bringing about price declines. Other effective curbs on credit can be accomplished through regulations imposed on the banking system, through the facilities of the Federal Reserve System.

The possibilities of increasing taxes to check inflationary pressure has been recognized by the present administration and the realities thereof will be apparent when the monthly pay check comes in tomorrow. Increased income taxes not only reduce consumer buying power, but avoid the inflationary effects of deficit financing through the media of Treasury bonds. Yet, as an anti-inflationary measure, taxation has the fundamental disadvantage of being extremely unpopular. As a result, it is difficult politically to increase the taxation rate to the extent necessary to affect consumer demand and in turn the general level of prices. It is doubtful, therefore, if we shall have the fortitude to put partial mobilization on a pay-as-you-go basis, and consequently the net effect will be inflationary.

To summarize, the over-all effect of partial mobilization on the Florida fruit and vegetable industry will be to provide a stronger demand for products than would otherwise exist. Production costs will increase, but no serious shortages are expected in materials and labor. There is nothing in the current or future situation to warrant price controls or consumer rationing. If they appear to be needed, the best method of handling is by controlling the general price level through tightening over-all credit controls and increased taxation rather than by interfering with the pricing mechanism.

How far we shall go in credit controls or taxation I do not know, but of this I am sure; if we do the job which is now before us—as it should be done—our sacrifices are going to have to match our hopes and aspirations for peace.

CITRUS SECTION

THE EFFECT OF 2, 4-D ON PRE-HARVEST DROP OF CITRUS FRUIT UNDER FLORIDA CONDITIONS

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Pre-harvest drop of citrus fruit during some seasons reaches a high percentage of the total crop in certain varieties. Midseason varieties, such as Pineapple and seedling sweet oranges, are generally considered the most prone to heavy pre-harvest dropping. Periods of warm, dry weather during the fall and winter months favor fruit shedding. Losses from this cause may constitute as much as one-third of the total crop and are rarely less than 15 percent. The Valencia variety is not considered such a bad dropper, and indeed fruits rarely fall in such large numbers within a short time as is frequently observed with Pineapple orange near the end of its maturity season. However, the drop extends over a much longer period in

the case of Valencias, so that the total losses in this variety also may be very heavy. The rapid decay of grounded fruit and also the covering-up of such fruit from time to time by grove disking serves to hide from the grower the magnitude of the losses during a prolonged dropping period.

Following the successful use of naphthaleneacetic acid and naphthaleneacetamide to control pre-harvest drop of apples (3), it was reported by Gardner in 1941 (1) that these compounds also could be used to materially lessen the drop of Pineapple oranges in Florida. However, the relatively high concentrations required and the fact that the materials were not found to be effective applied later than November, made the discovery of doubtful practical value. More recently the findings of Stewart and his associates in California have shown that 2,4-D is much more potent in controlling the drop of citrus fruits and, as a result, its use is gaining wide acceptance in that State. Stewart and Klotz (4) sprayed Valencia orange trees in May with a 2,4-D derivative (diethanolammonium 2,4-dichlorophenoxyacetate) in concentrations of from 5 to 40 p.p.m. and reported a decrease in fruit drop, compared with the controls, of up to 55 percent at 40 p.p.m. On Marsh grapefruit Stewart and Parker (5) used the same compound in June in concentrations of 5, 25, 75, and 225 p.p.m and obtained nearly as good control with the two lower concentrations as with the higher ones; both of the latter caused rather severe foliage damage. It should be noted that the sprays applied in May and June are just prior to harvest period of these varieties in California. The trees at this time would be in a very active condition. This situation will be referred to later, as it may have a bearing on the divergent results secured in the studies here reported with sprays applied in the fall and winter months.

1948 Experiments

Sprays of 2,4-D and several other hormone compounds were applied to Pineapple and Valencia oranges. Trees were chosen for their comparable size and crop in blocks of six. Blocks were replicated ten times and within each block the following six treatments were applied to single-tree plots: (1) 2-methyl 4-bromophenoxyacetic acid; (2) 2-methyl phenoxy alpha-butyric acid; (3) 2-methyl 4-chlorophenoxyacetic acid; (4) sodium salt of 2,4-D, all four materials being applied as sprays at concentrations of 20 p.p.m. of 2,4-D acid equivalent; (5) isopropyl ester of 2,4-D incorporated with dusting sulphur and used as a dust, also at the rate of 20 p.p.m. of 2,4-D; (6) control plots receiving no spray or dust.

