a great extent false economy. Any money spent on these groves will be better spent with adequate drainage and money cannot be spent to a better advantage than to secure it. This is the one big opportunity for these growers to increase production which will pay high dividends and allow them to continue to prosper in a highly competitive field.

# PROGRESS REPORT ON CONCENTRATED SPRAYS ON CITRUS IN FLORIDA

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Experiments on the use of concentrated sprays applied by the Hardie Mist Sprayer and the Speed Sprayer were reported for the first time by Griffiths, *et al.*,[2] in 1950. These machines were used to compare the effectiveness of concentrate sprays with that of dilute sprays applied both by hand pressure machines and Speed Sprayers. In general, satisfactory results were obtained with lime-sulfur, wettable sulfur, DN, zinc sulfate and lime, neutral copper, oil and parathion applied as concentrated sprays. This method of spraying produced as good quality fruit as that produced by dilute sprays. Twenty-five to 30 percent more spray material was deposited on foliage by concentrated sprays than by dilute sprays indicating that less spray material may be used per tree than with dilute sprays.

During the 1950-51 spray season, concentrated sprays were again compared with dilute sprays. In addition to previously tested materials, concentrated sprays of lead arsenate, borax and lime-sulfur were compared with dilute spray applications. The purpose of this paper is to present further results on the use of concentrated sprays on citrus.

The work reported here deals with experiments conducted during the latter part of 1950 and through October 1951 using the Speed Sprayer as a concentrate machine. In all cases the sprays were applied at one-eighth of the normal gallonage and at six to eight times the concentration normally used.

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1—Formerly Associate Entomologist.
2—Griffiths, James T., C. R. Stearns, Jr., and W. L. Thompson. Proceedings of the Florida State Horticultural Society. Vol. 63: 53-59. (1950).

## RESULTS

*Mite Control.*—Rust and purple mites were controlled as well with concentrated sprays as with the dilute sprays. In connection with an experiment with concentrated lime-sulfur solution (16 gal./100 gal.) which gave poor control of six spotted mites, the spray residue was observed to retain the light amber color of the stock lime-sulfur solution. This was quite different from the typical milky white residue obtained when a dilute lime-sulfur spray solution is used. The sprays were applied on grapefruit trees which had a considerable amount of tender growth and more burning of tender foliage was obtained with concentrated than with dilute sprays.

*Scale Control.*—On July 5, 1951, a parathion and oil experiment was carried out in a grove near Auburndale. Both materials were applied as concentrates at one-eighth the dilute gallonage and at six and eight times the normal concentrations. These were compared with dilute parathion and oil sprays applied with a hand machine and with a Speed Sprayer. Duplicate plots were used in all experiments.

The parathion was used at a concentration of 1⅔ pounds 15 percent wettable powder and the oil at a concentration of 1.3 gallons of actual oil per 100 gallons in the dilute spray plots. The concentrated sprays contained six and eight times these amounts. The Speed Sprayer with the single side delivery attachment was operated at one mile per hour. The results of this experiment are shown in Table 1. In this case purple scale control was satisfactory even where only 75 percent of the normal amount of oil was applied as a concentrated spray. Results reported earlier have indicated that poor scale control might occur when only 75 percent of the normal amount of oil is applied as a concentrated spray. When all the results of the experiments were taken into account, irregular control of scale apparently was obtained if only ¾ of the normal amount of oil is applied.

TABLE 1.
PURPLE SCALE CONTROL FOLLOWING THE USE OF DILUTE AND CONCENTRATED SPRAYS AT AUBURNDALE, FLORIDA, ON JULY 5, 1951.

| Treatment | Gallons Oil/Tree | % Reduction of Purple Scale | Pounds Parathion per Tree | % Reduction of Purple Scale |
|---|---|---|---|---|
| Speed Sprayer, dilute spray | .32<br>.33 | 96<br>100 | .05<br>.048 | 98<br>97 |
| Speed Sprayer, spray concentrated 6 times | .246<br>.246 | 92<br>94 | .047<br>.047 | 100<br>99 |
| Speed Sprayer, spray concentrated 8 times | .31<br>.33 | 97<br>98 | .06<br>.067 | 93<br>99 |
| Hand Machine, dilute spray | .35<br>.35 | 99<br>95 | .0698<br>.0678 | 95<br>100 |

Leaf drop was not severe following the July 5 spraying, and there was no significant difference in the amount of leaf drop between plots where either concentrated or dilute spray had been applied.

