

Joint Meeting of Avocado Growers, La Habra, February 5, 1937

Auspices Agricultural Extension Service and Avocado Departments of Orange and Los Angeles County Farm Bureaus

H. H. Gardner: Meeting will come to order. As the notices sent out stated, we have gathered here to consider the recent frost and its effect on avocados and we have invited various people, prominent in the avocado business, to be here to tell us something about it.

The general discussion is to be led by Mr. Vincent Blanchard of Ventura County, who is known to most of you, and he will start our program.

Vincent Blanchard: Mr. Chairman, Ladies and Gentlemen: Quite apparently the frost has stimulated interest—at least in attendance—at this meeting. I presume some of you are wondering why they selected me to lead the discussion on this subject. Mr. Rounds wrote to me and asked if I would come here and lead the discussion on the question of frost, its effect on avocados and its relationship to the avocado industry and its future. I was glad to do so because my interest in freezes began quite a few years ago. Way back before I entered college, I spent a year working on a big ranch in Ventura County—called Rancho Sespe. I always thought a good deal of that property because it was home to me; for each year I always went back there and going onto that ranch was the thing that changed my whole future. I changed from one line of thought to another as to what I was going to do.

I remember that during the 1913 freeze, I was at the University of California, and at the end of the semester on the way home my roommate was with me and he didn't know anything about Ventura County. We were traveling on the train and I had been telling him about the beautiful property, how the trees looked, etc., but when we rode through the Ranch I was amazed to find those beautiful trees denuded, bare and the ranch looked terrible. In other words, it had gone through the 1913 freeze and it was a sad-looking sight. So, the following summer I again went back there, as I had in previous years and did three months' work, helping them in rebuilding those trees—what they could of them. Later, as Assistant Farm Advisor in Los Angeles County, we had some contacts with similar work in connection with the freeze in 1922. Professor Hodgson was the Farm Advisor at that time in Los Angeles County. Knowing that I had had some experience at Rancho Sespe, he asked me if I would make a survey of the experiences which growers had had. Then, as a basis of that survey, establish some conclusions and utilize the information we had secured. We did that, and so I presume that is the reason why Mr. Rounds asked me to carry on this discussion here tonight.

MARKETING COMMENDED

This avocado industry which has been steadily growing, finally arrived at a point where it is an important industry. A lot of effort has been expended on this industry, from the standpoint of attempting to make it important and successful. Marketing is one of the most important problems that this industry has had, and such a rapid expansion really is a tremendous problem. I think the industry should have a lot of credit in the way it has handled the problem of expanding production, and now you have arrived at the point where naturally that has been interfered with, by this freeze, so all-inclusive of avocado sections in California. It even included me, because I happen to have an avocado orchard and when I talk about the problem of avocados I am speaking not only as a Farm Advisor but also as a grower who is vitally interested in the industry. We have something to think about from the standpoint of the marketing end and I believe Mr. George Hodgkin is here tonight and I expect to call on him later on to present a few points—the man who has been at the helm of this great marketing organization which he represents.

BENEFITS FROM THE FREEZE

I think that we ought to discuss some of the things whereby we can profit from this freeze. It might seem peculiar to you after such disaster to think or visualize how we may profit from such a disaster but I think we can. I jotted down some things we ought to be considering from the standpoint of the future. One of the great problems common to a lot of industries— apple industry in particular—is the large number of varieties grown. I have been interested many times in going down to the Calavo Growers' packinghouse and walking through there and seeing the tremendous number of varieties that come into that house, and some of them in small lots, and even in some boxes they might have some different mixed varieties, which is a complicating factor. Hodgkin soon recognized that in order to have a successful marketing program it was necessary to reduce the number of varieties. We know a number of these varieties that are "just OUT" and this freeze is, I think, going to help us decide what to do about it. In other words, a number of these trees that still have good trunks, and good limbs, or at least good trunks, can be worked over to the more desirable varieties and I think this is the time, this particular year, when we ought to give considerable consideration to the question of reducing the number of varieties, from a commercial standpoint. Now, if we are going to do that, why naturally the question comes up, "What am I going to bud to, or what am I going to plant?" I am not here to tell you, by any means, because if I were going to do this (and I am talking about my own particular place), I will have to do some further studying. I think a lot of others are not quite decided. One of the unfortunate things we have had staring us in the face is the indecision about varieties. We had hoped that the Fuerte was the final solution but we know it has certain weaknesses from the standpoint of production and continuity and regularity of bearing. Now we have within the California Avocado Association a Variety Committee that has functioned very well over a period of years and it seems to me that if this Committee has ever been valuable to the industry it ought to be valuable at this particular time, because this problem of varieties needs more study and some prompt decisions. Growers want to know now; they can't wait.

COLD-RESISTANT VARIETIES NEEDED

Now another question that we haven't paid much attention to in the past. We have developed this avocado business with the idea that we are going to plant in frost-free areas, and that is what we attempted to do.

In other words we went onto the hillsides and higher elevations—areas where coastal influences prevail—where we could have some assurance that it would be somewhat temperate in climate. We have learned, certainly from this freeze, that we have got to do some new thinking on that subject and I believe this Variety Committee ought to be thinking about that too when they give us suggestions on varieties. If we are to have avocados, without heaters, we must have varieties that are more resistant to cold than many varieties which we have been growing, because it is quite apparent that the high percentage of varieties we have grown have not been able to withstand temperatures of this last freeze. Some of them, however, came through better than others and those things ought to be considered.

Another thing avocado growers should begin thinking about for the future is whether or not we can continue in this business without at least some attention being given to the question of orchard heating. A good many citrus growers feel that if they don't have a freeze within a period of ten years, they can get by without injuring the trees. Now if we go ten years, twenty years and have the trees all wrecked, it is a matter of rebuilding from the ground up. Certainly that isn't a sound premise for the industry. From the standpoint of the future, we have got to give more attention to the question of heating in avocado orchards.

