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THE CARNATION LEAF-ROLLER CACOECIMORPHA (CACOECIA) PRONUBANA HUEBNER (LEPIDOPTERA, TORTRICIDAE) ON AVOCADO TREES IN ISRAEL

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The Carnation leaf-roller *Cacoecimorpha* (*Cacoecia*) *pronubana* Huebner (Lepidoptera, Tortricidae) is known to be harmful to a great number of agricultural crops. It attacks more than 140 types of plants (Von Winning, 1938), including the following economic crops: pears, peaches, plums, cherries, apples, cabbage, pimiento, tomatoes, broad beans, clover, and roses. It is particularly prevalent in the Mediterranean basin. It is found in many countries in southern Europe. In Italy on ornament plants and crops belonging to 25 different botanical species, in *inter alia* the olive tree (Bestango, 1955; De Bellis, 1956; Ragusa, 1967), in Spain (Fischer, 1924), in Greece (Mourikis and Vassilaina-Alexopoulou, 1972), and in France (Balachowsky, 1966). In North Africa the insect attacks mainly citrus in Morocco (Bleton, 1938; Chapot and Delucchi, 1964; Delucchi and Merle, 1962) and olives in Tunis (Damiano, 1966) and Algiers (Balachowsky, 1966).

Description of the Pest and its Biology

Adult: There is sexual demorphism, the males being smaller than the females. The upper wings are brown and rectangular in shape; the lower wings are orange. At rest, the upper wings cover the lower ones.

Egg: The egg is green, shiny and elliptical in shape, covered with net-like lines. Its diameter is circa 0.4 mm. The average number of eggs laid by the female is 340, with a maximum of 620 eggs counted (Mourikis and Vassilaina-Alexopoulou, 1972).

Larva: Light green in color, becoming darker as the larva develops. The head is brown. The larval stage lasts from 37 to 40 days.

Pupa: Light brown in color, 9-12 mm long. The pupal stage lasts for 3 to 20 days.

The number of generations raised by the pest in one year differ with the country: in France and Italy it maintains four generations (Bestango, 1955; Colizza, 1927; Ragusa, 1967), in Central Europe two generations (Balachowsky, 1966), and in Tunis six generations per year (Damiano, 1966).

The damage caused by this moth differs from that caused by the two other moths found

in avocado orchards—the Honeydew moth and the Giant looper. The damage caused by each of these insects can be identified easily as follows:

1. The Honeydew moth (*Cryptoblabes gnidiella* Mill.)—Shallow gnawings. frequently close to the stalk or in two adjacent fruits, with brown webs and dark excreta.

2. The Giant looper (*Boarmia selenaria* Schiff.)—Shallow or deep gnawings, with no signs of webs or excreta.

FIGURE 1. Larva of the Carnation leaf-roller, Cacoecimorpha pronubana Hb.

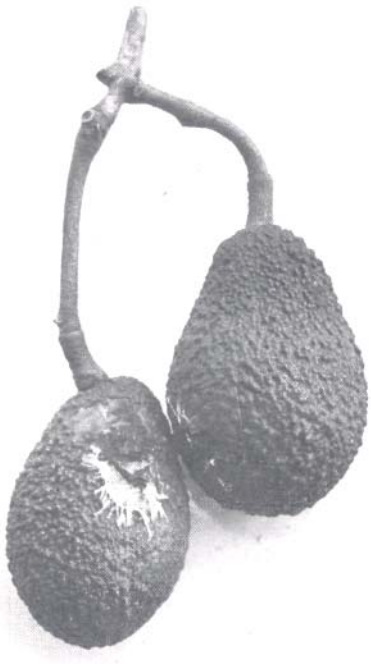

FIGURE 2. Damage caused to the avocado fruit (Hass variety) by larva of Cacoecimorpha pronubana Hb.

3. The Carnation leaf-roller (*Cacoecimorpha pronubana* Hb.)—Shallow gnawings with white, glossy, fibreglass-like webbing, in most cases found between two adjacent fruits or between a leaf and fruit. Also found on leaves, when two leaves are adjacent. In many cases tunnel-like gnawing, but not deep. The larva has clear tigmotactic characteristics.

In many countries this insect has a large number of natural enemies (Adkin, 1906; Colizza, 1927; Delucchi and Merle, 1962; Milliere, 1859, from Ragusa, 1967; Poutiers, 1927; Targe and Deportes, 1961).

Tachinidae: *Nemorilla floralis* Fall.; *Actia pilipennis* Fall.; *Morinia bigoti* Rob.; *Zenellea roseana* B.

Braconidae: *Apanteles lacteus* Nees.; *Apanteles xanthostigmus* Mal; *Microgaster* sp.

Ichneumonidae: *Pimpla alternans* Grav.; *Pheogenes nigridens* Wsn.

Chalcididae: *Chalcis intermedia* Nees.; *Elachertus affinis* Masi (= *artaeus* Walker): *Trichogramma* (*Oophtora*) *semblidis* Auriv.

Proctotrupidae: *Camptoptera* sp.

Appearance of the Pest in Israel

The insect was recorded in Israel in 1937 under its previous name *Tortrix pronubana* Hb. and was not known to be injurious (Bodenheimer, 1937). In the 1970s surveys were undertaken in avocado orchards on the long-tailed mealybug and the Honeydew moth (Wysoki *et al.,* 1974, 1975), the populations of which grew as a result of a disturbance of the biological equilibrium in the wake of aerial sprays of cotton fields in the vicinity of avocado orchards. During the same period a larva was found which caused damage to the avocado and was identified by M. Sternlicht. In 1972 this pest was found in orchards at Regba, Shave Ziyyon and Bet haEmeq, all in the Western Galilee. At Regba, in groves far removed from cotton fields, it was found on the varieties Nabel (six fruits damaged out of a total 611 examined) and Hass (eight fruits out of 550 examined). In a grove of Hass trees close to a cotton field, a record was made also of damage caused by other moths found in the orchard (the Honeydew moth and the Giant looper). Twenty-four trees were examined and out of 616 fruits, all of them within arm's reach, 7.6% were found to be damaged by the Giant looper, 7.3% by the Honeydew moth, and 4.2% by the newly defined pest.

In the tree tops the results were different—out of 777 fruits examined (from 10 trees) 3.0% were damaged by the Giant looper, 5.1 % by the Honeydew moth, and 11.8% by the new insect. In subsequent years the number of fruits damaged by this pest declined considerably and in 1975 it was almost not recorded except for isolated cases at Regba and Shave Ziyyon in the Western Galilee, and at Ma'barot in the center of the country.

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