*Maturity Sprays.*—On May 10, 1951, a block of large seedy grapefruit trees was sprayed with lead arsenate and wettable sulfur. This block of trees had been randomly divided into two untreated control plots, three dilute spray plots and three concentrated spray plots. The dilute sprays which contained 1¼ pounds of lead arsenate and 10 pounds of wettable sulfur per 100 gallons were applied with a double head Speed Sprayer. The concentrated sprays contained 10 pounds of lead arsenate and 80 pounds of wettable sulfur per 100 gallons and were applied at one-eighth of the dilute gallonage with the double head Speed Sprayer.

The results, as shown in Table 2, represent the maturity analyses made at two different dates on fruit of size 126. The results are an average of the representative treatments. It appears that the concentrated sprays were as effective as the dilute lead arsenate sprays in lowering the citric acid content of the juice.

## Comparison of Dilute and Concentrated Sprays as Applied by A Commercial Caretaker

A cooperative experiment,[3] designed to compare the efficiency of concentrated sprays with that of dilute sprays when applied by a commercial caretaker, was undertaken on a 20-acre grove of Valencia oranges. In this grove one-half of the trees received dilute sprays and the other half received concentrated sprays. All sprays were applied with the Speed Sprayer. Mite and insect counts were made before and after each spray application as well as at certain intervals during the spray season. A combination sulfur, nutritional and melanose spray was applied on March 22, 1951. On June 5, 1951, a parathion-wettable sulfur spray was applied. This was followed by a wettable sulfur spray on July 26, 1951, and on September 4 parathion and wettable sulfur sprays were again applied.

All materials applied as dilute sprays were used at the usual recommended concentrations. When applied as concentrated sprays, the materials were used at eight times the dilute concentrations but at one-eighth of the dilute gallonage. The results of this experiment are in Table 3. Part A shows that, in general, most mite control was comparable in the two different spray areas; however, nine weeks after the last spray, a much higher infestation of rust mites was present in the section receiving the dilute sprays than in the section receiving the concentrated sprays. Part B shows that control of purple and red scales resulting from the application of both parathion sprays was as good or better with the concentrated sprays than with the dilute sprays.

3—The authors wish to express their appreciation for the assistance of Mr. Earle Wirt, Jr., grove owner, Babson Park, Florida and Mr. William Owen, caretaker, Frostproof, Florida.

TABLE 2.
RESULTS OF LEAD ARSENATE SPRAYS ON MATURITY OF SEEDY GRAPEFRUIT.

| Treatment | Juice Characteristics | | | | | |
|---|---|---|---|---|---|---|
| | Percent Soluble Solids | | Percent Titratable Acid | | Ratio of Soluble Solids to Acid | |
| | Sept. 19 | Oct. 8 | Sept. 19 | Oct. 8 | Sept. 19 | Oct. 8 |
| Check (Average 2 plots) Unsprayed | 8.55 | 8.70 | 1.59 | 1.54 | 5.39 | 5.67 |
| Dilute (Average 3 plots) Sprays[1] | 8.57 | 8.64 | 1.45 | 1.38 | 5.91 | 6.27 |
| Concentrate (Average 3 plots) Sprays[2] | 8.43 | 8.30 | 1.45 | 1.34 | 5.84 | 6.23 |

1—1¼ lbs. lead arsenate and 10 lbs. wettable sulfur per 100 gallons in dilute sprays.
2—10 lbs. lead arsenate and 80 lbs. wettable sulfur per 100 gallons in concentrated sprays.

TABLE 3.
A COMPARISON OF DILUTE AND CONCENTRATED SPRAYS AS APPLIED BY A COMMERCIAL CARETAKER AT BABSON PARK.

A. Rust Mite Control (Percent Infested Fruit)

| Dates | 3-19 | 5-11 | 5-31 | 6-26 | 7-20 | 8-27 | 10-13 | 10-30 |
|---|---|---|---|---|---|---|---|---|
| Dilute | 6 | 0 | 0 | 2 | 6 | 2 | 4 | 57 |
| Concentrate (8 times) | 4 | 0 | 0 | 2 | 13 | 8 | 3 | 22 |

B. Scale Control (Percent Reduction in Infested Leaves)

| Dates | Purple | | Red | |
|---|---|---|---|---|
| | 6-27[1] | 10-4[2] | 6-27[1] | 10.4[2] |
| Dilute | 72 | 88 | 82 | 94 |
| Concentrate | 80 | 99 | 88 | 94 |

1—Sprays applied June 5.
2—Sprays applied September 4.