I have visited today, and other days, some orchards that had heaters and they came through in fine shape. I was interested in looking at some of these orchards—some of the fruit dropping—good, normal trees, normal stems, having fruit drop, and then visiting one or two where they had orchard heaters. The fruit is still on the trees, without drop. Whether that is common answer I don't know but that seemed to be the case in one or two orchards today.

FREEZE LESSONS LEARNED

I carried on a survey on the question of rebuilding after the 1922 freeze. Then we took the results of that survey and established a number of plots—this work was with lemons and oranges—distributed in Los Angeles county. Over a period of years, we did arrive at some definite conclusions regarding frosted trees and the things that we should or should not do in attempting to rebuild them. I am not going into a detailed discussion of the subject of rebuilding trees, because I am sure Mr. Rounds and Mr. Wahlberg will hold meetings in their respective counties in which they will go into the subject very thoroughly. But, I am going to outline briefly some of the lessons that we got out of the previous freezes. I say "some of these things"—I want to emphasize one of the points. **The importance of delaying any pruning whatsoever until those trees themselves tell you how far back they have been injured.**

DELAY PRUNING FEW MONTHS

The only way you can find out to what extent the trees are damaged is to wait long enough to get quite a growth before cutting. We took trees in which we started right in, that is lemons and oranges, and I think the same will apply to avocados—trees which we cut back early, using our best judgment. Then, we took trees which we had let go a long time and we cut back then to where the trees told us from their growth was the place to cut. We brought those trees back with the latter method far sooner into commercial production than where we cut too soon. We hear growers already say, "Well, I am going to get in soon because I am afraid of sour-sap."

From our experiences there is nothing to that, and I am sure you can get much better results when you wait a long time—even March or April might be too soon—wait until along in the summer some time. Of course if you have a tree, and cut into it and find it is dead, why that is different; then you have visible evidence that the wood is dead. Many times you can't tell and the thing to do is to wait.

PROTECT AGAINST SUNBURN

Another thing I want to emphasize and that is you are going to lose the leaves on those trees, not so many perhaps on the lesser injured trees but some will be completely defoliated. There you get the direct rays of sun, drying the bark of trees and sunburn will surely result. Now in the survey following the 1922 freeze, I found orchard after orchard of trees that had been sunburned—the tops of the limbs exposed to the direct rays of sun—sunburned and wood exposed and those trees naturally weakened and life shortened by such condition, so we most assuredly recommend to you that the first thing to do after the leaves have dropped enough to do the job fairly well is to spray them with whitewash. There are a lot of different formulas and paints you might use and I would suggest that you consult your Farm Advisor or others interested in this problem and find out what to use.

DON'T IMMEDIATELY PAINT CUTS

Then here was a thing we ran into as a stumbling block at Rancho Sespe. A lot of failures were traced to this one thing, and that is when you get to the point of pruning, don't immediately paint that with wound-sealing paint. Let that wound dry out. Otherwise this is what happens. Suppose you take a moist wound, whether frosted trees or any other kind, paint it with wound-sealing paint, what happens? Moisture collects and right underneath the paint forms blisters and then when weathering, fungus sets in and once given entrance, it is pretty thoroughly rotten. In rebuilding the tree, we had tree after tree brought along in fine shape which later developed heart-rot. So we found it best to let those wounds go long enough to dry out sufficiently so that no blisters will form. Then use disinfectant before applying wound-sealing paint. I am going to make a definite recommendation. We would suggest that you not use Bordeaux paste. Bordeaux paste, unless in very weak washes, seems to interfere with healing of wounds. The thing I am going to recommend is Mercuric Cyanide. Mercuric Chloride is a good disinfectant and (I am quoting from Professor Fawcett, of the University, the man who has carried on

research work for the University of California on citrus diseases) mercuric cyanide is for wounds a much better disinfectant. In order to make this more penetrating, we use denatured alcohol, one quart; Mercuric Cyanide, one-quarter ounce; and water, three quarts. First dissolve the Cyanide in warm water, before you mix in the alcohol.

I have talked long enough. I am now going to call on some others who are interested in this industry. First, Mr. George Hodgkin, General Manager of the Calavo Growers of California. I know he has something to tell you. I was up at the Calavo plant this morning and it is wonderful the way they are handling this tremendous amount of fruit coming in at once. Mr. Hodgkin.

HODGKIN DISCUSSES MARKETING

George B. Hodgkin: Mr. Chairman and Fellow Sufferers from Frostless Hillslopes of California: I didn't know exactly what the program was to be tonight so I have no prepared address of any kind. I am just going to ramble on some of the things we have been discussing at the meetings I have been attending.

COLDER THAN 1923 AND 1913

Certainly 1937 set a record for the longest cold spell. Also, the average temperatures for the month of January, 1937, as reported by the United States Department of Agriculture Weather Bureau at Los Angeles, were several degrees lower than the average temperatures for January, 1922, or January, 1913; and every day's average temperature during January, 1937, was considerably lower than the normal average temperature for that date in past years.

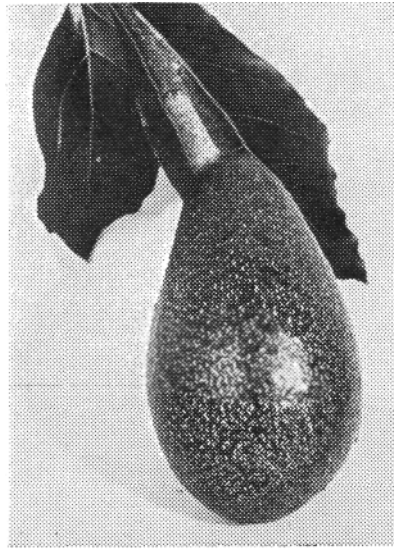
A little less than a month ago, I talked to some of you in this town, in the other school, which was just after the first freeze. I made a mistake when I thought I knew something about avocado fruit and trees when they were frozen. Since then I have decided there is one thing I do know, and that is that "I don't know." I am quite sure about that.

