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STUDIES FOR CROSSES BETWEEN DIFFERENT PEACH FLY BACTEROCERA ZONATA (SAUNDERS) (DIPTERA:TEPHIRTIDAE) ISOLATES

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ABSTRACT: *The peach fly Bacterocera zonata (Saunders) (Diptera: Tephirtidea) isolates were collected from different parts of Egypt (Alexandria, Upper Egypt ,Ismaillia and Laboratory strain).B. zonata in Egypt is distinct geographically different races. The breeding of the laboratory strains and crosses of the virgin females with the collected males of different isolates give rise to some sterile females. This result could be used as a control method of B. zonata in Egypt.*

Key words: *Anatomy, Peach fly, Geographic origin, Crosses, Sterility.*

INTRODUCTION

The peach fly *B. zonata* is a serious insect pest infesting different fruits of fruit trees in Egypt. This pest insect was found for the first time in great numbers in Al-Agamy, Alexandria, 1997 (El-Minshawy *et al.*, 1999).Nowaday, *B. zonata* is widespread in upper and lower Egypt attacking different fruits of citrus, peach, guava, datepalm, mango, fig and apricot .

Abnormalities were observed in hybrids of *C. capitata* when strain of different origins were mated .The morphology of the undeveloped ovaries recovered in the Medfly is apparently very similar to the gonadal dystrophy in *Drosophila melanogaster* (Meig.) is associated with the P-M and hobo mediated dysgenic syndromes .The amount of gonadal sterility that can be observed in Medfly hybrids depends on genetic background of the parental strains used, which exhibit specific differences in their inducing abilities (Torti *et al.*,1994).

At present, no single control practice will solve all the crops arthropod pest problems. In the past the excessive use of pesticides has often complicated the problem by creating a barren habitat void of all-natural enemies as well as having the host and prey become resistant to the pesticides (Patterson, 1990).

Ahmed, (2003) studied the pattern of abnormal traits observed in Medfly hybrids looks like the phenotypic expression of a rather complex, interacting dysgenic system of inducer and suppressor effects, probably, more than one

system is activated in the considered crosses, involving heterogenous isolates with different origins. From the population point of view, the discovery that hybrid dysgenic determinates could exist in the Medfly populations may have implications for the genetic evolutions of this pest species during its fast colonization.

Sawamura *et al.* (2007), the female sterility might be attributed to a single gene with a large effect. We have also found that the Lethal hybrid rescue mutation which prevents the inviability of male hybrids from the cross of D. melanogaster females and D. simulans males cannot rescue those carrying the introgression, suggesting that D. simulans genes maybe non-functional in this hybrid genotype. The genes responsible for the inviability have not been separated from the female sterility genes by recombination.

This study was conducted to determine biogenetic consequences upon performed crosses between different geographic places in Egypt.

The peach fly, *B. zonata* is one of the most damaging insect species affecting fruits in the world .It is wide spread and is especially important as a pest of tropical fruits.

Therefore, the present work aimed to reach to estimate biological control method for this insect without using any pesticides to protect the surrounding environment, human health and animals.

MATERIALS AND METHODS

Anatomy of females:-

Larvae of the peach fly *B. zonata* were collected from Alexandria, Upper Egypt, Ismaillia for Comparing with Laboratory strain. They were kept in laboratory until emergence of adults. Crosses and reciprocal crosses were performed between females and males of the lab. strain and each of the different isolates. The tested flies were kept in glass tubes (2cm diameter and 10cm length) including five virgin females and five males for each mating. Each cross was replicated five times and labeled. The progenies of the above mentioned crosses were mated with parents.

After 35 days of adult emergence, females from all different progenies of all crosses were anatomically processed after anesthesia by means of two fine needles to extract out the reproductive system with ovaries. These ovaries were dissected out the fly body and inspected on a slide a stereoscopic binocular microscope. Therefore, the ovary shape of these females was classified and divided into three categories (with normal ovaries, without any ovary and with undeveloped bones). The frequency of

sterility as the numbers and percentages of the undeveloped ovaries and / or normal ovaries were calculated.

Statistical Analysis:-

For the analysis of the percentage of gonadal dysgenisis (GD) of all isolates, the following formula was used according to Bucheton *et al.* (1976).

$$\% GD = \frac{[\text{Number of no ovary} + 1/2 \text{ number of one ovary}]}{\text{Total number of ovaries scored}} * 100$$

Total number of ovaries = number of one ovary + number of two ovaries.

RESUTES AND DISCUSSION

In the present work, it is suggested that the pattern of abnormal traits observed in *B. zonata* hybrids looks like the phenotypic expression of a rather complex, interacting dysgenic system of inducer and suppressor effects. Probably, more than one system is activated in the considered crosses, involving heterogeneous isolates with different origins. From the isolates point of view, the discovery that hybrid dysgenic determinates could exist in the peach fly populations may have implications for the genetic evolution of this pest species during its fast colonization.

