

Honey-Bee Populations Exposed to Bait Containing Mirex Applied for Control Of Imported Fire Ants

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THE Entomology Research Division in cooperation with the Plant Protection Division and the Mississippi State Plant Board tested the effectiveness of two doses of mirex bait (1.25 lb. bait or 1.74 g of actual mirex per acre and 2.5 lb. of bait or 3.48 g of actual mirex per acre) on about 600 square miles in northeast Mississippi in reducing or eliminating population of the imported fire ant, *Solenopsis saevissima richteri* Forel. The mirex bait consists of 85% corn cob grits, 14.7% soybean oil, and 0.3% mirex. Three treatments were applied to each block (100,000 to 150,000 acres) with multi-engine aircraft during October and November 1968, April and May, 1969, and September, 1969.

Since numerous colonies of honey bees, *Apis mellifera* L., are located within and adjacent to the treatment areas, we observed the treatments for possible effects on the colonies.

The present paper reports the results of our observations on the condition of colonies of honey bees within and outside the treatment area before and after the first and second application of both doses of mirex and include the results of chemical analysis of samples of bees, honey, pollen, and trapped pollen.

Before the two treatments and immediately after each one, samples of bees, honey, pollen, and trapped pollen were taken from three colonies in two locations within the area subsequently treated with 1.25 lb. per acre of mirex and from three colonies in two locations within the area subsequently treated with 2.5 lb. per acre. In addition, three colonies were sampled in two untreated areas, one 16 miles north and the other 6.7 miles south of the test blocks. The same colonies were also observed for the amount of honey, the number of frames of bees, the number of frames of brood, the presence or absence of new pollen, and the general activity of the colonies.

The samples of bees, honey, pollen, and trapped pollen were frozen after collection and submitted to the Methods Improvement Section, PPD, Gulfport, Mississippi, for analysis. Then the following gas chromatographic technique was used to assay for mirex:

Each sample was extracted with hexane/isopropanol, washed with distilled water, and dried by filtering through sodium sulfate-glass wool. The extract was then concentrated to the desired volume and injected into the gas chromatograph. After injection, the sample (a drop or less) was passed through a glass U-shaped column containing Chromosorb W, a fine-mesh solid material resembling a powder, which had been coated with a small amount of silicone gum (5% XE 60). The sample vaporized just before passing through this powder and was carried through the column by a carrier gas (5% methane in argon) into an electron-capture detector. The detector transmits an electrical signal to an electrometer which amplifies the signal and sends it to a recorder so a permanent record is obtained. Qualitative analysis is established from the retention time of the chemical in the column, and quantitative analysis is determined from the intensity of the electrical signal. The instrument (an F and M Model 402, high efficiency gas-liquid chromatograph with an electron capture detector) can detect 10^{-11} g of mirex. The sensitivity of the method was 0.1 ppm for honey and pollen.

A total of ninety-two samples were analyzed, but no mirex was detected. Inspection of the colonies showed no bee kills, no reduction in colony activity and collection of pollen, and no reduction in brood rearing or brood population.

Torchio (1967) reported that mirex applied in field tests as a dust had low toxicity to honey bees.

In light of our findings and the report by Torchio (1967), the mirex bait used in the Imported Fire Ant Control Program is safe to use where bees are present.

Bibliography

Torchio, Philip F. 1967. Pesticides. USDA Agriculture Handbook No. 335, pp. 97-104.

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