topics associated with grape production. In addition, some agents also are instructed in the best uses for the many different grape varieties whether these be wine, juice, jellies, fresh fruit or some other products.

Workshops. The art of winemaking is especially well suited to a workshop situation. The Food Science and Human Nutrition Department of IFAS has held one such workshop where participants first received formal training in wine production by lecture and were then led through the winemaking procedure from fruit crushing to tasting of the finished product. This program was well received and more are planned in the future.

Personal visits. Many personal visits to vineyards are made by county Extension personnel. Problems are discussed and solutions suggested. If the problem faced by the agent is complex, he may request consultation from the appropriate state Extension Specialist and when a site visit is necessary, it is planned so that the grower, agent and specialist are all present. In this way both grower and agent receive training.

Publications. Many different types of Extension publications are produced and disseminated for the Florida grape industry. A grape newsletter for growers offers production information and the latest insect and disease control recommendations. Other materials available to growers are Fact Sheets, research reports, variety releases, copies of relevant articles in the Florida State Horticultural Society Proceedings and in many magazines and trade journal articles. Such publications will continue to be used to inform growers of advances in grape production and utilization.

Mass media. This has been a very effective means of dispersing information to the public. Newspapers, radio, and T.V. programs are used to discuss the many and varied aspects of grape production. This presents information to the consuming public and helps make them aware of the grape industry.

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PERMETHRIN AS A CONTROL FOR THE PAPAYA FRUIT FLY[1,2]

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Additional index words. Toxotrypana curvicada.

Abstract. **Dipping papaya fruit fly,** Toxotrypana curvicada **Gerstaecker, adults in 0.01 lbs a.i. permethrin/100 gal water resulted in 100% mortality in less than a day. Adults were caged on papaya fruit which had been dipped in permethrin suspensions of 0.1, 0.2, and 0.4 lbs a.i./100 gal and air dried. After 24 hours mortality was 18, 45 and 65%, respectively, and was 55, 68 and 83% after 72 hours. There was no mortality of flies after 24 hours on untreated fruit and 18% after 72 hours. In a replicated experiment, where re-infestation of treated plots (64 plants each) probably influenced results, control averaged 64%. Control ranged from good to excellent in 3 large scale experiments in commercial plantings in which applications of 0.2 lbs a.i./A were made at 10-day intervals with an orchard air sprayer.**

The papaya fruit fly, *Toxotrypana curvicada* Gerstaecker, was first reported from Florida in 1914 by Knab and Yothers (3). They described the life stages of the insect, the damage it causes, and wrote that it ". . . presented a serious check to commercial development" of the papaya. Mason (5) described the life history of the papaya fruit fly, its habits and factors affecting its development and spread. Several writers have made suggestions for control of the papaya fruit fly ranging from use of DDT, sanitation and covering the fruit with paper bags (1, 2, 4). The materials and programs presently used to control the papaya fruit are not very effective or practical on a commercial level. Part of the difficulty stems from the fact that eggs are deposited and larvae develop within the fruit cavity where they are protected from insecticides. Another aspect of the problem is that the sensitivity of papayas to many insecticides, particularly phosphatic insecticides limits the choice of materials that can be used for control of the papaya fruit fly. The effectiveness of permethrin as a control for many flies gave us the idea that it might be useful as a control for the papaya fruit fly. We report on the results obtained from experiments made to explore this possibility.

Materials and Methods

Laboratory Studies: To measure acute toxicity, adult (5 male and 5 female) papaya fruit flies were dipped in suspensions of several concentrations of permethrin. Treated flies and 10 flies as an untreated check were caged and examined 24 hours later. As a measure of residual activity, mature green papaya fruit about 6″ in diameter were dipped in suspensions containing permethrin at rates of 0.1, 0.2 and 0.4 lbs ai/100 gal of water and air dried. Each treatment was replicated 4 times with each replicate consisting of 5 male and 5 female adults caged on a fruit. Mortality was recorded 24, 48 and 72 hrs later.

Field Studies. Field studies included one replicated experiment, conducted at AREC Homestead, and 3 large scale tests in commercial plantings. In all experiments, permethrin was used at the rate of 0.2 lb a.i./acre and applications were made at 10-day intervals. All sprays were applied with an orchard air sprayer. The replicated experiment compared 6 replications of sprayed and unsprayed plots. Each plot measured 48′ x 60′ and contained 4 rows of 16 plants each. Plots were separated from each other as far as possible (ranging from 300′ to 1300′) in order to minimize reinfestation of plots. Permethrin applications began on October 29 after the papaya fruit fly was established in most plots. Fruits were harvested weekly beginning on

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October 5 and all fruits were cut open to verify infestation. Records were taken on the number of infested and uninfested fruit harvested. The test was terminated on March 30.

