

THE EFFECT ON HONEY BEES OF PARATHION SPRAYS APPLIED TO FLORIDA CITRUS GROVES ¹

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In the last four or five years, the use of parathion has increased tremendously, especially for the control of scale insects in Florida citrus groves. When this material was first released for commercial use, there were numerous popular and scientific articles published concerning the toxic and residual properties of parathion. One of these articles ³ mentioned tests where caged honey bees were killed in one to eight hours when placed above a cage which had been sprayed with one percent parathion spray twelve days previously. After reading or hearing about some of these articles, many of the beekeepers in Florida formed exaggerated ideas about the toxic effects of parathion. One beekeeper, in particular had somehow gotten the idea that a single parathion spray application would kill any living thing in a citrus grove and remain effective for six months or more.

Since honey produced from various citrus sources accounts for more than 50 percent of the honey production in Florida, beekeepers became understandably concerned as to the effects the use of parathion sprays in citrus groves would have on the honey-producing industry. There was some fear expressed that beekeeping might have to be abandoned in areas where parathion was used widely. Early in the spring of 1950, reports were received telling of beekeepers who had had colonies of bees killed by parathion, or had heard of other beekeepers whose bees had been killed. These reports were generally very difficult to trace to the original source and in most cases it was impossible to determine whether these losses were due to parathion or to some other cause. As the use of parathion in citrus groves was becoming so widespread, it was important that controlled tests be made to determine just what effect parathion sprays have on honey bees under actual field conditions. To obtain this information, tests were conducted in

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³ Eckert, J. E. 1948. Toxicity of some of the newer chemicals to honey bees. J. Econ. Ent. 41: 487-491.

the summer of 1950 and spring of 1951 at Lake Alfred, Florida, in cooperation with Dr. J. T. Griffiths, Entomologist at the Citrus Experiment Station. The bees used in these tests were furnished by Mr. George O'Neil of Haines City, Florida.

The first test was made in July 1950, in an eight-acre grapefruit grove which was sprayed with two pounds of 15 percent wettable parathion in 100 gallons of water. This spray was applied at the rate of 35 gallons per tree.

In the first test, two lots of 3-frame nuclei were used. One lot, consisting of six nuclei, was placed in the center of the grove before the spraying operation began. These nuclei were located so as to receive a heavy application of the spray material as the Speed Sprayer passed. The nuclei were inspected two hours after they were sprayed and very little injury was detected. The maximum number of dead bees that could be found in any nucleus was about fifty. Bees in the nuclei behaved normally, and flight, which had ceased during the spray application, was beginning again. The queens in the nuclei were laying normally and no effects on the brood were observed. Three more observations were made at eight hour intervals. At the end of that time, two nuclei each had about 150 dead bees, and the others from 30 to 50. The death rate of the bees in these nuclei was surprisingly low—in fact, with the exception of the two “nukes” which had 150 dead bees, the death rate was very little higher than that of normal colonies which had not been exposed to any insecticidal sprays. Activity and behavior of the bees remained normal in all respects.

The second lot, consisting of ten 3-frame nuclei, was placed in the grove four hours after spraying was completed. Observations were made on these nuclei for 36 hours. At the end of this time, only five to ten dead bees were found in front or inside of any nucleus. The behavior of the bees and queens appeared perfectly normal and no ill effect on the brood was detected.

As the first test was conducted at a time when the citrus trees were not in bloom, a second test was made in March, 1951, at a time when the trees were in bloom and the honey bees actively working in the grove. Since parathion sprays are not normally applied while the trees are in bloom, special arrangements were made by Dr. Griffiths to have a ten-acre grove sprayed on March 14 and again on March 26, 1951. The colonies of bees were placed 30 yards from the north end of

the grove. Two of the colonies were placed on scales and their weights recorded every other day for a four-week period. Observations also were made as to the numbers of dead bees found in front of the hives, activity and behavior of the bees, queen behavior and effects on brood.

