

given the thorough and impartial study that we have made and are continuing to make of insect and disease control methods. There is great need for more accurate information on all phases of citrus production.

The Florida Citrus Commission recognizes that the production of quality fruit of good keeping quality is fundamental to its profitable marketing, especially since we are meeting increasing com-

petition from other citrus sections. New surveys must be made of all these problems, and I am hopeful that under the leadership of the Commission the industry will unite in a program to improve and standardize our cultural packing and handling practices, so that Florida fruit will be of better and more uniform quality. When this has been done our marketing problem will be made easier.

THE BETTER FRUIT SPRAY AND DUST PROGRAM OF THE FLORIDA CITRUS COMMISSION

(See Chart at the Back of This Book.)

E. F. DeBusk, Gainesville

Mr. President, Ladies and Gentlemen: I have been requested to discuss this spray and dust program referred to by Mr. Hartt, and I believe we can get more out of the time spent if we take it up in an informal way.

We have a purpose in presenting the program at this time. First, we wish to make certain that all growers present fully understand the provisions of the program; and second, we would like to have constructive criticism from any of you growers, so that the advisory committee may have the benefits of these suggestions. Don't hesitate to give us these suggestions—we shall be glad to have them any time as we go along with the discussion. Dr. Camp is chairman of this committee, and he also will be glad to have suggestions from you.

In order to tie in with what I have to say with Mr. Hartt's paper, I wish to call your attention first to this chart (No. 1) in order that you may have a picture of some of the factors that we have to contend with in improving the appearance and quality of our fruit. I hope you can see this chart. The percentage of the grade lowering factors given was taken from a study made by Mr. Victor Bowman of 94 crops in the 1934-35 season in Orange County. You will note on early fruit, 20.85 per cent. of the grade-lowering factors was melanose, and that 39.76 per cent. of

the grade-lowering factors of the late fruit is attributed to melanose. That certainly does present a rather serious problem and quite a challenge to those of us who are trying in a definite way to improve the appearance of our fruit. Sand chafing takes second place on these 94 crops in Orange County for that particular season. This would indicate that there is an opportunity to improve the appearance of our fruit by the use of a few simple windbreakers. I happened to be county agent there in Orange County a few years ago, and in several young groves we had some striking demonstrations of reducing wind chafing by leaving strips of crotalaria between tree rows running in a direction to break the March winds.

Referring to the chart, let's drop down to the rust mite factor. You will note that this factor does not take such an important place. I must admit it was somewhat surprising to me to note that only 5.35 per cent. of the damage to oranges was chargeable to rust mite. I might say here that during this particular season there was a special effort made to control rust mite in Orange County, which may have had some influence. So much for that. You can just glance over those other figures and make comparison.

* When we talk about improving the quality of our fruit, most of us think of doing something to improve the appearance. That is well and good,

NO. I—ORANGE COUNTY—94 CROPS—SEASON OF 1934-35—PER CENT. OF GRADE-
LOWERING BY FACTORS

FACTORS	ORANGES					GRAPE-FRUIT
	Early	Seedling	Pineapple	Valencia	All	
Melanose	20.85	39.76	22.70	23.90	28.53	35.18
Wind Chafing	11.88	12.20	13.12	20.33	15.15	4.29
Greenish	10.43	4.84	9.00	7.00	7.08	6.00
Texture	5.25	5.12	4.75	9.08	6.43	5.94
Rust Mite	2.20	3.12	5.42	7.54	5.35	10.71
Thrip Marks	3.63	2.23	4.38	4.42	3.63	1.00
Creasing .....	.....	4.82	2.86	1.45	3.55	.....
Ammoniation	2.00	1.88	5.50	4.83	3.43	.....
Sooty Mold	2.00	1.33	1.63	4.86	3.10	1.00
Scale	3.43	1.00	1.56	1.72	1.85	2.63
Green Spots	7.86	2.67	1.86	1.43	3.06	1.29
Spray Injury .....	.....	1.00	1.00	1.25	1.17	2.50
Scab .....	.....	.....	.....	.....	.....	6.80

