FRUIT FLIES
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Studies on a rapid adaptation of the Mediterranean fruit fly

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Summary
Preliminary experiments in the Instituto Español de Entomología show that it is possible a rapid adaptation progress of a newly collected field population of Ceratitis capitata (Wied.).

Starting with 4 pairs from grapefruits brought in the laboratory from Valencia (Spain) in April, 1984, a good daily oviposition rate in the F₁ was obtained (about 50 eggs/female). Although the egg production and the survival of larvae to pupation were low during the parental generation, hatchability, pupal production and adult emergence were near to 100% during the following generations. At the end of July a population of about 2,000 adults was obtained (F₂). Conditions during the experiments were 22 ± 1°C, 70 ± 3% RH and 12:12 hrs. light regime (1,900 lux).

1. INTRODUCTION
The adaptation process in fruit flies of economic importance is a matter of considerable concern (2,7). However, one of the most important problems of the well adapted pest populations in order to apply the SIT program is the production of reproductive barriers between the laboratory and field populations (6).

Since 1977 we have carried out a lot of experimental studies using isolated pairs of Ceratitis capitata (Wied.) in order to obtain useful and valid data about the reproductive activity of this species. A technique that allows to get a high adult longevity, a good oviposition rate and a high percentage of egg hatching was developed 7 years ago (3).

Recently, a new larval diet has been developed including Hansenula anomala as a protein source, with better results than the ones obtained using Saccharomyces cerevisiae (1,4). For this reason, it could be useful to study the possibility of replacing the laboratory strain that had been established about 1963 in the Instituto Español de Entomología and to help to solve some of the problems involved in the application of the SIT program.

2. MATERIAL AND METHODS

2.1. Oviposition cages
The reproductive activity of the wild strain (P) has been studied using a design as follows (Figs. 1 and 2): A cylindric glass chamber (A)
Fig. 1.- Oviposition cage

Fig. 2.- Vertical sectional view of the oviposition cage. A: Cylindrical glass chamber; B: Perforated transparent plastic; C: Feeding vial; D: Drinking device with a cotton wick (E); F: Oviposition device; G: Inverted Petri dish with pieces of cellulose paper (H).

(9 cm. dia. x 4.5 cm. long) covered by a hard transparent plastic (B) with a great number of holes (2 mm. dia.) to allow a good aeration. This cover supports a vial (C) containing adult food (mixture 1:3 of yeast hydrolysate and sugar) with pieces of cellulose paper to avoid the fluidification of adult food. A tube (D) provided with a cotton wick (E) soaked in distilled water for drinking and an hemispheric oviposition device (F), built with a smooth cheese-cloth dyed with an innoxious yellow tint immersed in melted cerosin. The oviposition device is covered by an inverted Petri dish (G), at the bottom of which several wet cellulose papers are placed in order to provide a saturated environment inside (H).

The reproductive activity of the following generations has been studied using a bigger design with the same basic structure. Adults were in-
roduced into the cylindric chamber without any kind of anaesthesia, through a hole (1 cm.dia.) made on the cover and provided with a stopper (1).

2.2. Larval diet

The composition of the artificial larval diet was as follows: (in % by weight) Water 50; wheat bran 27.9; sugar 14; Hansenula anomala 7; Nipasol (Propyl,p-hydroxy-benzoate) 0.1; Nipagin (Methyl,p-hydroxy-benzoate) 0.1 and concentrated HCl 0.9.

2.3. Experimental methods

Grapefruits infested by Ceratitis capitata (Wied.) were brought in the laboratory in April, 1984. Eight adults (4 pairs) that emerged from the newly collected pupae (6.5 mg/pupa 3 days old) were introduced into the oviposition cage previously described (Generation P).

Eggs were collected once daily and transferred to a Petri dish, in the bottom of which a wet black filter paper was placed in order to maintain an optimal level of moisture. Neonata larvae were daily seeded in vials (2 cm.dia. x 9 cm.long) containing 5 g. of larval diet (6) and provided with a porous stopper to get a good aeration. Pupae were daily removed and the emerged adults were introduced in a 36-cm-cube-cage to catch them afterwards and to start again the process. Conditions during all experiments were 22 ± 1°C, 70 ± 3% RH and 12:12 hrs light regime (1900 lux.).

3. RESULTS

The preoviposition period in the generation P was longer than in the control (about 8 days); egg production and survival of larvae were low, so that only 16 adults (10 males and 6 females) were obtained (F1) in June; however, the mean pupal weight was normal (9.5 mg/pupa 3 days old). This population showed a good adaptation level to the new oviposition cage (14 cm.dia. x 11.5 cm.long) provided with two artificial devices to oviposit.

Preoviposition period of this population was acceptable (3-5 days); the total number of eggs laid by females was increasing with the adults age, from 50-70 in the first three days to about 300 in the following days. Neonata larvae were daily seeded in vials (80 larvae/5 g) and a very good larval survival to pupation was obtained (about 95%) with a high pupal weight (12 mg/pupa 1 day old). The length of the oviposition period and the mean female’s longevity were 40 and 55 days, respectively.

At the end of July a population of about 2,000 adults was obtained (F2), half of which was introduced in a 36 cm-cube-cage with 5 oviposition devices (6.5 cm.dia.). The other one was also introduced in a similar cage to study the oviposition adaptation progress through screened walls.

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REFERENCES