My findings could be explained as a syndrome of genetic effects, which resembles Drosophila hybrid dysgenesis in hybrids of Medfly when strains of different origin were mated. This syndrome includes high frequency of partial or complete female gonadal sterility, chromosomal rearrangements at male meiosis. As suggested in the pattern of abnormal traits observed in Medfly hybrids appeared to be the phenotypic expression of a rather complex interacting dysgenic system of inducer and suppressor effects. Torti *et al.*, (1994) found in *C. capitata*.

From the data illustrated in figs. (1 to 6), the GD sterility percentages were compared. It has shown the mating schemes of different crosses between the tested isolates and the resulted proportions of gonads in peach fly *B. zonata*.

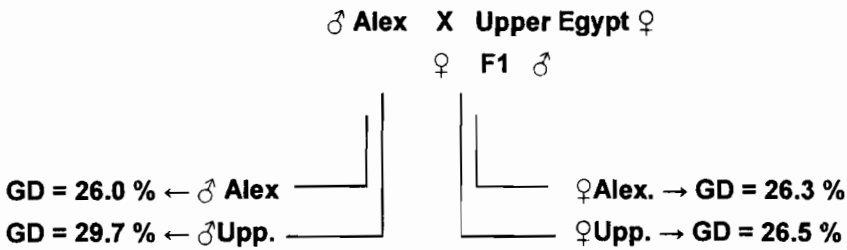


Fig. (1) Mating scheme to test for the interaction between Alexandria (Alex.) and Upper Egypt (Upp.)strains of peach fly .

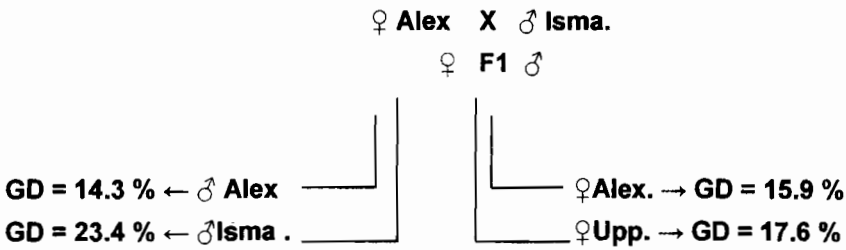


Fig. (2) Mating scheme to test for the interaction between Alexandria (Alex.) and Ismaillia (Isma.)strains of peach fly .

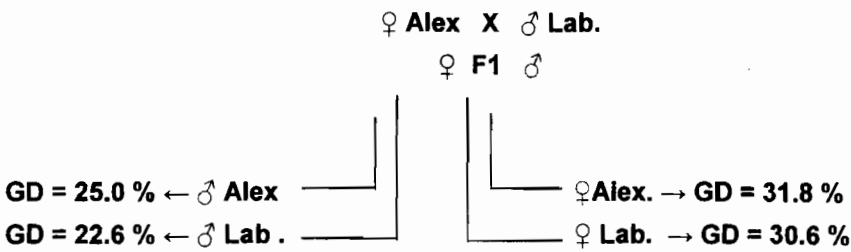


Fig. (3) Mating scheme to test for the interaction between Alexandria (Alex.) and Laboratory (Lab.) strains of peach fly .

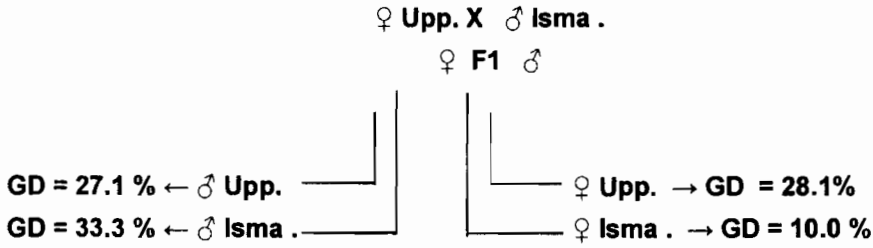


Fig. (4) Mating scheme to test for the interaction between Upper Egypt (Upp.) and Ismaillia (Isma.)strains of peach fly .

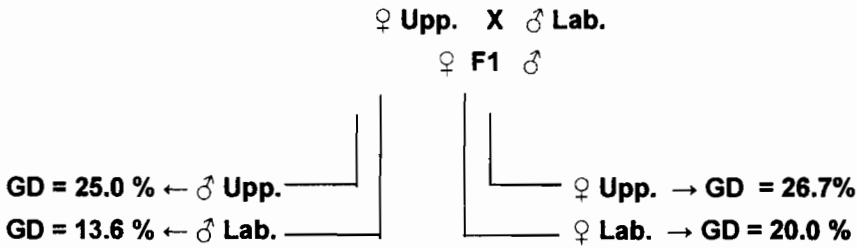


Fig. (5) Mating scheme to test for the interaction between Upper Egypt (Upp.) and Lab. strains of peach fly .

