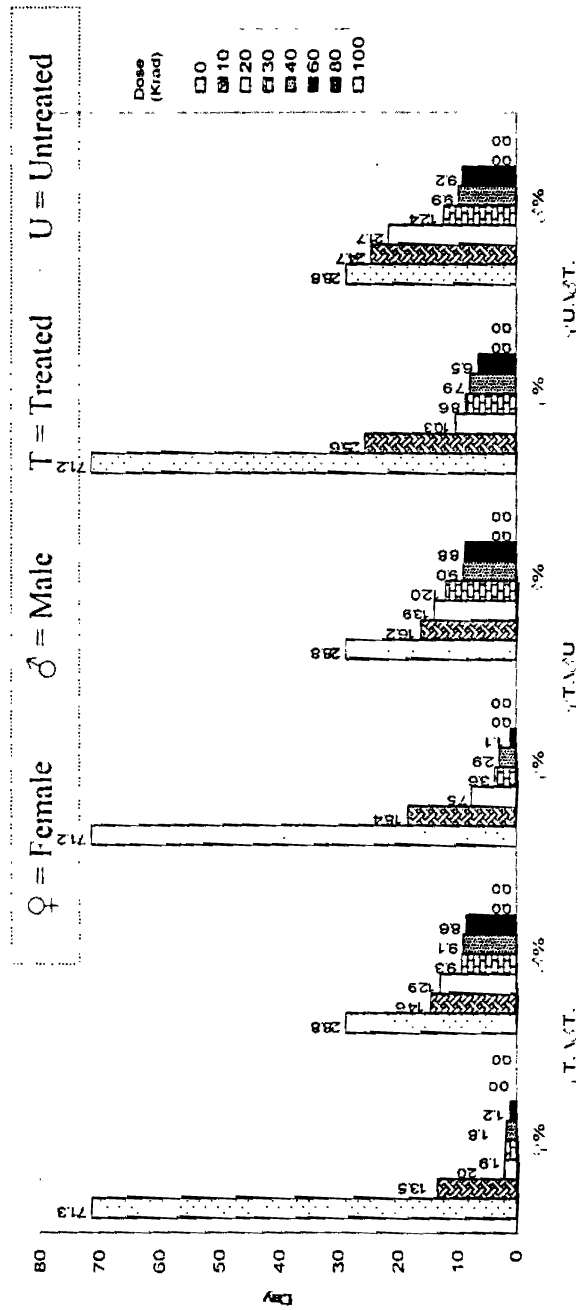


Fig.(3): Effect of gamma irradiation on F1 progeny produced by irradiated newly emerged adults of *Tyrophagus putrescentiae* at 28 ± 2 °C and 62 ± 5% R.H.

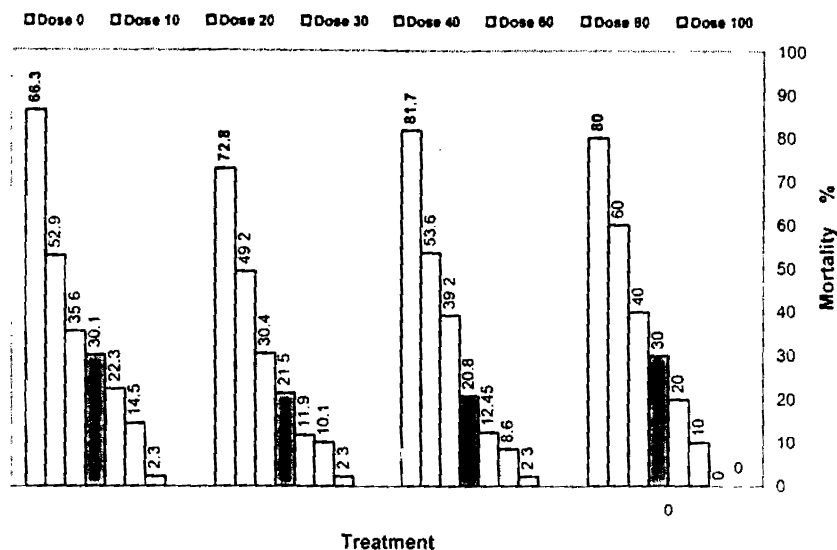


Fig: (4): Effect of gamma irradiation on mortality of immature stages resulting from irradiated newly emerged adults of *Tyrophagus putrescentiae* (Schr.)

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تأثير حساسية الإشعاع الذرى لتعقيم *putrescentia* على ناتج الجيل الأول.
بسمة محمد إبراهيم أبو النور و وفاء لبيب فكرى محمد
جامعة الأزهر - كلية العلوم - (بنات)

أجريت التجربة فى جامعه الأزهر كلية العلوم بنات قسم الحيوان وتم عليه الأشعاع فى قسم الطاقة النووية.

T. دراسة تأثير الإشعاع الذرى على الإناث البالغة الحديثة الفقس للنسوع *putrescentia*

الجرعات المختلفة 10 و20 و30 و40 و60 و80 و100 krad حيث أظهرت النتائج أن النسبة المنوية للانخفاض فى فقس البيض تزداد تدريجيا بزيادة التعرض للإشعاع. كما وجدت زيادة طفيفة فى فترة وضع البيض كلما زادت الجرعات. تعريض الإناث البالغة لجرعات عالية أدى الى خفض كمية البيض الموضوعه وكذلك الخصوبة. تعريض الإناث والذكور الى جرعات إشعاعية عالية من 80 الى 100 krad لم يوضع بيض تقريبا. عند تعريض الإناث البالغة وتزاوجها مع ذكور غير معاملة فأن النسبة الجنسية فى الجيل الأول الناتج كان يميل الى الإناث وعلى العكس عند تعريض الذكور لجرعات عالية ثم تزاوجها مع إناث غير معاملة كانت نتائج الجيل الأول كل ذكور تقريبا.