Two large tests were conducted simultaneously with Grower A (2.6 acres) and Grower B (4.1 acres). Sprays were begun on June 4 and continued at 10-day intervals over a 5-month period. Samples of 200 immature fruit (ranging from 4 to 8 cm in diameter) were collected on June 5 and thereafter at approximately 5 week intervals until the end of October when the tests were terminated. Samples were placed in a fruit tower and the number of larvae which emerged was recorded.

The third field trial was conducted on 3.2 acres of papayas being grown for a fertilizer experiment. Transplants were set in the field on April 19-20. Permethrin applications were begun on July 10 and were continued at 10-day intervals until the experiment was terminated on April 9. Permethrin applications were started before there was evidence of papaya fruit fly infestation. Fruit were harvested weekly beginning October 13. Each fruit was examined externally for evidence of infestation.

Results and Discussion

The papaya fruit fly is not only difficult to control but it is also difficult to get definitive results on its control by standard small plot experimental procedures. The adult is a mobile insect capable of flying considerable distances, thus re-infestation of small treated plots is a problem likely to mask the efficacy of a good control. Furthermore, the size of the papaya plant dictates relatively large plots thus the problem of space compromises in number of treatments, replication and experimental design. These considerations account for the use of only 2 treatments and 6 replicates in one test and in the decision to spray the entire plantings in the experiments in commercial fields.

In preliminary laboratory tests, permethrin was shown to be toxic to the papaya fruit fly. Adults showed 100% mortality when dipped in suspensions of 0.01 a.i./100 gal which was the lowest dosage tested. Permethrin also showed considerable residual activity as shown by the results presented in Table 1. Males and females were affected equally. Because of the relatively slow kill, permethrin residues are not likely to have much effect on fruit infestations.

