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EFFECT OF INSECTICIDES, PREDATION, AND PRECIPITATION ON POPULATIONS OF *THRIPS PALMI* ON AUBERGINE (EGGPLANT) IN GUADELOUPE

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Aubergine (eggplant) in Guadeloupe has been attacked by *Thrips palmi* Karny since November 1985 (Bournier 1986). In 1986 the damage resulted in a reduction of the aubergine crop from 5,000 tons each year to 1,600 tons (Manyri 1986).

Profenofos O-(4-bromo-2-chlorophenyl)-O-ethyl S-propyl phosphorothioate] was reported to be an effective control agent in 1986 (Hostachy et al. 1986a, b); however, field studies in 1987 indicated thrips populations in profenophos-treated plots as great as in control plots. Therefore, we initiated the following study during the normal growing season to determine some of the factors influencing thrips populations in aubergine.

Three plots of 200 m^2 were established. Each contained 8 rows, 40 plants per row, 20 m long with 1 m between rows. The plots were separated by 50 m. Fertilization and drip irrigation were the same in all plots. The plants were set at the beginning of August, 1987, flowering began one month later and harvest began about 45 days after planting. Insecticide treatments began on 17 August and were terminated on 14 November. One plot served as an untreated check, the second received profenophos

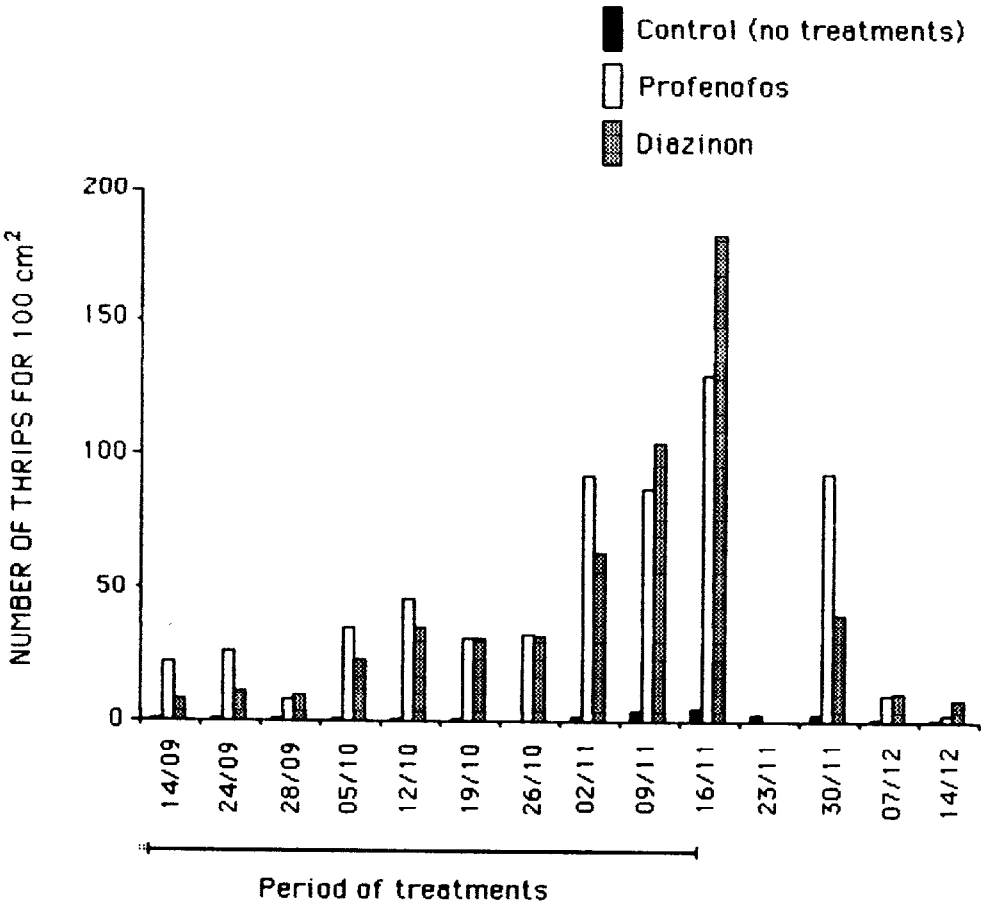

Fig. 1. Variation in the number of thrips collected in Berlese extractors during the experiment. Samples were not collected in the insecticide-treated plots on 23 November (sample 11) because of heavy rains.