## Discussion

During 1950-51 further work with concentrated sprays was carried on and it appeared that almost all of the spray materials used on citrus can be applied successfully in concentrated form. However, the application of concentrated lime-sulfur sprays may lead to more injury to fruit and foliage, particularly during hot weather and when tender growth is present on the trees. Although only one experiment was carried out for control of six-spotted mites with concentrated and dilute lime-sulfur sprays the control obtained with the concentrated sprays was not satisfactory.

The use of concentrated sprays can result in a savings to the grower because less insecticide in needed per tree. In all cases whenever 75 percent of the normal amount of insecticide was applied as concentrated spray, satisfactory results were obtained except with oil emulsions.

In addition to material savings are the other possible savings in operation and equipment that should result in a lower cost for application of spray materials. One supply unit should be able to supply at least two, and possibly three, concentrate sprayers if the water haul is not too long. One cooperative caretaking organization has reduced their charge for applying spray materials about 40 percent when using concentrate sprays. The reduction was made on the premise that there was less capital investment in equipment involved, less operational costs of machinery and less labor cost. Also the fact that the application of concentrated sprays required less time meant more efficient use of spray equipment. This organization very rarely applied more than 35 tanks of dilute spray in one day using two supply units, yet an average of six tanks of concentrated spray has been applied with one supply unit. These six tanks of concentrated spray were equivalent to 48 tanks of dilute spray.

## Summary and Conclusions

Concentrated sprays, which have been used experimentally for three years and tried out commercially for one year, appear to produce as satisfactory results as dilute sprays with most spray materials.

A reduction in spray material of 25 percent when concentrated sprays were tested did not result in inferior insect control. It was concluded that a practical ratio for concentrated sprays would be to use six times the concentration and one-eighth the gallonage normally used for dilute sprays. This would result in applying only 75 percent as much actual insecticide per tree and would represent a real saving to the grower. Oil was the one material that gave irregular results when only 75 percent of the normal amount was used.

# A COMPARISON OF OIL EMULSION AND PARATHION FOR THE CONTROL OF SCALE INSECTS ON CITRUS

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For many years oil emulsions have been used for the control of scale insects, but parathion is a comparatively new insecticide which

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has been used on citrus for only four years. Experimental work with parathion was started in 1947 (7) and progress reports were given before the Florida State Horticultural Society in 1948 (8) and 1949 (9). This report is a summary of the comparative work accomplished during the past four years with parathion and oil emulsions. Oil emulsions are very good insecticides, but it is now well known that they have deleterious effects on both trees and fruit. In comparison, parathion has not, as yet, shown the same deleterious effects as oil emulsions. In this paper an attempt will be made to compare some of the advantages and disadvantages of each insecticide. Since there are several phases of the work to be considered, each phase will be discussed very briefly. In all the experimental work reported here, the oil emulsions were applied at a concentration of 1.3 percent actual oil and, except where two or more applications were made, the parathion was used at a concentration of 1⅔ pounds of a 15-percent wettable powder per 100 gallons of spray. Wettable sulfur was combined with parathion in all sprays.

TABLE 1.
PURPLE AND FLORIDA RED SCALE INFESTATIONS IN SPRING AND FALL FOLLOWING OIL EMULSION AND PARATHION SPRAYS

Percent Infested Leaves

| Periods of Applications | March 1950 | | November 1951 | | March 1951 | | October 1951 | |
|---|---|---|---|---|---|---|---|---|
| | Oil | Parathion | Oil | Parathion | Oil | Parathion | Oil | Parathion |
| **Purple Scale** | | | | | | | | |
| Post-bloom[1] | 50 | 49 | 18 | 19 | 28 | 15 | 11 | 6 |
| Summer[2] | 36 | 20 | 6 | 4 | 5 | 3 | 3 | 2 |
| Fall & Winter[3] | 32 | 21 | 16 | 16 | 4 | 2 | 14 | 10 |
| Averages | 39.3 | 30.0 | 13.3 | 13.0 | 12.3 | 6.6 | 9.3 | 6.0 |
| **Florida Red Scale** | | | | | | | | |
| Post-bloom | 6 | 3 | 15 | 17 | 3 | 2 | 26 | 25 |
| Summer | 3 | 2 | 7 | 7 | 2 | 1 | 11 | 17 |
| Fall & Winter | 7 | 3 | 20 | 20 | 2 | 1 | 38 | 35 |
| Averages | 5.6 | 2.6 | 14.0 | 14.6 | 2.6 | 1.3 | 25 | 25.6 |