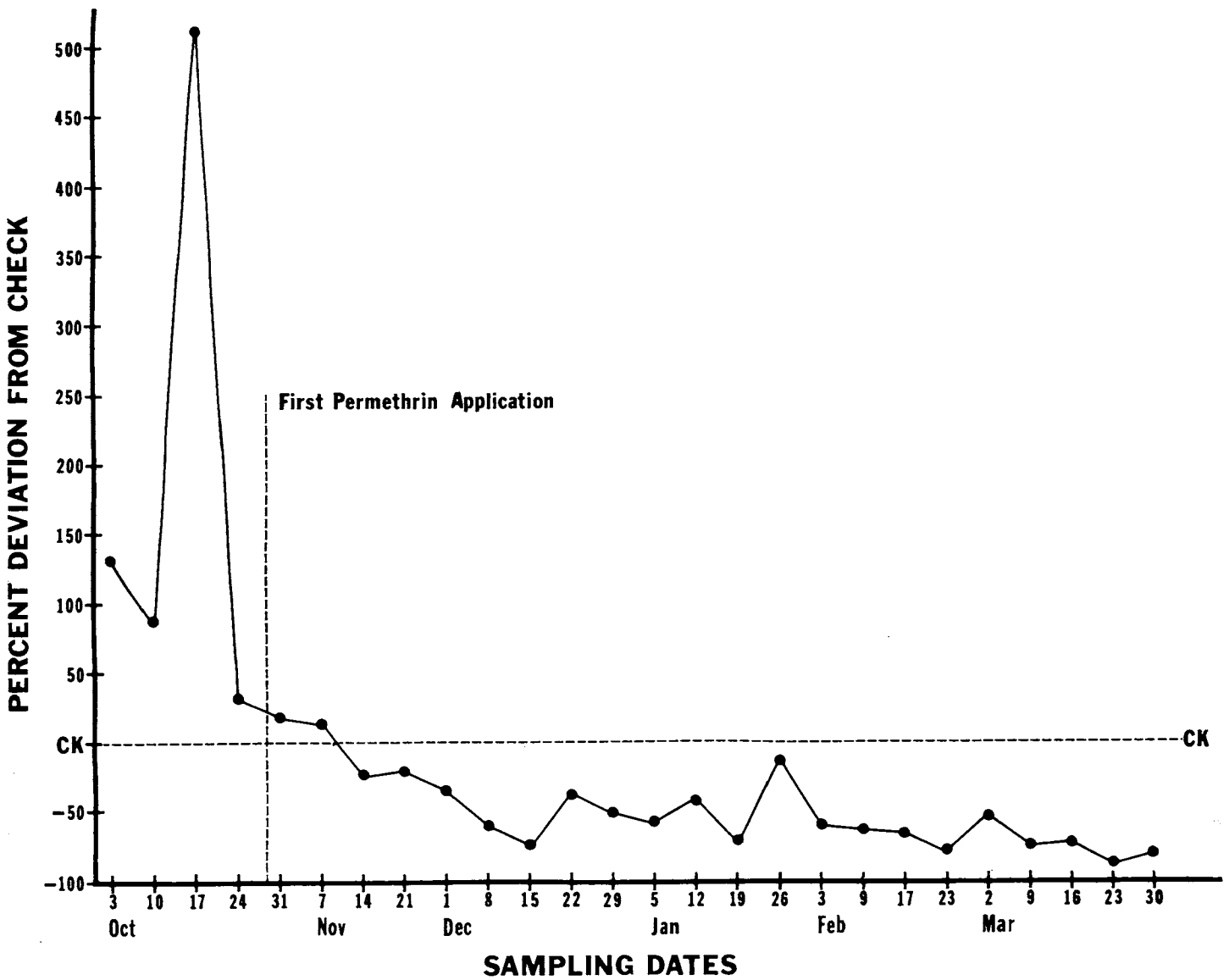

Fig. 1. Control of papaya fruit fly infestations with permethrin sprays. Depicted is the % deviation in numbers of infested fruit of permethrin-treated plots from untreated (check) plots for each sampling date.

Table 1. Percent mortality of adult papaya fruit flies caged on papaya fruit which had been dipped in permethrin and air dried. Figures are average of 4 replicates.

Permethrin lbs a.i./100 gal	% mortality[z] after 24 hrs	48 hrs	72 hrs
Check	0 a	8 a	18 a
0.1	18 b	48 a	55 a
0.2	45 c	50 a	68 a
0.4	65 d	73 b	83 b

[z]Means within a column followed by the same letter are not significantly different at the 5% level according to Duncan's Multiple Range Test.

The results of the replicated experiment are presented in Fig. 1. Initially the plots to be treated with permethrin (selected by chance) had a higher level of infestation than check plots. After permethrin applications were begun, numbers of infested fruit in treated plots declined steadily during November. Treated plots averaged 66% fewer infested fruit than the check plots from December 1 until the end of the experiment.

In the 2 experiments conducted in cooperation with Growers A and B, the number of larvae which emerged showed a large initial decline after 4 sprays after which the number remained low and relatively constant (Table 2). The larger number of maggots recovered in samples from Grower A's field on and after July 19 was probably due to a large planting of infested papayas about ¼ mile away. The field of Grower B was relatively isolated. Although untreated plots were not available for direct comparison, the figures in Table 2 are believed to reflect the effect of treatment of papaya fruit fly infestations since during the same period infestations in other plantings in the Homestead area remained high as they usually do as long as fruit is available.

Table 2. Control of papaya fruit fly with permethrin sprays in 2 commercial papaya plantings.

Date sample collected	No. emerged larvae Grower A	Grower B
June 5	1708	1604
July 19	89	0[z]
Aug 14	36	2
Sept 20	82	6
Oct 30	25	35

[z]Only 78 fruit in this sample. Other samples were 200 fruit.

Permethrin applications in the third field trial began before papaya fruit fly infestations were observed and were continued until the end of harvest. Under these conditions the papaya fruit fly never became established and not a single infested fruit was observed during the harvest period. Even though there was no unsprayed check for direct comparison, and because other plantings in the area were infested as usual, lack of infested fruit was the result of the treatment applied, in our opinion.

From the results of this work it appears that permethrin has real potential for control of the papaya fruit fly. Before a specific control program can be developed, however, more information is needed about minimum dosages and application schedules. Our results suggest that adults are most effectively killed by direct contact with the spray. Thus "space sprays" would be more effective than sprays directed only to the fruit. It appears that applications to a large area are more effective than to a small area—it is doubtful applications to the fruit on a few trees in the backyard would be helpful.

Permethrin is not labelled for use on papaya and it should not be used as a control for the papaya fruit fly until it is labelled for such usage. This report of experimental results is in no way to be considered as a suggestion of recommendation for its use as a control for the papaya fruit fly.

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GRAFTING ANNONAS IN SOUTHERN FLORIDA[1]

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Additional index words. Annonaceae, bud union, apical dominance, propagation, budwood preparation.

Abstract. **Spring is considered the best time of year for grafting Annonas (Annonaceae) in Southern Florida. Pregraft preparation of budwood on the tree and scion preparation off the tree, permitted grafting most of the year except when the trees were dormant during the winter months. Graft combinations tested showed higher rates of grafting success when using pregraft preparation for the budwood.**

Tropical fruits have less critical time periods during the year when they may be successfully grafted when contrasted with temperate fruits. However, many tropical fruit species do have an optimum time of year when higher percentage of graft take occurs (11). Weather conditions such as high temperatures, rainy or dry season, and fluctuations in humidity can have an influence on the condition of rootstocks and scions and subsequently the success of graft union (1, 6, 8). Also, the annual cycle of dormancy influences the success of the graft union in some species (11).

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