Sprays were applied on October 15 by a ground crew with conventional high-pressure rig. Thorough coverage was

TABLE 1.
THE EFFECT OF SEVERAL HORMONE COMPOUNDS ON PRE-HARVEST DROP OF CITRUS.

Treatments Applied October 15, 1948 Conc. 20 p.p.m. Free Acid Equiv.	Applied As	Pre-harvest Drop in Percent of Total Crop		
		Pineapple	Valencia (+Splits)	Valencia (−Splits)
2-meth. 4-chloro phenoxyacetic	Spray	24.3	37.4	30.9
2-meth. phenoxy alpha-butryic	Spray	26.2	43.5	31.1
2-meth. 4-bromophenoxyacetic	Spray	25.1	36.2	28.3
2,4-D (isopropyl ester) in sulphur	Dust	21.3[1]	28.7	21.4
2,4-D (sodium salt)	Spray	16.3[1]	36.4	28.8
Control	.....	28.6	32.3	24.3

[1]Statistically significant. Difference between means of 6.9 required for significance at 1% level.

obtained with 15 gals. of spray per tree. Temperatures during the time of application ranged from 74° to 82° F. The dust treatments were applied on October 19, a still day on which the temperature varied from 74° to 77° F. All previous drops were removed from beneath the trees and subsequently all drops were gathered and counted, beginning November 1 and at weekly intervals thereafter until the crops were harvested, the Pineapple oranges on February 14 and the Valencias on May 4.

The first three compounds listed in table 1 had previously been found to be very effective (in a class with 2,4-D) in delaying abscission of Coleus petioles—a test used by Gardner and Cooper (2) to screen a large number of compounds for effect on abscission. It is evident that none of the three had any influence in controlling the drop of either of these orange varieties. The data in table 1, however, serve to show the very heavy fruit drop frequently encountered in Florida citrus, and that 2,4-D applications effected an appreciable control of this drop in Pineapple oranges but not in Valencias. The reduction in drop of the Pineapple oranges with the 2,4-D spray amounted to 43.1 percent of the drop from the control trees. The dust application was less effective, due probably to the poorer coverage than can be obtained with sprays.

Fruit splitting in the Valencias was quite severe during the fall and winter of 1948 in this test grove and therefore all Valencia drops were separated as to split and sound fruit and counted separately. The subtraction of splits from the total drops as presented in the Valencia section in table 1 did not alter the conclusion that 2,4-D had no effect on drop in this variety. Neither was there any influence of this compound on the amount of splitting.

1949 Experiments

Because of the frequent use of wettable sulphur sprays in Florida for rust-mite control, it was important to learn if 2,4-D could be added to such sprays instead of making a separate application. The 1949 experiments were designed to test this point, as well as to investigate the possibility of higher concentrations of 2,4-D. Both Pineapple and Valencia varieties were included in these tests, which included 6 treatments with 10 replications. The 2,4-D (sodium salt) was used at 25 and 50 p.p.m., both with and without wettable sulphur (10 lbs. per 100 gal.) Dual control treatments were set up consisting of (a) no spray and (b) sulphur only.

Table 2 discloses a very appreciable

TABLE 2.

THE EFFECT OF 2,4-D WITH AND WITHOUT SULPHUR ON PRE-HARVEST DROP OF PINEAPPLE AND VALENCIA ORANGES.

Treatments—Sprays Applied December 19, 1949	Drop in Percent of Total Crop	
	Pineapple Picked Feb. 13	Valencia Picked May 5
Control—(no spray)	16.8	14.7
Control—wettable sulphur only	18.7	15.4
2,4-D at 25 p.p.m.	6.8[1]	17.9
2,4-D at 25 p.p.m. with sulphur	6.1[1]	17.4
2,4-D at 50 p.p.m.	4.0[1]	19.8
2,4-D at 50 p.p.m. with sulphur	5.3[1]	14.0

[1]Statistically significant. Difference between means of 5.88 needed for significance at the 1% level.

and highly significant reduction of fruit drop in the case of Pineapple oranges at both concentrations of 2,4-D. The higher concentration (50 p.p.m.), while appearing to be the more effective, is not significantly so, and the use of this high concentration would not seem justified. In this experiment the use of 25 p.p.m. resulted in a saving of 1.7 boxes of fruit per tree, compared with the average drop of the controls.[1]

It is evident from table 2 that 2,4-D can be combined with wettable sulphur without loss of effectiveness. Apparently there is considerable leeway in the timing of the 2,4-D application (October, November, or December) and combining it with wettable sulphur will rarely present interference with the timing needed for rust mite control.