DIFFICULTIES NUMEROUS

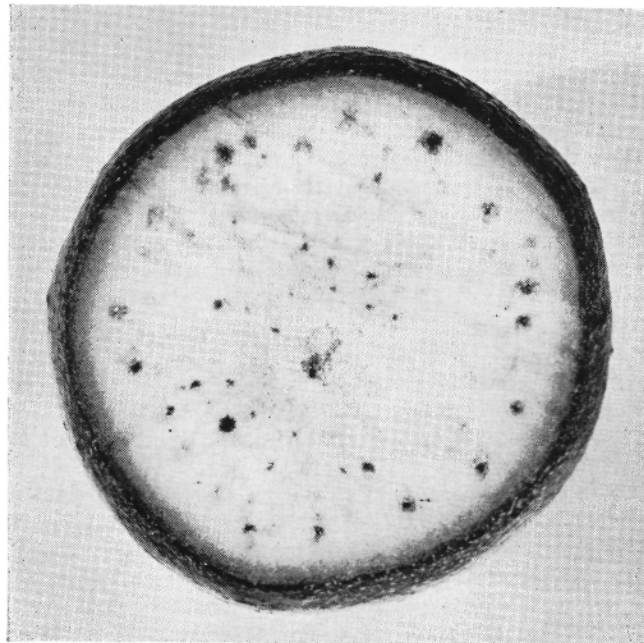
Last Friday we had a meeting of directors of Calavo Growers. We discussed what fruits to pick and what to leave on the trees; how to advise the growers, their picking problems. Most of our directors agreed that if the stem which was only partially brown and had some green in it was probably alive and would continue to hold the fruit. In these cases we wouldn't urge the growers to pick any more fruit than they absolutely have to. I heartily agree with that, because if correct, it was going to help the marketing considerably. Within an hour after that decision we had reports from two of the fieldmen, here tonight, that fruit was dropping rather heavily in La Habra, Whittier and Tustin and some stems had quite a lot of green; and some entirely green.

The next day at Vista I heard that fruit with green stems was dropping and, generally speaking, I was able to prove that the fruit was not dropping from the freeze alone but from some other factor as well. That was on Saturday. By Sunday night I had reports

from all areas that fruit was dropping everywhere and it didn't make much difference if stems were green, brown, or half and half; and I am sorry to say this is keeping up. With big trees it is actually dangerous to walk under them. Some of the pickers are wearing tin helmets. How much longer it is going to last, I don't know. We have had to reverse ourselves every day, almost, about this proposition and try to find out something new. Our fieldmen have generally been able to reverse themselves and have been glad to admit that what they said the day before was wrong. Then they got new facts and advised the growers on that basis.



This photograph shows the upper part of the stem discolored by frost, while the section close to the fruit remained green and normal.



This is the maximum "damage" allowed under the regulation issued by the State Department of Agriculture for injury by freezing. Any worse appearing fruit would have to be discarded.

FEBRUARY 5TH DAMAGE ESTIMATE

*The total damage to the fruit on the trees at the time of the freeze is about 65%, roughly. I will give you figures of the various areas.

In Southern San Diego County, damage at time of freeze—about	60%
Coastal areas of San Diego County.....	62%
Rancho Santa Fe, which was reported by citrus men to have very light damage, apparently.....	100%
Probably was light on citrus but it was heavy in avocados (probably they were planted in more "frostless areas")	
Escondido damage was.....	53%
Fallbrook	58%
Vista	80%
Total of San Diego County, a little less than	70%.
In South Orange County.....	79%
In this area.....	50%
(and this was the area hit the hardest during the first freeze, reporting after the first freeze that area was the one most hurt, and San Diego had not had any damage at that time.)	
Across the hills—in North Whittier.....	40%
Along the foothills, Glendora, Azusa.....	78%
and the rest of L. A. County a little over	80%.
Ventura and Santa Barbara Counties.....	35%

Approximately two-thirds of the total fruit remaining on the trees had been damaged and that is about 50% of the original crop at the beginning of the season.

*These estimates were made shortly after the freeze. For latest figures, see Calavo Annual Report, in this book.

FRUIT DAMAGE CONFINED TO FIBRES

The damage to the fruit is, of course, extremely varied. Some fruit is badly damaged and some only a little damaged. I have some fruit here and want to give you some idea what damaged fruit looks like and how bad it is. I think we are safe in saying that we know now that the damage to the fruit is primarily to the fibres within the fruit instead of the flesh itself. I am speaking of fruits not severely damaged. Some are damaged so badly that they are more or less rancid. Two-thirds of the total fruit is mostly damaged only in the fibre of the fruit, and as you know, that shows itself in the form of dark fibres or little spots, or big spots as the case may be. Flesh in the fruit is, according to hundreds of tests I have seen made, just as good. The flavor is just as good; no bad odor or anything of that kind. If blindfolded, you can't tell whether a particular fruit is partially damaged or not. It is pretty difficult to get across to the folks who haven't tried it and I find every new group I talk to about the good eating quality look very skeptical. Consumers are even more skeptical than we are.

When the freeze occurred, we had no accurate standard for frozen fruit. The Standardization Law simply said that frost damage is considered a defect and any fruit that is wasted more than 15% by some defect is damaged in the eyes of the law and cannot be sold. Well, 15% wastage in an avocado—caused by dark fibres—is a pretty hard thing to figure out. One may sample the fruit and like it, and say "Why, there is no waste there at all," while the next man says, "I wouldn't eat it on a bet. I don't like the looks of it." Somewhere, between those two extremes, of course, lies what is "damaged

fruit" in the eyes of the law.