From thesis by Victor Bowman.

but we should not stop there. When we think of controlling rust mite, we think primarily of preventing the pest discoloring the fruit. As Mr. Hartt mentioned in his paper, there are other effects that rust mites have on our fruit which we shall take up later. I am simply presenting these data as a background for a little more effort and thought toward the production of bright fruit and better fruit generally. Let's not lose sight of the fact that we have been making progress. For the last five years, including last year, the growers of this particular county and also in Lake County, have increased their expenditure for sulphur for rust mite control 35 per cent. So there is more effort being put forth in the production of bright fruit than we sometimes might think. Let's give the growers credit for everything they are doing in that line.

Here are some data that I believe will be of interest, especially since we are going to take up our spray and dust schedule in detail. In analyzing 163 grove records taken in such a way that they represent a cross-section of Lake, Orange, Polk and Highlands counties, running about 26 per cent. grapefruit, here in Chart 2 is what we find the growers are doing in rust mite control:

Of the number of lime sulphur sprayings represented by the records of these 163 groves there were 251 applications of lime sulphur made during that year. How were they distributed throughout the year? Look at the chart. That shows when the greatest amount of spraying is done for rust mite control. Next, the number of dustings. There were 319 dustings made on 163 groves during that season, against 251 sprayings. Note how those dustings were distributed. So you can see at a glance where the greatest stress is placed on dusting. This next bit of data is disappointing to me, but it is the best I can do, because I can only take what is in the records. You will note that there were only 16 applications of a fungicide for melanose control. If you recall the importance of melanose control, as a factor in grade-lowering of our fruit, and note the very few applications of fungicide made in these groves, you will see that there is a place where we can get to work if we have a practicable and economical method of controlling melanose.

The next data in Chart 3 give information on the number of times of spraying and dusting. Fifty-four of these 163 growers did not spray at all, but dusted; 48 did not dust at all, but sprayed; 28 dusted one time; 31 dusted twice; 26 three

NO. 2—NO. SPRAYINGS AND DUSTINGS BY MONTHS—SEASON OF 1934-35—163
GROVES 26% GRAPEFRUIT

	Total No.	January	February	March	April	May	June	July	August	September	October	November	December
L.-Sulfur	251	10	13	9	28	44	28	34	29	16	20	18	2
S.-Dust	319	15	4	10	8	43	42	44	52	33	16	31	21
Fungicide	16	6	2	....	3	4	1	....	....	....	....	....	....

NO. 3—SPRAYINGS AND DUSTINGS BY NUMBER OF TIMES

Times	No. Sprayed									No. Dusted								
	0	1	2	3	4	5	6	7	8	0	1	2	3	4	5	6	7	8
	54	50	25	11	11	7	4	1		48	28	31	26	13	8	6	2	1

times; 13 four times; 8 five times; 6 six times; 2 seven times, an 1 eight times. These 163 growers report 24 cents per box for sulphur on rust mite control.

I thought you would be interested in the data because it all helps us to know what growers are

NO. 4—PER CENT. LOST IN WEIGHT OF FRUIT BY
EVAPORATION

Days	Bright Fruit	1 to 50% Russet	51 to 100% Russet
10	2.2	5.79	6.14
20	5.56	11.02	12.41
30	9.76	14.54	19.22

W. W. Yothers.

NO. 5—DIFFERENCE IN RATIO OF ACIDS TO SOLIDS

Fruit Taken From Tree			
Date Picked	Ratio of Acids to Solids		
	Brights	Russets	
November 1	1— 8.14	1— 7.55	
November 10	1— 8.60	1— 7.88	
November 20	1— 8.82	1— 8.01	
November 30	1— 8.14	1— 7.29	
December 10	1— 9.44	1— 8.48	
December 20	1— 9.47	1— 8.50	
December 30	1—11.18	1—10.47	
Fruit Taken From Packing Houses			
November 10	1— 9.09	1— 5.33	
November 23	1— 7.93	1— 6.03	
November 30	1— 8.17	1— 7.38	
December 20	1— 9.44	1— 8.81	