The 1949 trials with 2,4-D, like those in 1948, were without effect on Valencias. These results are in marked contradiction to those reported from California with this variety. Until more work is done with Florida Valencias, the reason for this disagreement in results can only be surmised. Trees sprayed in May or June in California are in a much more active condition than the trees in Florida that were sprayed in the fall and winter. It is possible that the difference in time of spray application is responsible and that earlier application would be effective in Florida. If this is the correct explanation, it is strange that the Florida Pineapple trees respond so markedly to 2,4-D at any time during their dormant period.

Effect On Other Varieties

Sweet seedling oranges, Temples, and Marsh grapefruit were also sprayed in 1949. The treatments consisted of controls and 2,4-D sprays at 25 and 50 p.p.m. without wettable sulphur. Each treatment was applied to single-tree plots with 10 replications. Unfortunately, picking crews harvested the crops without notifying the experimenters and thus no record of the amount of crop on the trees at picking date was obtained on which to base percentages of drop. With only the week-by-week pick-up record of dropped fruit from the sprayed and non-sprayed trees, no definite statement can be made as to the effectiveness of the sprays on these three varieties. The partial data, however, suggest that 2,4-D was reasonably effective on sweet seedlings and Temple oranges but was not at all effective on Marsh grapefruit.

Injury To Citrus From 2,4-D

Fall and winter applications of 2,4-D at a time when young growth is not present and not anticipated for some weeks to come, have not resulted in any observable effect on the foliage on the tree at the time. In the following spring when new foliage appears there are nearly always a few leaves to be found that show 2,4-D effects. This is true almost regardless of the weakness of the concentration used. The deformed leaves are few in number and may not appear except on occasional trees, and they are not cause for alarm.

The lack of damage from low concentrations of 2,4-D should not lull the grower into the belief that high concentrations can be safely applied to or around citrus. A disastrous instance was observed in which 2,4-D at 1000 p.p.m. was applied to eradicate a dense stand of *Callicarpa americana*, growing as a weed in a block of Pineapple oranges on Rough lemon roots. The application was made in midsummer and care was taken to avoid spraying the trees directly. A heavy rain shortly thereafter

[1] A concentration of 25 p.p.m. of 2,4-D was made by adding 2.1 oz. of the commercial sodium salt (83 percent 2,4-D equivalent) to 500 gal. of spray. Because it is readily soluble in water, it was added directly to the spray tank and agitated briefly before application.

washed the 2,4-D down to the Rough lemon roots and resulted in severe damage and eventual death of the trees. The same weed in another grove nearby was treated in the same manner with the same spray and on the same day. This grove was on sour orange roots and in somewhat heavier soil. It escaped any visual damage. Presumably the difference in response can be attributed chiefly to the difference in rootstock,—the Rough lemon apparently being more sensitive than sour orange.

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THE CHEMICAL COMPOSITION OF IRRIGATION WATER USED IN FLORIDA CITRUS GROVES

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A knowledge of the chemical composition or mineral content of irrigation water is of great importance to growers because of the known detrimental effects to plants of highly mineralized water. Although water from various sources has been used for irrigating citrus in Florida for many years little is known of the actual chemical composition of much of the water which is used. A report made 50 years ago indicated damage to citrus when irrigated with artesian well water (9). A more recent report (14) indicated that many wells in several East Coast districts were increasing in salt content thus increasing the possibility of damage when used on groves. Similar increases in saltiness have been experienced with municipal water supplies for several coastal cities (8) (10).

In most areas where irrigation is required, the annual rainfall is generally low. Such conditions result in accumulations of salts in the soil, because there is little or no loss of the salts through leaching by rainfall. Since practically all of the citrus growing area of Florida receives annually 50 to 60 inches of rain (4) accumulations of salts are not likely to occur from year to year. Leaching of applied salts is also aided by the fact that most of the soils on which citrus is growing in Florida is of a very sandy porous nature and easily leached. Since these soils contain practically no clay which exhibits exchange capacity, additions of sodium from salt water does not destroy their structure thus impeding leaching as often happens in many regions using irrigation.

For these reasons the use of irrigation water on citrus in Florida presents a different problem than found in many other citrus growing areas. In fact,