After many conferences and discussions, the Standardization officials decided that the only thing they could do would be to describe the spotted condition in the fruit. They lined them up like this, and like that, and a little less, and on down the line until they got to the more or less perfect fruit, and then they looked them over and decided what was a marketable fruit and what wasn't. They decided to draw the line somewhere in here (indicating fruit). Now various other groups have done the same thing and, generally speaking, they have all come to about the same conclusion—that fruit about like that—is as bad as should be sold and anything worse should be kept off the market.

LEGALLY UNSALEABLE FRUIT

The next problem was how to describe that fruit so anyone could picture it; so it could be taken into court as illegal to sell. The final definition as issued by Mr. A. A. Brock, Director of the State Department of Agriculture, is as follows:

"Freezing injury to avocados **shall not be** considered as causing a waste of 15 per cent or more, by weight, of the entire avocado, including the skin and seed if, at the time of cutting on a transverse cut through the blossom end of the specimen, at the base of the seed, such cut surface shows ten or less dark spots each having a diameter or length of one-sixteenth of an inch or less. Such damage **shall** be considered as causing a waste of fifteen per cent or more if such cut surface shows more than this amount of damage or any other evidence of serious damage from freezing such as discoloration of the flesh or other indications."

I haven't counted the spots in this particular fruit—probably ten or eleven, but that is approximately it. Here is a specimen to illustrate what that meant. Finally, after cutting many fruits, this particular one was chosen and placed on a table; photographers were called in, flood-lights thrown on it, and they finally got a good picture of it—more temperamental than any movie star—they had to retake it a number of times, then touch it up—a number of times and still it doesn't quite portray what was intended in the regulation outlines by Mr. Brock.

GRADING BY SAMPLE TESTS

Now it is generally impossible to tell from the outside of the fruit how many spots are on the inside. Just picture yourselves at the grading table trying to pick them out. Some you can tell, yes. This shows some discoloration and would be thrown out. This one shows discoloration. That one doesn't. So, we have to grade them in the way that Mr. Christie instructs his fieldmen to grade walnuts—by cracking them. So far as I know, that is the only way we can grade. Take a sample lot—from whatever lot is to be graded—select samples at random—forty or fifty fruit—or whatever is necessary to represent a cross section of the lot, and cut samples. On the basis of the cut fruit, grade the rest of the fruit. Check it from time to time and be sure that it is living up to the cross section sample that you took out of it. That means cutting a lot of fruit, and I guess all of you have cut a lot of fruit since the freeze. We cut fruit in order to save fruit. There is no other way of grading it.

CONSUMERS' FEAR NOT JUSTIFIED

Our greatest difficulty has been with consumers. Apparently they have an idea that the fruit is poisonous or isn't going to taste good and they are just not buying it. The citrus people are having the same thing, more or less, a little less this year than in past years. In 1922, a great many folks who were pretty close to the citrus industry, wondered whether or not they were or were not poisonous and only the other day our mailman wanted to know if it would be safe to feed orange juice to his children at the present time. That situation is even more aggravated with our industry. Less is known about it, and consumers are a little hesitant about buying fruit which they understand has been frosted. The man in the store doesn't know anything about it—whether it will soften or not—and therefore the consumers are just not buying it.

The market is in the most chaotic condition I have ever seen it—so much fruit on the markets that they are overloaded with it and at the same time the consumer is afraid to buy it. Fortunately we still have some pretty fair fruit of this type and we are able to ship quite a quantity and we hope to get some fair returns but there is a lot of it that isn't going to bring a great deal, we are sorry to say.

Here is a fruit a little too far gone, and one here that will pass. Here is one that will just pass—we will pass it around. This one decidedly would not pass, as you can see from this end.

FRUIT NOT SO BAD

When cutting this passable fruit, if cut the way they are ordinarily served, it doesn't look so bad. As a matter of fact, among ourselves, a lot of our fruit sold in the East, at pretty good prices, for one reason or another doesn't look a bit better than these by the time the consumer gets them—so many people handling the fruit that don't know anything about it; wholesalers, retailers, etc., who finally pass it on to the consumer.

You notice that the Director of Agriculture put in a clause about "other defects." They can't imagine all of the things that might happen so they are allowed to throw them out under that clause "other defects" if they don't have enough bad spots on them.

We are in hopes this situation will be over rather shortly—within two weeks, we think that most of this distressed fruit is going to be on the market, or on the ground. What will happen to the market after this is out of the way is something we can't tell. Obviously there is not going to be as much fruit for sale as there was before which should have a tendency to bring up prices, but it is possible that some of this fruit which is being consumed won't be satisfactory, and it is possible it will give us a bad reputation. Those are some of the chances you are going to have to take with selling.

The method we have in arriving at marketability is simply a matter of opinion as to how bad the fruit should look and still be allowed to be sold. Take any group—one-half of the room may decide on it, and the other half be opposed. You will probably come to pretty nearly the same guess. It is nothing but an arbitrary standard when you get right down to it. Standard of maturity for adults is 21 years of age. At that age, humans are

supposed to be mature; but many of you know folks who have passed that milestone and yet are a long way from being mature. Others, still under 21, may be fully mature. You just have to fix an arbitrary standard and stick to it.