Experiment started in July of 1948.
1—Post-bloom = March and April
2—Summer = July, August and September
3—Fall and Winter = October through February

Where one application was made per year of either oil or parathion, the parathion-sprayed plots had slightly less scale than plots sprayed with an oil emulsion. Table 1 shows the percentages of infested leaves in the spring and fall of 1950 and 1951 on grapefruit trees which had been sprayed with either oil or parathion for a period of four years. These data indicate that parathion has been as effective as an oil emulsion. However, in October 1951, in a Pineapple orange block where a somewhat similar experiment is being conducted, the Florida red scales were more numerous on the parathion-sprayed plots. It was also found, in some cases, that parathion did not control red scale on tree tops as well as an oil emulsion.

## Control of Scale Insects

The control of scale insects varied with the same product during the same season as well as in different years. Over a period of four years the degree of control of purple scales *Lepidosaphes beckii* (Newm.) and Florida red scales *Chrysomphalus aonidum* (L.) has been similar with oil emulsions and with parathion. On the basis of initial reduction, oil emulsions have been slightly more effective than parathion where applications were made during the spring and winter months, but parathion was slightly more effective when applied during the summer months. However, several months after the applications, the differences in favor of oil were not apparent as shown in Table 1.

The timing of either oil or parathion sprays is a factor in the number of scales present during the different periods of the year. It has been reported previously (5) that a longer period of control had been obtained where the scalicides were applied during the summer. Table 1, under purple scale, shows that the lowest average infestations were in plots sprayed during the summer, and the heaviest infestations were in plots sprayed during the post-bloom season.

wood was pruned from Pineapple orange trees where oil had been used than from trees sprayed with parathion. This same trend is apparent in grapefruit trees. In 1949 an average of four pounds more dead wood was pruned from oil-sprayed trees than from those sprayed with parathion, and in 1950 there was one pound more per tree in the oil-sprayed plots. These comparisons were made by weighing the prunings from 84 trees sprayed with oil and from a similar number sprayed with parathion. The most dead wood, regardless of the scalicide, was pruned from trees where scale control was delayed until the period from September through February.

TABLE 3.
COMPARISONS OF PRODUCTION OF PINEAPPLE ORANGES WHEN PARATHION AND OIL EMULSION WERE USED FOR SCALE CONTROL

| Month Sprayed | Figures Express Average Number of Pounds per Tree 1948-49 | | 1949-50 | | 1950-51 | | 3 yr. Ave. 1948-51 | |
|---|---|---|---|---|---|---|---|---|
| | Oil | Parathion | Oil | Parathion | Oil | Parathion | Oil | Parathion |
| April | 712 | 622 | 269 | 338 | 588 | 688 | 532 | 549 |
| July | 562 | 638 | 303 | 394 | 625 | 738 | 497 | 590 |
| August | 403 | 544 | 156 | 412 | 488 | 788 | 349 | 581 |
| September | 525 | 562 | 206 | 238 | 650 | 681 | 460 | 494 |
| Averages | 550 | 592 | 234 | 346 | 588 | 724 | 457 | 554 |

First Parathion Sprays applied April, 1948.

Oil sprays applied during the period between October and January sometimes affect the trees in such a way that only a partial crop is set the following year. For example, where an oil spray was applied on October 30, 1942, 40 percent less fruit grew in those plots the next year than the average for the whole block of trees, and where the sprays were applied on December 1, 20 percent less fruit was borne. In 1949 where oil sprays were applied in either October, November or December in a grapefruit grove fewer fruits were set on the trees in 1950 than where parathion had been applied. There was actually little or no difference in the number of boxes picked from the various plots, because where the crop was light, the fruit was much larger. For instance, in the October oil-sprayed plot, 45 percent of fruit was in the size range of 54's and larger compared to 16 percent in the same size range where parathion was used. However, there was no difference in fruit sizes between oil and parathion-sprayed plots where the applications were made between March and September.