(0.5 kg [AI]/ha) applied each week with a Hardy RY-2 sprayer, and the third plot was treated every 2 weeks with diazinon (fine granule) at 0.8 kg [AI]/ha.

The thrips were sampled and observed every week from 14 September until 14 December. Samples consisted of 5 leaves or a total of about 500 cm^2 of leaf surface from each row. These samples were transported to the laboratory in an ice chest where each was exposed to a turpentine soaked cotton ball for 20 h in a Berlese extractor. After extraction, the leaf area was measured with a planimeter and the number of thrips adults and larvae collected per 100 cm^2 of leaf was calculated. Additional information was obtained from collections taken from whole aubergine plants and from soil samples that were placed a Berlese extractor with a 40 watt bulb for 4 days.

In the untreated plot the number of thrips larvae and adults remained at less than 5 per 100 cm^2 of leaf area (Fig. 1). In the profenophos-treated plot, the thrips population was 22 per 100 cm^2 when sampled on 4 September (Fig. 1) and increased in an exponential fashion ($\ln Y = 2.47 + 0.22x$, where Y = number thrips per 100 cm^2 of leaf surface and x = the number of the sample (10 samples); $r = 0.82$). The population peaked with the 10th sample (16 November) and fell to 10 thrips per 100 cm^2 in the 12th sample (7 December) following heavy rains during the period from 16-29 November (Fig. 2). No sample was obtained in the insecticide-treated plots on 23 November because of heavy

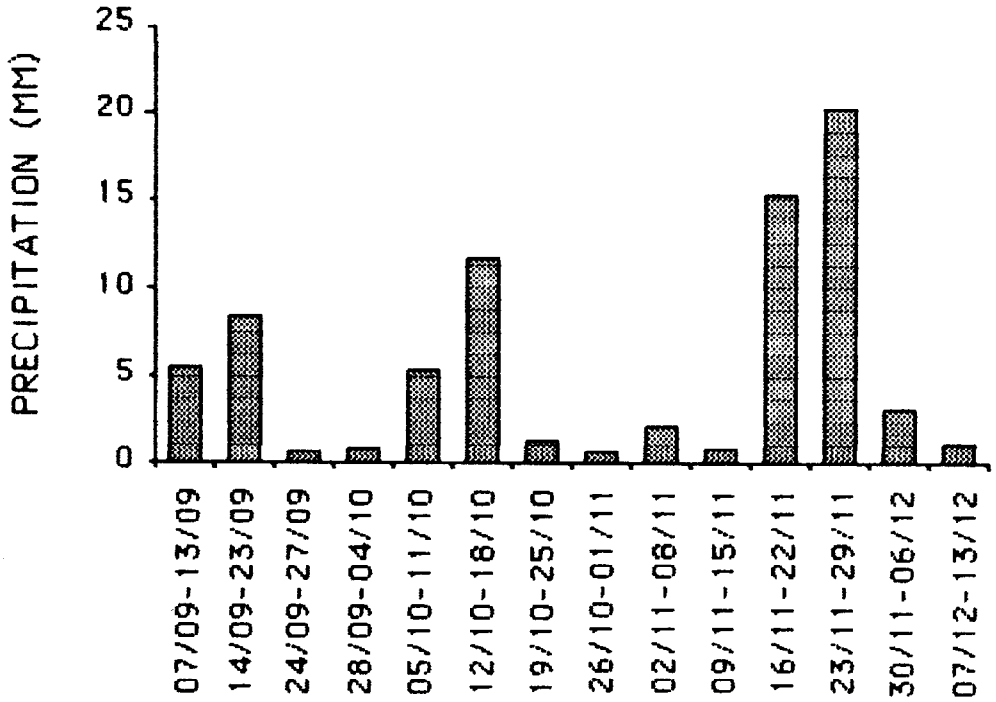

Fig. 2. Daily mean precipitation during the experiment.

rains. Population trends were similar in the diazinon-treated plot ($\ln Y = 1.63 + 0.33x$, $r = 0.97$ during the period of increase), although the population level on 30 November following the heavy rains was much less than in the profenophos plot. Populations fell rapidly in both insecticide-treated plots to near the levels in the control plot during the following two weeks.