FINANCIAL AID

The matter of financing has been discussed at some length at meetings which I have attended—financing growers who have lost part or all of their crops through the freeze. I am sure the federal agencies, as well as your commercial banks, are prepared to take care of those cases that have at least reasonable security—some chance of working out. Mr. Ellis, the agent of the Farm Credit Administration, came down immediately following the freeze and is still in the South, studying conditions; and he told me the other day that there wasn't any question but that various branches of the Farm Credit Administration were prepared to take care of the situation as well as they can. They are not going to consider this as some panic emergency from which to back away—it is a permanent organization—the Land Bank has been in existence twenty years now and they expect to carry on, and I think you will find your Production Credit Corporation and your Land Bank are prepared to make reasonable loans that are necessary to tide over this emergency.

This morning I attended a meeting of the citrus growers who met primarily to discuss financing heaters. Fortunately we have a sister-industry that has been through this experience two or three times in the past, and are well equipped to investigate various phases, and I am sure we will be able to benefit greatly by their experience and by their conclusions. The marketing organization—Calavo Growers—has a Committee working on finance, heating equipment, and various other phases. These will have to take some time to work out.

It might be well to give you a chance to ask a few questions.

QUESTIONS AND ANSWERS

Q. I notice fruit on the market bearing the "Calavo" stamp. How is the public taking to that, which must be an evidence of quality?

A. (GBH) Well there is not as much "Calavo" on the market as there has been—a very small percentage of what we are packing out. We are endeavoring to grade finely enough to put into first grade that fruit which should be there and we are getting some "Calavo" out of these lots. On the local market it is pretty nearly impossible to get what "Calavo" is worth at the present time because the whole price structure is so low—so much fruit at salvage prices—it is pretty hard to get a premium for anything even though it is known to be better.

Q. Couldn't good fruit be put in cold storage and held?

A. (GBH) We are in better position to store it for you but I doubt if that situation will come about. I think within another week we will be in the clear on this and if it comes in and we can't pack it, we will put it in cold storage.

Q. What is status of fruit which drops on the ground?

A. (GBH) Well it depends on how hard it drops and a lot of other things. If badly scarred, of course it is not able to soften up properly. If dropped on soft earth and not too far, it is a pretty fair fruit and takes a second grade and is being sold.

Q. Where do you find the most frosted fruit—in that which is riper fruit or in the greener fruit—which seems to be frosted the worst, well matured or the greener fruit?

A. (GBH) I can't answer that. I don't know. One day it looks like one type, and the next day the other. I think the more mature fruit is dropping from a combination of circumstances. We have mature fruit on the trees. We have had recent heavy rains and in addition the frost, and the frost is undoubtedly the more important of the three factors responsible for the heavy drop.

MUST MOVE FRUIT QUICKLY

Q. How long will this frosted crop hold on?

A. (GBH) After it is in storage, I question whether it will hold more than a couple of weeks. We are trying to move it out in two weeks' time. A couple of weeks would be the maximum in storage. There are a lot of things we are going to have to learn from this experience. In that connection, the University of California has been kind enough to loan us a man, Dr. F. F. Halma, who is now working on some phases of this problem and we hope to get some valuable information out of that. Fortunately or unfortunately we have never had a major freeze before with enough trees to know what happens.

Q. How is summer fruit—percentage of damage compared to the Fuerte?

A. (GBH) I don't know the exact percentage but in many areas the Fuertes are practically undamaged while some of the summer varieties are all damaged right alongside of them and even higher up. Of course a frozen stem on a summer variety means a complete loss of that fruit because it will not mature.

Q. What is the by-products situation? Is there anything at all for by-products?

A. (GBH) We are making a rather large supply of oil, but how much it is going to be worth, I don't know. The by-products situation has not been particularly promising for the simple reason that for the past several years we have convinced ourselves that we could sell the crops as fresh fruit, or some time at least; therefore, we didn't have a real by-products problem.

Q. What should we do—pick the avocados on the trees now?

A. (GBH) If they will stay on the trees, I suggest that you leave them on. Even if damaged, you will have more time to select them later on than now.

WHITEWASHING

Q. When do you advise as the time to white-wash?

A. (Blanchard) Just as soon as the leaves are off sufficiently to put on the spray and get

it uniformly distributed. You will have to use your judgment. I wouldn't wait until all the leaves are gone as you may have sunburn take place.

Q. What is the formula for white-wash?

A. (Blanchard) Yes, we have a formula here. I have prepared a circular on citrus, which will apply to avocados, and have placed it in the hands of all Farm Advisors at the request of Dr. Batchelor and others, and I'd rather leave the detailed information on white-wash and things of that character to the Farm Advisors of your respective counties. There are a number of different formulas for white-washes and we have two of them given in this circular, and either of the Farm Advisors can give that information to you.

Any other questions for Mr. Hodgkin?

Q. What seems to be the chance of getting buds later on, under proper weather conditions? (Fruit-buds, you mean?)

A. (Blanchard) Maybe we can expect some secondary bloom. Is Austin Marshburn here? I think he could answer that.

You will not get a blossom after the first blossom, you will not get a new blossom.

(Blanchard) Ours seem to have a habit of blooming for a long time but whether this cold has been sufficient to check the development of what we ordinarily have, I am sure I don't know.

Q. Mr. Hodgkin didn't say what length of time that it would take to determine this damage. Can you determine the damage on any Fuerte at the present time by cutting?

A. (GBH) You can determine that within a day or so after the freeze, and as far as we have been able to determine, this fruit if allowed to soften will look approximately the same as it does now. Some little change but not a great deal.

Q. Is there any particular variety that has withstood the frost better than others?

A (GBH) All the Mexican thinskins have stood it much better.

FUERTE AND PUEBLA HARDIEST

Q. Which ones used commercially stood it best?

A. (GBH) Well, the Fuerte and Puebla should stand it the best and as far as I have seen in one orchard the Fuerte stood it better, and next the Puebla. They are pretty close together.