Regarding production in the experimental blocks it has been observed that where parathion has been applied for three successive years on Pineapple oranges, there is a trend to higher production compared to the production of the oil sprayed trees. Before the experiment was started all of the trees had been sprayed annually with an oil emulsion and the differences in production mentioned above are likely due to eliminating the harmful effects of the oil sprays rather than to any particular properties of parathion. Regardless of the time of the year the sprays were applied, the parathion-sprayed trees had a higher production than those sprayed with oil (Table 3). The 1951-52 crop has been estimated to be as large in the parathion-sprayed plots as in oil-sprayed plots.

*Effect of Oil and Parathion on Fruit Quality.*—Since internal quality of the fruit is of prime importance, use of a spray that does not adversely affect it is desirable. Previous reports have shown that oil sprays are likely to prevent the formation of maximum soluble solids (Brix) content of the juice (3, 4, 6, 10). Oil sprays applied in August, September, or October are usually associated with the greatest reduction in soluble solids content, but they may reduce the soluble solids if applied at any time after the fruit has set. Two oil sprays have affected the soluble solids adversely to a higher degree than one application. In contrast, fruit from trees sprayed with parathion have shown no marked decrease in soluble solids content irrespective of the time of application. The following conclusions are based on the results of the past three years' work to ascertain the effect of timing of parathion or oil sprays on internal fruit quality.

The soluble solids content of Pineapple oranges from trees sprayed with parathion in July averaged about one full Brix unit higher than fruit from trees sprayed with oil at the same time, or an increase of approximately 9 percent. The same differential in soluble solids content existed in Pineapple oranges

from trees sprayed with copper-parathion and those from trees sprayed with copper-oil in April, followed with a second oil or parathion spray in July.

The same general trends were apparent in the results from sprayed grapefruit trees except that grapefruit trees are not affected as adversely by oil sprays and therefore the differential in soluble solids content between the parathion and oil-sprayed trees was not as great.

The Vitamin C content of Excelsior grapefruit and Pineapple oranges has not been affected unfavorably by the time of parathion sprayings. Fruit produced by Pineapple orange trees sprayed with parathion compared with fruit produced by trees sprayed with oil emulsion was found to contain approximately 9 percent more Vitamin C. In two out of three years' tests with Excelsior grapefruit, no differences were found between fruit from trees sprayed with parathion and those sprayed with an oil emulsion. However, during the 1949-50 season fruit from trees sprayed with oil emulsion contained approximately 6 percent less Vitamin C per 100 ml. of juice than fruit sprayed at the same time with parathion.

No significant differences were found over the three-year period in juice content of Excelsior grapefruit or Pineapple oranges between fruit from parathion-sprayed and oil-sprayed trees.

Fruit quality from the outside appearance was considered because a high degree of color is desirable on fruit for the fresh fruit market. On an average, fruits from trees sprayed with oil have not had as deep a color as fruit from unsprayed trees or those sprayed with parathion. Degreening of oranges and grapefruit sometimes were retarded when the oil was applied as early as July. The degreening tests made in 1951 substantiated previous work (8, 9). In Table 4 are shown results of degreening tests made in October 1951, with Excelsior grapefruit. Without exception there was a higher percentage of fruit classed as well to fairly well colored from the parathion-sprayed plots than in those sprayed with oil. When the sprays were delayed until September, the color in all plots was affected by the presence of purple scale on the fruit, which prevented degreening where the scales were attached. A shorter time in the coloring room is desirable from the standpoint of packinghouse capacity and keeping qualities of the fruit. After being in the coloring room for 48 hours, the fruit from the parathion-sprayed plots had degreened much more than fruit from the oil-sprayed plots.

It was hoped that a small amount of oil combined with parathion would not hinder degreening, but apparently it will when applied as late as September. Where oil sprays were applied to grapefruit trees on September 18

TABLE 4.

