INTEGRATED PEST CONTROL IN CITRUS-GROVES

Importance of old males in the reproductive activity of the Mediterranean fruit fly

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Summary

Experiments have been carried out in Spain in order to study effects of male age on the reproductive activity of Ceratitidis capitata (Wied.) using single pairs. When old males were crossed with young and old virgin females, a very short pre-mating period of about 1 minute was observed, all females were efficiently inseminated and a high daily fecundity and fertility rate was obtained. When neonata larvae, from these crosses, were daily seeded in vials containing a new larval diet, larval development time, pupal production, pupal quality and adult emergence were similar to those obtained from crosses between sexually mature males and females emerged at the same time. Daily oviposition of virgin females was lesser than the mated females one.

Males mated with young and old virgin females, after they mated with the same age females, lived longer; the life span of virgin females was longer than the mated females one.

1. Introduction

The aim of this study was to point out the importance of basic knowledge on the reproductive characters of this species, a highly destructive pest of citrus and various other fruit crops in Spain. Generally, laboratory researches on insects of economic importance are made on the basis of a population consisting of males and females that are confined together from the day of emergence. However, in order to the efficiency of using several techniques of insect pest management, it is necessary to consider the impact of newly emerged females in a population of old males and females. This is a very important requirement for using SIT programmes.

2. Material and methods

One day old males and females were removed on 7 January 1985 from a laboratory population, that has been reared for over 20 years, and then introduced into specially designed cages (4,5). Each cross was carried out in 10 replicates consisting of 1 male and female each. The individuals of these crosses are referred in the text as "Control".

Eggs were collected once daily and then transferred to a Petri dish to observe hatching levels. When the fecundity or fertility of a female was null during 5 or more days, this female was removed from its cage; at the sa-

Number of eggs / female

Fig. 2

Egg hatch (%)

Fig. 3

me time, a new female was also removed from a virgin females population (1 February 1985) and then was introduced into that cage to mate with the same sexually mature male. So, it was possible to study the variation of the age specific fecundity and fertility obtained from the new and "Control" crosses. Each sterile female was confined in another individual cage to record longevity data. Also, one day old virgin females were introduced into the same cages to collect daily oviposition and longevity; 10 replicates were carried out.

On the other hand, 80 neonata larvae were daily seeded throughout the females' longevity period, in glass vials containing 5 gr. of a new larval diet (1,6) in order to collect the following data: Larval development time, pupation, pupal weight, pupal density, adult emergence and sex segregation of the newly emerged adults. A Zeiss standard microscope with camera lucida was used to calibrate the size of pupae and to estimate their volume (3,7).

Conditions during the experiments were $26 \pm 1^{\circ}\text{C}$, $60 \pm 1\%$ RH and 12:12 hrs L:D regime (1.900 lux).

3. Results and discussion

The variation of the age specific fecundity of mated and virgin females throughout their age is represented in Fig.1; figures in parenthesis are the number of virgin females introduced in the "Control" population with respect to a day of the adult life. It can be noted that the daily oviposition rate of virgin females was lesser than the mated females one, and the preoviposition period was 3 days in the both virgin and mated females, in agreement with Feron (2).

When plotting age specific fertility throughout the female life span, it could be observed that one day after the first 5 days old virgin female was introduced in an individual cage to mate with a 32 days old "Control" male, the daily average of larvae/female began to rise with a high rate of increase (Fig.2). This fact was also observed when the percentage of egg hatch was plotted (Fig.3). The total fertility period was almost duplicated in relation to the "Control" one; that indicates the high insemination power of the old males.

Reciprocal crosses (old mated females X young virgin males) didn't give these results because of the existence of atrophic and hypertrophic ovaries in the "Control" females (3).

When a virgin female and a "Control" male were confined together to mate, a very short pre-mating period was observed (about 1 minute), irrespective the male age; in various cages this period was significantly shorter (about 20 sec.).

When neonata larvae, produced by old males X young females were daily seeded in the larval diet, a good pupal characters were obtained (Table I). Weights, mean volume and densities were adequate for the experimental conditions of this work. In earlier studies, similar results were obtained at 25°C and 57 R.H.

Table II shows various reproductive patterns obtained from crosses between "Control" males and young females. In the before mentioned earlier studies, data of 7,61 days, 60,22% and 95,53% were reported for larval development time, pupation and adult emergence, respectively (7).

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