Q. A slightly damaged tree—should the rest of the pruning be done on that tree?

A. (Blanchard) Should the rest of the pruning that you would ordinarily have done—such as perhaps elimination of deadwood on the inside or control of branches way out, or things of that character. My inclination would be to let it alone and utilize all of that leaf surface possible to bring it back again. You have already reduced your leaves—the number of leaves, and that has reduced its ability to manufacture food, and you need just as many leaves as you can get. If it's an extra branch, leave it there.

Blanchard: Professor Hodgson said that he would just as soon not be called on, but I am going to ask him if he will give us the benefit of his counsel. Professor Hodgson is a man in whom I have the utmost confidence and regard for his judgment, sounding up a situation, and I am going to ask him to talk to us in a few minutes. First I want to ask Mr. Chapman to come up here and say a few words. In this circular we have prepared we have outlined the different degrees of injury and how to proceed. I think we ought to be interested in that from the standpoint of the future of the business. How long is it going to take to have these trees come back into production? We ought to know something about the proportions and it might take some time to find that out. I don't think it possible to tell definitely now. Mr. Chapman and others have been visiting a lot of the different areas and perhaps could give us a few thoughts along that line—about the degree of injury, how extensive and so forth, and may have some sort of hunch as to how we might be planting for the future. Mr. Chapman. He is the man who visits our district in Ventura County.

NORTHERN COUNTIES FORTUNATE

R. J. Chapman: Mr. Chairman, Ladies and Gentlemen: I don't know just what Mr. Blanchard expects me to say, but in his district I don't believe he is a good church-goer, for his grove and that of his neighbor's were the worst affected by the frost.

The districts of Santa Barbara and Ventura were very much less affected by the frost and cold than any district I know of. However, in spots in Carpinteria there is one grove in particular that was seriously affected and the trees killed to the bud—at least it appears that way. The adjoining grove has practically no damage at all—possibly 10% over all.

The grove which suffered the least, as far as I can find, I noticed wind machines being used, especially in one grove—a wind machine plus heat seemed to be more effective than wind machine alone. Whether generally true or not I don't know. The Santa Barbara district—in Goleta section— was more affected than other sections. Just why, we don't know, except it did get colder in Goleta than in the section five miles south. The Ojai section was seriously affected—very seriously. By that I mean almost 100%. In Ventura proper the condition was very spotted. In the Mound Section a grove probably thirty feet higher than the highway on Telegraph Road—thirty feet seemed to make a great deal of difference. As a matter of fact Fuertes were shown to be affected on the lower section and yet thirty feet above no effect in any way. Any questions? (R.J.C.)

Q. What varieties were those you mentioned killed to the bud? And their age?

A. (RJC) Those were Fuertes and they were old trees. That grove was in a draw, and I believe was worst affected than anything I have yet seen.

Q. Did you state what the temperature was?

A. (RJC) There was no thermometer in the grove but it must have gotten down to 18, or possibly lower.

Q. When the temperature is down to 20 and 21, how many heaters per acre would be needed and how many feet apart should they be?

A. (Blanchard) That is a very good question. I will refer that question to Mr. Rounds of Los Angeles County.

HEATERS PER ACRE

Mr. Rounds: We don't know from experience so much in avocado orchards as we do in citrus but we do know that when we have fifty orchard heaters to the acre, it has been our observation and experience that we get better results but in many instances fruit got by in pretty good shape with less than 50 heaters. Our recommendation in regard to heaters is to put in fifty per acre and to stagger them as much as possible to make it easier to handle. Heaters put in rows and then blind rows in which there are no heaters and every other row with heaters. This way it is simpler to handle for filling and lighting—less walking. Of course where you have fifty heaters to an acre you do not have to have quite as high flame in the heater as where you have only 25, and it has been assumed that you may have too much variation in case 25 heaters to the acre—takes too much fire to make satisfactory heat and you have a warmer row, then a cool row, and frequently find that is the case—quite a variation in the way the fruit looks afterwards.

When you cut it you find right on the borderline more frozen fruit in those rows. Whether this will apply to avocados I don't know—I don't think we have enough information. Possibly with large trees and in case of being pretty well protected, with canopy almost of leaves overhead—in a large orchard as we find in some of the 15 to 20 year old orchards—we could get by with a lesser number of heaters. That of course is something that will have to be worked out with reference to avocados. We know pretty well what should be used in citrus.

Q. Do you think protection should be based for the future upon this year's freeze which was one of the worst or should one base it on the average over a period of years?

A. (counter-question) Do you have reference to whether to use heaters or not?

Q. Should we install heaters on the basis of this year's freeze or on the basis of the average?

A. We don't know but what we might get another one in less than five years; then again—will it pay to heat under those conditions and how much is it going to cost? It will have to be worked out with individual locations of orchards.

DANGER AND DAMAGE TEMPERATURES

Q. What temperature would you say is within safety up to the point of using heaters?—for avocado orchards.

A. (Blanchard) My suggestion would be that we get together on that particular subject with avocado growers in each county and go into the details of it.

Rounds: I don't know that we know definitely what temperature should be kept up to.

Q. Is 28 or 26 dangerous point? If my grove never gets below 28, am I ever to worry

about heaters or not?

A. (Rounds) We know avocado orchards where the temperature this year went down to 26 but how long they were down to 26 I don't know. We do know that some of those orchards reported 26; that one or two in particular had no frosted fruit or indications of frost in the orchard. I think that is as near as I can come to an answer at the present time.

Q. Is there any information on whether it made a difference whether a grove has been well fertilized as against one which hasn't been so well taken care of?

A. (Blanchard) I personally haven't been able to check up on that— whether there is a difference in the degree of injury on orchards well fertilized as against one which is not. I have made this observation; that is that weak trees seem to have been hurt harder than the more vigorous ones. I suppose a weak tree would be more susceptible than a stronger one.