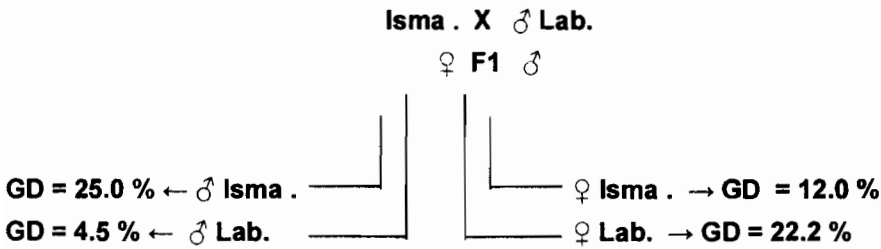


Fig. (6) Mating scheme to test for the interaction between Isma . and Lab. strains of peach fly .

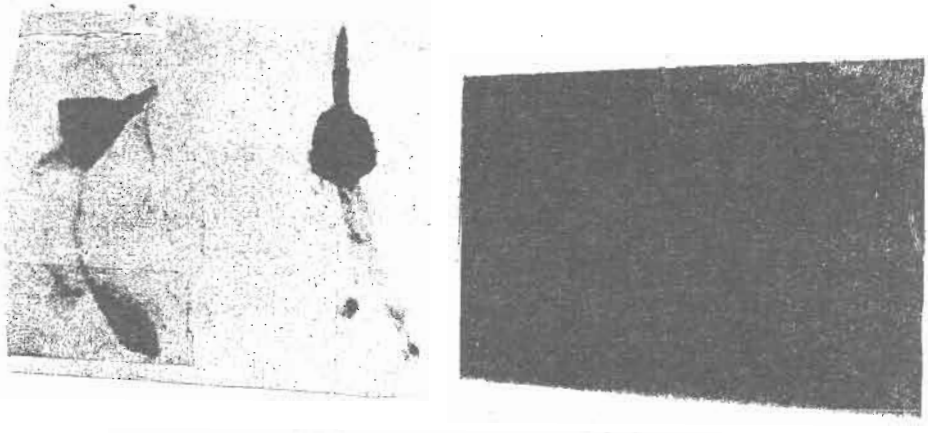
From the data illustrated in figs. from (1) to (6), the GD sterility percentages were compared. However, it has shown that the it ranged

between 33.3% from the back cross of male Ismaillia with female of (Upper Egypt female X Ismaillia male) to 4.5 % from back cross of laboratory male with female of (Ismaillia female X Laboratory male).

The back ground genotype of Medfly is clearly of great importance in determining the nature and magnitude of any chromosome breaks or sterility. The amount of gonadal sterility that can be observed in Medfly hybrids depends, as for Drosophila Raymand *et al.* (1991), on the parental strains used, which exhibit specific differences in their abilities and, probably, in their regulation mechanisms.

Anatomy of the ovaries of the peach fly different isolates:

As indicated in Fig. (7), the three ovary shapes of these females was classified and divided into three groups normal with two ovaries, with one ovary and no ovary. The later two abnormal phases are malformed ovary or undeveloped one.



(A) (B) (C)

Fig (7) *Bacterocera zonata* ovary shapes

(A) No ovary, (B) One ovary and (C) Normal Ovary

According to the data shown, all females of each back cross were isolated and collected separately after emergence. They were anatomically processed after anesthesia to extract out the reproductive system. Ovaries were dissected and inspected out the fly body over a slide under a stereoscopic binocular microscope as a phenomenology of hybrid dysgenesis.

Therefore, the ovary shape of these females was classified and divided into, with three groups normal, with one ovary and no ovary. The later two abnormal phases are malformed ovaries or undeveloped ones.

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دراســـات لتـــزاوجات بين عـــزلات مختلفـــة من ذبـــابة الخـــوخ

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الملخص العربى

الهدف من هذا البحث هو استحداث طريقة مكافحة لذبابـــة الخـــوخ حيويـــا و ذلـــك باحداث التهجينات بين عدد مختلف من عزلات من اماكن مختلفة فى مصر منهـــا الاســـكندرية ومصر العليا والاسماعيلية مع السلالة المعملية.كانت نتيجة هذه التهجينات ظهور انـــاث بهـــا تشوهات بالجهاز التناسلى من عدم وجود مبايض او وجود مبيض واحد نتج عنـــة نـــوع مـــن انواع العقم يعرف باسم عدم التوافق الجنسى التاتج من التلقيح الرجعى حيث و صـــلت نـــسبة العقم فى الاناث من نوع عدم التوافق الجنسى بحساب نسبة التشوة فى المبـــايض مـــن حيـــث وجود مبيض واحد او عدم وجود مبايض (من اعلى نـــسبة GD = 33.3 % فـــى التهجـــين الرجعى لذكر الاسماعيلية مع انثى من (♀ مصر العليا ×♂ اسماعيلية) و اقل نـــسبة GD = 4.5 % من التهجين الرجعى لذكر معملى مع انثى ناتجة من (انثى اسماعيلية × ذكر معملى).