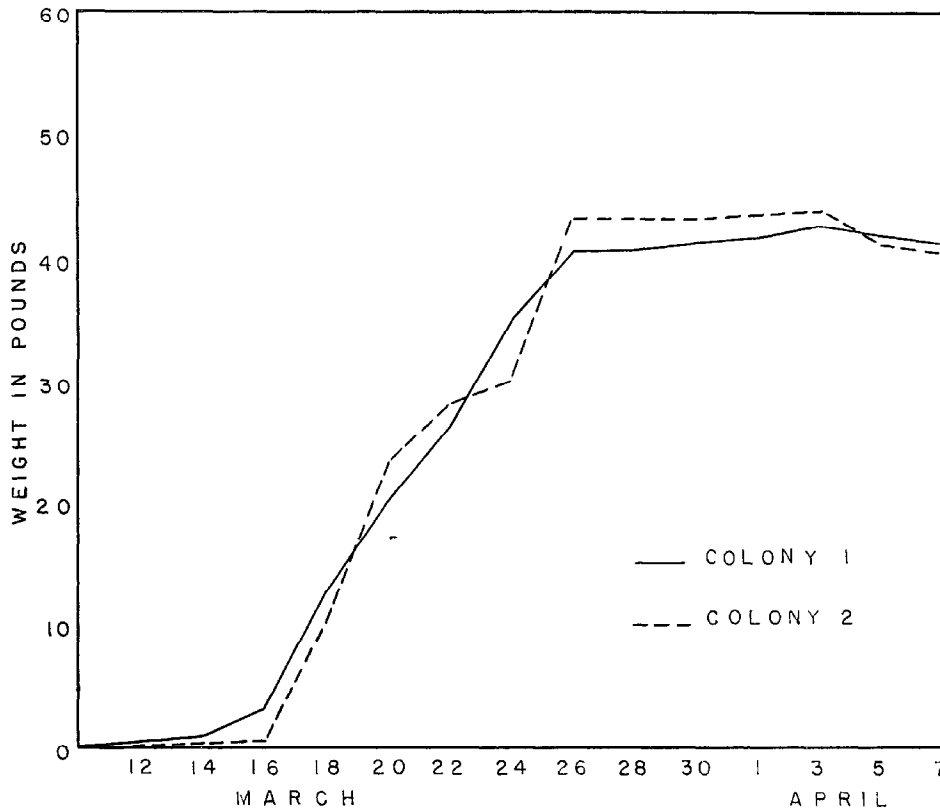


Figure 1.—Daily weight of two colonies of honeybees collecting nectar from a citrus grove sprayed with parathion.

The first spray application was made on March 14, 1951. The rate of application was two pounds of 15 percent wettable parathion in 100 gallons of water. This spray was applied at the rate of 35 gallons per tree. The temperature was about 50° F. when the spraying operation began and no bees were observed visiting the bloom at this time. However, by the time the spraying was completed, large numbers of bees were observed visiting the blooms. The second spray application was made on March 26, 1951, and this time there were bees working in the grove at the time the spraying operation began. The activity of the bees ceased for a period of several hours until the spraying operation had been completed and

spray residue had dried on the trees. Most of the blooms had already dropped from the trees and the nectar flow was about over when the second application was made, and this was undoubtedly the reason why little or no increase in weight was recorded after March 26. A graph showing the weights of these two colonies from March 12 through April 10 is shown in figure 1. Observations were made as to the number of dead bees found in front of the hives before and after the spray applications.