Q. What did the wind machines do in this frost?

A. (Blanchard) Let us leave the wind machines out. Mr. Rounds is going to carry on a survey in relation to frost protection which will include wind machines and Mr. Johnson in Tulare, where there are over a hundred of these machines, is going to carry on a careful study, so let's wait for that.

Q. But Mr. Chapman just mentioned that they used a wind machine in Ventura and Carpinteria. He might tell us how that grove stood, having the protection of a wind machine—whether better or worse.

A. (Blanchard) He said wind machine and heaters. We have two machines up there, in widely separated sections, and we hope to find out some details of what happened but we haven't done that yet.

We don't want to hold you here too long but Professor Hodgson is present and I know from experience that he is always in a position to give us his views and worthwhile summary of a situation.

REPORTS FREEZE IN EGYPT

Professor Robert W. Hodgson: Mr. Chairman, Ladies and Gentlemen: This is really an imposition on me as well as on you. I just got off the train this morning from my trip abroad and I haven't seen the frost injury except in two or three orchards and very little because it has been raining all day. The most recent frost injury that attracted my attention, until that which I have seen this afternoon—and I mention it because possibly there is a little solace in the fact that misery always loves company—I saw in Egypt. They had the worst freeze in fifteen years in December, when I happened to be there and they have a few avocados there, and I saw a lot of bad avocado frost injury there. I have absolutely nothing to contribute at the present time. That is a matter for those who have been studying the situation, and it is much better that they should take your time than I, and with more value to you. I think we should, by all means, take advantage of this disaster and learn everything that is practicable to learn from it, with a view to the future. That is about the only general suggestion that I can offer, and I hope that I may

be able to assist somewhat in learning the lessons to be derived from what has occurred in the recent weeks. I won't take more of your time. Thank you.

H. H. Gardner: Thank you, Professor Hodgson. We just wanted to see you and have the folks know that you are on the job. Next fall at the Institute we hope to hear if you learn anything on this situation when we will give you a chance to tell about it.

I would like to have Carter Barrett, Chairman of the Variety Committee of the Avocado Association, as well as President of the Association, make a little statement as to what his Committee is going to do about this frost question.

Carter Barrett: I assure you we can't do a thing unless every one of you cooperate with us. I have to date asked the chairmen of various county committees to use any variety committee time that they may have in studying the situation. I don't know how much time any of you are going to have in determining the susceptibility and relative hardiness of different varieties and types of avocados in all districts. I don't think we are going to have as good an opportunity to ascertain this point in a good many years. Certainly I think you will all agree that you hope we won't. Now is the time to get this information. Fortunately I have some detailed checking that I made of this same situation in 1922 freeze, which will help in correlating the material that we get at this time, but I am hoping that all of the agencies which are investigating the situation throughout the various districts, over the whole field, will place such material as they may have in regard to manner in which different varieties have gone through this catastrophe, so we may correlate that information and give it back to you at a later time. It is impossible for any one individual today, as most of you very well know, to cover the whole of the growing territory, and this work has been well organized in different districts and as we recover from the immediate effects of this freeze, we will find time to get much of this information for you and it may be very helpful in determining for the future the plans some of you will want to make.

H. H. Gardner: Now, ladies and gentlemen, we are going to give you a chance to ask questions but before that, Mr. Wahlberg will give us a resume of the treatment to use for frost damaged trees.

WAHLBERG'S TREE CARE POINTERS

H. E. Wahlberg: I don't know why I should appear on this discussion since it has been already very nicely summarized by Mr. Blanchard from Ventura County, but just to bring the thing down to brass tacks, before your questions, we might repeat just as a matter of emphasis, and to make it a little more indelible—although we are very much concerned about the condition of the trees and it is rather irritating to go out and see that brown foliage and you want to do something about it—I know how you feel—we have had hundreds of calls asking, "When should I prune—next week or so?" And, as Mr. Blanchard has pointed out to you—just let that go for another few months—July, August or so. Some of those trees will look like hatracks by that time, and it may look discouraging, and from a real estate man's standpoint, as far as appearances are concerned—but it will be the best thing for the future of the tree, and that is what you are trying to obtain— better results from those trees in the next few years. As Mr.

Blanchard said, do no heavy pruning—delay that pruning until later on, and when that time comes, you can see just where those dead twigs extend to; then you can make definite cuts. He also pointed out that it is desirable to protect these denuded trees, as the season progresses. We are going to have considerable defoliation and the healthy parts of the trees—the green parts are going to be exposed to the sun, to which they have not been accustomed, unless we give them some artificial protection. The whitewash treatment is a desirable follow-up on defoliated trees. There are a number of formulas. Possibly you have a formula which you have used for years—use it—and if you do not have—if you have Dr. Fawcett's Bulletin of the Citrus Experiment Station—it contains a paragraph or two and explains several types of whitewash.

DISINFECT CUTS—REDUCE FERTILIZATION

Then, a word of caution, as was pointed out in the treatment of large cuts or wounds. It is desirable to disinfect those wounds and help nature along by keeping fungus spores from developing on open cuts. They should be disinfected with the formula which he gave you. I notice most of you took that formula down. On top of that, some good pruning compound, or possibly use emulsified asphaltum paint, which will not crack and allow the cut to dry out and crack. Those are some of the precautions to take. The main thing is—don't do anything about pruning at the present time. Let nature take its course. Let dead wood definitely define itself before pruning. We have had a number of questions on fertilizer. I don't know whether that was touched on. Our suggestion, inasmuch as these trees have undergone the tremendous shock and are going to lose some of their skeleton, foliage, etc., is that they will not require as much fertilizer as you normally put on. I would use judgment—certainly don't put any more fertilizer on than under normal conditions.