Adapted from Tech. Bul. 176, U. S. D. A.

doing. I shall not take time to go into the next two or three charts very much, but they are prepared simply to call attention to the fact that rust mite affects fruit, besides discoloring it. Chart 4 shows that russet fruit loses weight by evaporation more rapidly than bright fruit. A thorough waxing reduces drying out in transit, but some houses do not have facilities for thorough waxing and consequently lose money from that effect of the rust mite.

You can see from this Chart 5 that the bright fruit is about one point higher in acid than the russet. In addition to discoloring the fruit, slowing down maturity and increasing evaporation loss, rust mite also stunts the growth of fruit. The greater the percentage of russets, the greater the loss in volume of fruit, because of the stunted growth of the fruit.

The same thing applies to melanose. It has been noted in a good many instances that melanose affects the growth and ultimate size of the fruit.

County Agent, Mr. Baetzman, will now please pass out copies of this spray and dusting program, and I would like for each one of you present to have a copy. See chart at back of book.

Now, let's take a few minutes to go over these schedules. I shall have to hurry as my time is about up. You will note we have four schedules in this program. In practice, pick out the one that applies to your grove and follow it. Each one is complete.

A and B are the only schedules that make any provision for disease control. Schedule A is designed for a grove in which it is desired to do the most effective spraying for scab control. If you have a grapefruit grove in which you wish to do some scab control, but do not wish to use copper, use the lime sulphur in the B. schedule.

Coming down to the second part of those schedules, they are very much alike. In schedule A, you may wish to do a second scab spraying; if so, you should use the bordeaux in No. II. This spray is just half as strong as the dormant spray. We have specified bordeaux mixture there, because it is the standard copper spray. Other copper sprays may be just as good and in some instances better.

There is a little difference in number IV under Schedule B. It is presumed that you may need to use some oil at that time, following a copper spray in No. II. But in No. IV under A, there is no doubt that you will need to use oil, because of the fact that you have applied a full-strength copper spray in your first application. From there on down, schedules A and B are about the same as C and D. So we can pass over and start at the top on Schedules C and D. You notice these do not provide for any disease control. Schedule C anticipates some scale control, which may be taken care of in these fourth reinforced lime-sulphur sprayings. Schedule D does not participate in any particular scale control, but a possible holding down of scale development by the use of soluble sulphur in those lime-sulphur sprays. From there on, they are about the same. You see particular stress is laid on the first few months of the

year in getting a program started right, but I am sorry to see some growers are inclined to lighten up to some extent on this rust mite control program and find themselves confronted with a lot of black fruit next spring. Any grower can follow these schedules without any knowledge of insect control and come out fairly satisfactory, but if he has some knowledge of insect control and applies that knowledge, you can see readily how he can reduce the number of applications in any one of these schedules. If you don't have sufficient knowledge to go it alone, stick to the program.

You notice in these schedules lime-sulphur is mentioned frequently, and that with the addition of wettable sulphur. With the sulphur spray used as outlined you should hold down scale and whitefly. But remember it is necessary to spray at these critical times—the time when the greatest percentage of the population of these insects is in the young stages—the weak link in the chain of the life cycle.

Now, just another word about this dusting. If you depend on dusting as a means of controlling rust mite you must watch the rust mite and act accordingly—you cannot make a calendar program for dusting for rust mite control. I believe you growers can understand this program. Read carefully the footnotes. If any part needs further explaining I shall be glad to take it up with you at any time. We shall be glad to have your constructive criticism of the program at any time. These schedules will be revised from time to time as research data become available. Thank you.