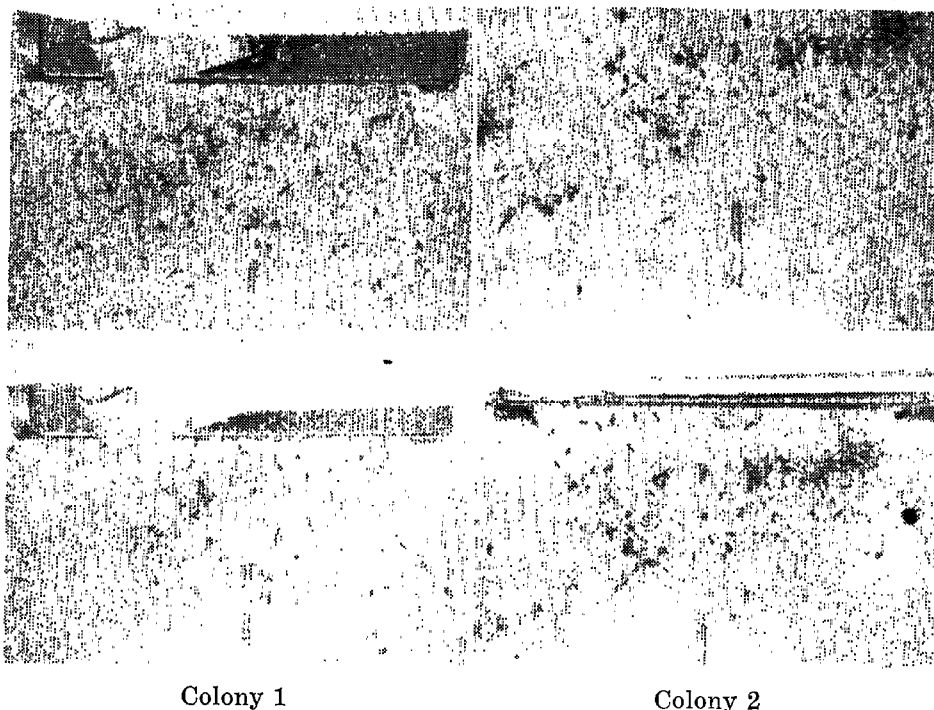


Figure 2.—Photographs of the ground in front of the scale colonies. Upper pictures one day before and lower pictures one day after first spray application.