IRRIGATE CONSERVATIVELY

Then there is a word—as spring progresses—and that has to do with my favorite subject. Be a conservative irrigator—my middle name—but inasmuch as the trees are weakened now and their volume has been reduced, foliage has been reduced—they are not going to need the same water as they would normally need. A person may be rather anxious to irrigate to get new vitality in the tree but it would be a serious mistake—as you know, a normal tree—each leaf—each square foot of leaf surface is a pumping plant and if you only have 50%, they only pump 50% of the water and the tree is not going to need as early irrigation in the spring as it normally would, and just because you see "Jim Brown" putting on water don't follow suit—his trees may not be so badly affected. Your grove may be located farther down in the draw and suffering considerable damage, may not need irrigation for another month or two. In some cases they may need no irrigation until the middle of summer. Use your soil auger. That is going to be the best friend of the tree.

Carter Barrett, heading up one of these Committees you have in Farm Bureaus, Los Angeles—Avocado Departments of the Farm Bureau and I think this season offers a challenge to these various departments and committees and fine cooperators who are

helping the industry as a research department in finding out what is happening and here is an opportunity for you as an individual to bring any observations of interest to the industry. If it interests you as an individual, it certainly is of interest to the industry. Send it to your local committee. It might be something about resistance, tolerance or about the response—how trees came out of the frost. If you have something definite, submit it to your local Farm Advisor or your chairman, and you will render a service to your industry. You have heard we are an "infant industry"—we are beginning to crawl now, and we need to know more about ourselves and there is a place for various committees in different sections.

WINDBREAK PROTECTION

Nothing has been said this evening about my pet topic. I thought someone would bring it up. Windbreaks. Some of you have windbreaks and some of you have no windbreaks. You have heard from some angles "You better not plant windbreaks or when a frost comes along you will suffer from severe freeze; you will form frost pockets, and you will suffer severe damage. "I am glad to stand here tonight and speak for Orange County at least—I haven't been around much in L. A. County—and I want to pass it on to you—in these orchards where windbreak protection is available—the avocado fruit and trees have come through in very much better shape in those rows next to the windbreaks than out in the open. Mr. Carter from Yorba Linda stated the two rows next to windbreaks stood the cold the best. I just want to point that out. We are learning these things and we want them brought up in our local committees. If you have observations about orchard heating, etc.—bring it to their attention. Mr. Rounds pointed out the problem before us regarding the economics of orchard heating. We haven't done much of that in avocados. We rested rather assured that "those fellows who raise citrus should worry about heaters" but we don't need them. As a result, we weren't prepared for an emergency period and a question given here a little while ago—would it pay us to install heaters if we only have frost once in ten years or so? Those are questions we have to work out and possibly we will have obtained information well enough ahead of next season so you will have time to make such purchases if you think it economical.

HEATER COSTS—THEIR ECONOMY?

Here is data from which you can figure this out—not conclusive by any means—but the way to figure it out yourselves. You will recall that citrus growers have been carrying on Cost Studies in Orange County. We have segregated the orchard heater costs over the last ten years in Orange County and these figures will not fit into your interior valleys and possibly may not fit Whittier or San Gabriel. Maybe Ventura, I don't know. We have found in these cost records, over ten year period, that the average cost of equipping an orchard was \$230.00 per acre with 50 heaters of standard equipment—50 nine-gallon heaters to the acre. Now your equipment consists of those 50 heaters and a storage tank, capable of storing fuel for four or five nights, tank wagons, etc.—\$230.00 per acre. Figure depreciation at 10%—we think that is fair—\$23.00 per acre—whether you use them or not. Then on top of that, interest at 6% will be somewhere around \$13.00. There is \$36.00 per acre overhead and that will hold good for whatever county you are

in, but your cost of operation is the thing that will vary with the district.

In the ten year period it cost our men down here in Orange County about \$5.00 an acre for fuel and \$5.00 per acre for operating those orchard heaters per year over a ten year period. Now during that ten year period we haven't had a major freeze as we had in 1937. Those are just normal cold seasons for Orange County conditions. Those figures will not hold true for the interior—which will probably double that. This year it may be four, five or six times that much. You might go home and figure it out yourselves. If that is the condition, at what point would it be desirable to install heaters? That \$36.00, plus \$10.00, is \$46.00 per acre. Now what are your returns for avocados? We will illustrate with two figures. At 10c a pound—the first figure I gave you was \$23.00 per year and \$13.00 per year, making \$46.00 per year plus operating costs; divide that by 10c a pound—460 pounds per acre per year. That is what it would cost to maintain heaters whether you use them or not. Now if you want to use 5c per pound—920 pounds per acre per year is the cost of maintaining. I am just giving you a cue. Can you afford to put in heaters if you lose an average of 920 pounds of fruit returns to maintain them? You may say "I don't lose that each year.—only the tenth year." But you lose 9,200 pounds over a ten year period. Then you just about break even on the cost of maintaining equipment, at 5c a pound to you.

Q. May I ask the speaker if there is any pronounced advantage in having the windbreaks he speaks of in areas like La Habra where we don't have winds?

A. (Wahlberg) I think not. Do not put in windbreaks unless you find sufficient loss from wind injury—not only in windfalls, loss of fruit, but with respect to reduced growth of your trees, and lack of production. If you don't have that, don't put in a windbreak.

Mr. Gardner: We who work with avocado growers are all very much impressed with the class of people that grow avocados. They just seem to be a little bit better than the rest to get along with. They take a serious interest. It encourages the Farm Advisors and the Avocado Departments to go ahead and start these meetings. As I have said before, the Institute has been moved ahead to the fall, and on this coming program we will provide a longer period for questions and answers, which has been requested. We are going to try to provide a little less program and try to answer your questions a little better.

If no more questions, we stand adjourned.