DEGREENING OF GRAPEFRUIT WITH ETHYLENE GAS FOLLOWING OIL AND PARATHION SPRAYS. FRUIT PICKED OCTOBER 8, 1951. FIGURES EXPRESSED IN PERCENT.

| Date | Spray Application | 48 hrs. in coloring room | | | 65 hours in coloring room | | | 72 hours in coloring room | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Well Colored | Fairly Well Colored | Slightly Colored to Green | Well Colored | Fairly Well Colored | Slightly Colored to Green | Well Colored | Fairly Well Colored | Slightly Colored to Green |
| July 15 | Oil Emulsion (1.3% actual oil) | 4 | 71 | 25 | 16 | 84 | 0 | 62 | 38 | 0 |
| | Parathion (15%) 1.66 lbs. per 100 gals. | 57 | 43 | 0 | 77 | 23 | 0 | 97 | 3 | 0 |
| August 15 | Oil Emulsion (1.3% actual oil) | 18 | 68 | 14 | 25 | 74 | 1 | 70 | 30 | 0 |
| | Parathion (15%) 1.66 lbs. per 100 gals. | 28 | 70 | 2 | 47 | 52 | 1 | 79 | 21 | 0 |
| September 15 | Oil Emulsion (1.3% actual oil) | 7 | 48 | 45 | 16 | 51 | 33 | 25 | 56 | 19 |
| | Parathion (15%) 1.66 lbs. per 100 gals. | 6 | 69 | 25 | 21 | 73 | 6 | 59 | 31 | 10 |
| | No treatment | 32 | 63 | 4 | 59 | 40 | 1 | 81 | 19 | 0 |
| September 18 | Oil Emulsion (1.5% actual oil) | 0 | 0 | 100 | 0 | 39 | 61 | 12 | 41 | 47 |
| September 18 | Oil Emulsion (1.3% actual oil) | 0 | 15 | 85 | 3 | 46 | 51 | 9 | 47 | 44 |
| September 18 | Oil Emulsion (0.5% actual oil) & Parathion (15%) 1 lb. per 100 gals. | 0 | 39 | 61 | 17 | 57 | 26 | 42 | 39 | 19 |
| September 18 | Oil Emulsion (0.4% actual oil) & Parathion (15%) 1 lb. per 100 gals. | 2 | 37 | 61 | 16 | 69 | 15 | 51 | 47 | 2 |
| September 18 | Parathion 1.66 lbs. & Wettable sulfur 10 lbs., each per 100 gals. | 6 | 50 | 44 | 57 | 43 | 0 | 73 | 27 | 0 |

and the fruit picked on October 8, degreening was affected with as little as .4 percent of actual oil. However, as the percentage of oil was decreased, the effect on degreening was lessened. Where 1.5 percent oil was applied, 39 percent of the fruit was fairly well colored after 65 hours in the coloring room, compared to 49 percent with the same degree of color where 1.3 percent oil was applied. In contrast, where the oil concentration was reduced to 0.5 percent and 0.4 percent respectively, there was 74 and 85 percent in the well to fairly well colored grades, but where parathion alone was applied 100 percent of the fruit was in the well to fairly well colored classification (Table 4).

### Disadvantages of Parathion

The distinct disadvantage of using parathion is the hazard to the men working with it. However, it has been demonstrated in commercial operations that parathion can be used with the minimum amount of danger if the recommended precautions are taken. It is strongly recommended that Florida Agricultural Experiment Station Bulletin 479 (1) and a study on the health status of parathion when used on citrus (2) be read by those who expect to use parathion. Parathion at the recommended dosage is also somewhat more expensive per 100 gallons of dilute spray than the average oil emulsion.

Weather conditions should be favorable when parathion is applied. The results of experimental work indicate that parathion is not very effective when applied during a period of even slightly windy weather (15 mile wind), nor should it be applied when the temperature is below 65° F. Failures of scale control have been reported where rain fell one to three hours after a parathion application. In comparison oil emulsion sprays are usually effective if the foliage has dried before a rainfall occurs.

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# SOME RESULTS OF IRRIGATION RESEARCH WITH FLORIDA CITRUS

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The simple practice of supplying water in addition to that provided by rainfall for crop production has been used by Florida citrus growers for many years. Problems concerning irrigation may be classified into three general categories: those related to delivery and application of irrigation water, those which are specifically concerned with the soil, and those which are related to the plant itself. The discussion in this paper is primarily concerned with the latter, since they are of considerable importance to the growers, and since only a minimum of information is available. Irrigation problems and results of experimental work as discussed here apply more specifically to the central ridge citrus section of Florida than to the coastal sections of the state.

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### Procedure and Results

In an attempt to learn more about the reaction of citrus trees to varying conditions of soil moisture, three different types of irrigation studies have thus far been undertaken. The first two of these studies were of short duration, and have already been terminated. The third one, however, will be continued for a number of years.