From 14 September to 14 December, 20,921 adults and 31,891 larvae were trapped (13 samples). Only 1.5% of the individuals were from the check plot, with 50.5% and 48% from the profenophos and diazinon plots, respectively. We attribute much of this difference to reduced predator activity in the treated plots. Predators observed attacking the thrips were: 1) several species of *Amblyseius* and *Phytoseius* mites (Phytoseiidae); 2) an unidentified species of Diptera: Dolichopodidae; 3) *Orius insidiosus* Say (Heteroptera: Anthocoridae) which was abundant on aubergine in Guadeloupe; 4) *Franklinothrips vespiformis* Crawford and *Neohydatothrips portoricensis* Morgan. Additionally, many potential predators were recovered from soil samples and these were more numerous in the check plot than the insecticide treated plots. Predators collected were: 1) Arachnida (eight families) comprising 67% of soil organisms collected; several Staphylinidae (6% of total—no predatory beetles were found in insecticide treated plots); *Lasiochilus pallidulus* Reuter (Heteroptera: Anthocoridae); 23% of the organisms in soil samples were ants (Hymenoptera: Formicidae); 4% of the specimens were *Lamyctes* spp. (Chilopoda).

Our tests indicate that some of the ineffectiveness of insecticides in controlling *Thrips palmi* in Guadeloupe is due to the reduction of endemic natural enemies (predators). We believe rain may also depress populations of *Thrips palmi*. The three periods of intense rainfall coincided with decline in the number of adults and larvae (Fig. 1, 2). Rainfall of about 40 mm in 24 h seemed to affect primarily the insect on the plants whereas greater precipitation (80 mm in 24 h) causes floods in this clay soil with mortality of stages found in the soil.

The drop in the density of thrips at the beginning of December seemed to be the result of increased precipitation and the termination of chemical treatment at the middle of November.

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MEDITERRANEAN FRUIT FLY, *CERATITIS CAPITATA*, ERADICATED FROM BERMUDA

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Mediterranean fruit fly (medfly), *Ceratitis capitata* (Wiedemann), reached Bermuda between 1858 an 1865 (Heyl 1892, Back 1919) and was established in Bermuda for the next 100 years until 1962.

Organized efforts to control this pest began in 1905 with the introduction of *Anolis grahami* Gray, a lizard from Jamaica thought at that time to be responsible for control of various fruit flies. The lizard quickly became abundant, but it is doubtful if it had any impact on the medfly population (Bennett et al. 1985).

An eradication program was initiated in 1907. For four years inspectors in each parish cut down surinam cherry, orange, and peach trees, and stripped unripe fruit from other hosts (Johnson 1913). The number of flies was greatly reduced, but the pest was not eradicated and returned to its former abundance within a few years. Failure stemmed from a lack of support from residents who concealed trees from inspectors (Johnson 1913) and because it was propagating on banana, *Musa cavendishii*, and broad bean, *Vicia faba* (Ogilvie 1928).

Two consignments of a braconid parasite, *Opius concolor* Szepligeti, were received (as *O. humilis* Silv.) from Hawaii in 1926-27. The parasite was recovered in 1936, but not subsequently (Bennett et al. 1985).

A second campaign against medfly was initiated in 1957, though at this time eradication was not considered possible. Steiner-type traps using angelica seed oil as an attractant and DDVP as a toxicant were used to monitor the medfly population.. Peak populations occurred in the middle of June. An average of 936 flies were caught per trap during 1957 (Hughes 1957, unpublished data). Eighteen orchards with high levels of medfly were sprayed on an eight to ten day schedule for 4-5 months with a mixture of malathion and a protein attractant (Staley's sauce bait No. 2).

In 1958 trapping and foliar sprays were augmented with ground sprays of dieldrin (50% wp, 5 lb./acre). Trap catches indicated a great reduction in the medfly population.