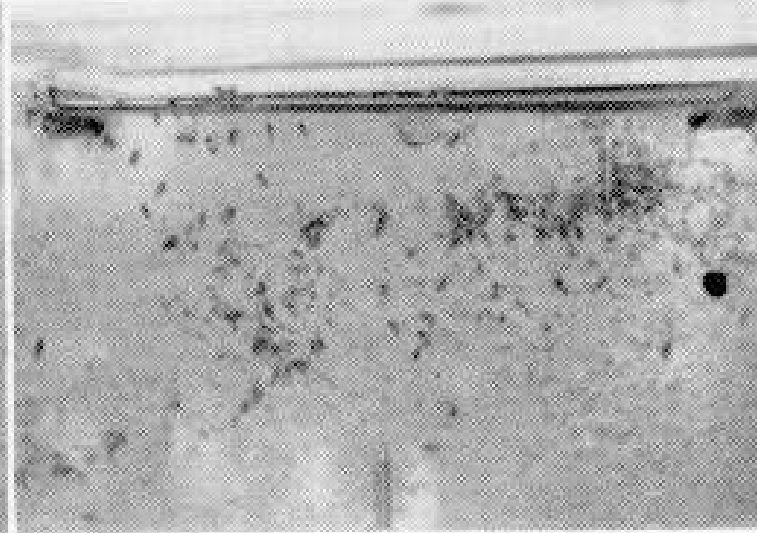
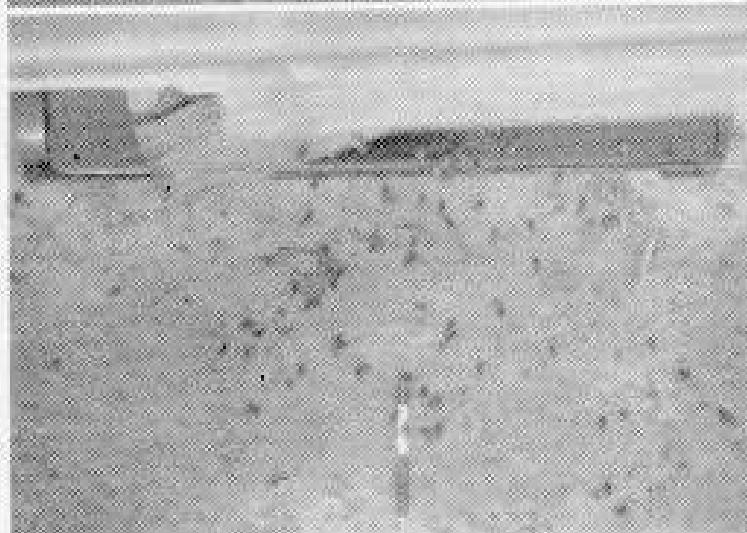
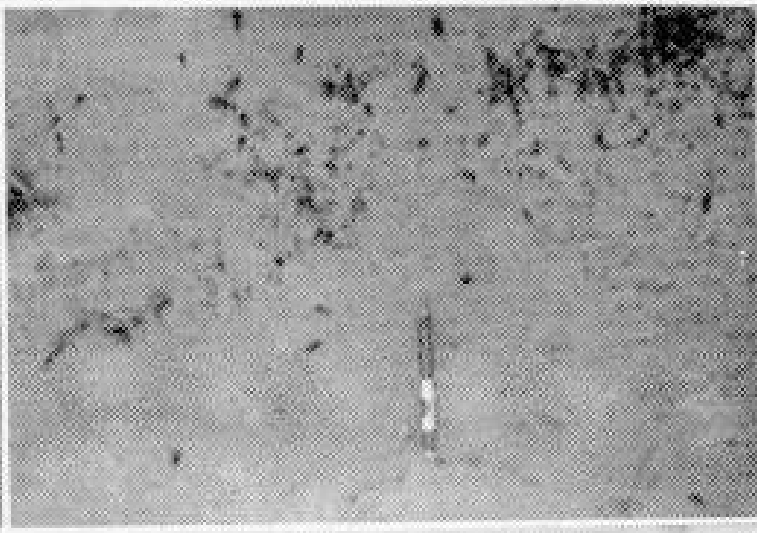
Photographs were taken of the ground immediately in front of the two scale colonies. In figure 2, the top pictures were taken one day before the first application of parathion, and the bottom pictures were taken one day after the grove was sprayed. After each observation was made the ground in front of the hives was cleared of dead bees and a close examination of these photographs shows little or no difference in the numbers of dead bees before and after the grove was sprayed. After failing to note any increase in death rate of adult bees at the hives, close examinations were made in sev-

eral locations in the grove to determine whether or not the field bees might be dying before they could return to the hives. This idea was abandoned after repeated examinations failed to disclose any larger numbers of dead bees than can be found in any citrus grove during the time the trees are in bloom.

Each colony was checked before the grove was sprayed as to the amounts of brood it had and each was checked again after the sprays had been applied. In no colony was any adverse effect observed on brood production. The queens all continued to lay eggs normally and the percent viability of the eggs remained unchanged. The sealed and unsealed brood matured normally and showed no signs of being affected in any way by parathion residue which might have been brought back to the colony by the field bees.

CONCLUSIONS

The results of these tests indicate that parathion sprays used in citrus groves do not present nearly as great a threat to honey bees as had been expected when this material first came into widespread use. This conclusion seems especially justified when one considers that in these tests the bees were in one case directly exposed to the spray material and in the other case they were working the blooms within three to four hours after the sprays had been applied—and yet even under these conditions there was no detectable adverse effect on the colonies. Unless the colonies of honey bees were in the grove at the time the spray applications were made there seems to be little danger that they would suffer any serious injury.



Colony 1

Colony 2