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# ESSENTIALS IN AVOCADO CULTURE

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We have been talking in many groups about the present agricultural depression. How are we going to meet that situation? Returns for agricultural products have been going down, the trend has been going down for practically all of our products. We have very little influence on the consumer's end. There are conditions over there in the centers of population that influence the purchasing power of the people who are accustomed to using your product over which we have no control. These conditions are world-wide today. They are beyond your influence and control but there are things that are within your control in this producing business and they are right here in your own grove, and that is where our salvation is going to be. The marketing association is doing as much as it can to meet the other situation but the individual grower can meet the cost factor on his own acre, two acres, five or ten acres, as the case may be.

My discussion here is preliminary to the two days' program. I do not want to go into too much detail for fear of encroaching on the subject matter of other speakers. But I want to point out some of the things we feel are of primary importance in the program of avocado production and on the other hand to point out some of the things that are being done that we consider to be of minor importance—non-essentials.

The subject of my discussion is "The Essentials of Avocado Production." Well, what is the first thing? I will put it down here on the blackboard. I do not know that I will put all these down in the order of their importance but I have five essentials in relation to economic avocado production.

1. A good soil.
2. A good tree.
3. Proper soil moisture control.
4. Fertilization.
5. Exposure—
   (a) To wind.
   (b) To frost.

These, I believe, are the essentials that we must take into consideration in the production of avocados, and I will, if I have time, point out briefly a little later on some of the non-essentials, there are a long list of them. What I mean by non-essentials is not

that we can get along without them but we do not have to worry about them as much as about these particular factors I have outlined on the board. The three principal non-essentials are:

1. Cultivation.
2. Cover cropping.
3. Pruning.

Now we will take each one up in their order. As I say, I have not placed these in the order of their importance but probably in a general way that might be considered a fairly good order.

A Good Soil: In this nine thousand acres of avocado plantings we have in the state, we have a great variety of soils. As you come from Ventura down through Los Angeles and Orange Counties and down into San Diego, you have all types of soils, and some of you are confronted with very serious problems at the present time because of that one factor—Soil. One reason why the avocado industry is faced with an exceptionally important soil problem is it has endeavored to get into the thermal belts, which thermal belts have not always had a uniform soil condition that you find in the large areas devoted to other crops. A great deal of our planting we find on slopes, hillsides, and rolling contours. Naturally on that type of typography, we are going to find a tremendous variation in soils. Some people have been very fortunate in getting soils that are comparatively deep and of good texture. Others have bought, some with their eyes closed, and even in some cases with their eyes open, very spotted situations and we are coming across them every day in the year. Some of you are faced with this problem of poor soils, spotted soils.

What is a good soil for avocados? Well, there is quite a large range of good soils for avocados. We find good trees growing on fairly heavy soil. We find the majority of good trees growing on what we would call the medium textured soils. Then we find some good orchards located on sandy-loam soil. From our observations in these various counties, we feel a good soil should be at least three feet deep. Trees will grow on a less soil than that but a good soil would have to meet that requirement—three feet or more in depth, and one that is properly drained, and one in which the moisture will move satisfactorily. It should be a soil that contains a fair amount of organic matter—in other words, that contains some native fertility where the organic matter has not been burned out or consumed by the natural elements during the past ages. Of course, in this semi-arid country of the Southwest, we find the organic content of most of our soils is rather low but a good soil will have a comparatively fair amount of organic matter. I am pointing out the ideal. A good soil will not be a tight soil. We are having considerable difficulty in some of our young orchards particularly, and we are finding it in some of our older orchards—trees going to pieces on tight soil which is subject to excessive irrigation. It holds the water for a long period of time and we are inclined in many cases to make too many applications of water during the season on those heavy soils. They do not give up their moisture readily and as a consequence we find a good deal of root rot, decayed roots and a funny thing is that we are finding it on exposures on hills where we would naturally expect the drainage to be perfect. As a matter of fact, on many of these hills, we find pockets and the drainage is rather imperfect. Going ahead on the

assumption that the drainage is good, some of us in the past have been inclined to put the water on too frequently and have caused a saturated root zone in these holes dug out to plant the young trees on the side of the hill, and the consequence is we have a hole full of water and in a period of a few months or a year, the trees die as with heart failure. Well, it can be traced to a certain extent to the use of water on some of these supposedly well-drained soils, the tight soils of the hill-slopes that do not provide the good drainage. You can see that soil is an important factor.

The second fundamental factor in good orchard management to insure the best returns possible is A Good Tree. A good tree is the foundation of your orchard. You are not planting this orchard simply for one year, or two years, or even ten years. You are planting, you are establishing an institution that you expect to keep going for at least forty-six years. Why do I say forty-six years? Some of you are smiling because you are familiar with our depreciation table in connection with our cost studies. We sent out a questionnaire about a year ago to a group of people in the avocado industry whom we felt had very good judgment and whose experience we wanted to lean on to determine what they considered to be the average life, of the average avocado grove under Southern California conditions. Some came back with the statement, "We haven't had the avocado in Southern California long enough to know what its life will be." But we needed a depreciation table for this cost study. We went to practical growers, the staff of the experiment station, and the officials of the marketing organization. When we got their answers all back, we found that forty-six years is the average estimated life of an avocado grove under our conditions. Now contradict that, if you will. Some of you will say, "fifty years," some "sixty," and some "thirty." Yes, but for the basis of this cost study you will average about forty-six years. You have an orchard then that you expect to maintain for forty-six years or better. That means you have to have a good foundation.

It means, in selecting your tree, you don't want to go blindfolded; you want to be sure you are getting a proper root-stock and that the scion of this particular tree comes from good parentage. I don't want to take the time to go into a discussion of the merits of one particular root-stock as compared with another, the Guatemalan as compared to the Mexican. In the light of our present knowledge, it appears that the Mexican stock is the hardiest as far as resistance to cold is concerned and most of the nursery men are using the Mexican root-stock. But there are all kinds of Mexican stock—good and bad. You have the vigorous root-stock and you have the weak root-stock and it isn't necessary for me to emphasize the advantage of a vigorous-growing Mexican seedling as a root-stock for your future tree over a weak seedling. So it is desirable in the selection of your tree to know something about the type of growth and the origin of that root-stock as well as the bud, the graft, or the scion. It is probably a little easier to check on the latter than it is on the root-stock but it is essential to investigate the sources of both factors that make up that tree, the root-stock and the scion.

Now we have a large number of trees in Southern California that are coming into bearing at the present time. We have some individuals that are showing up splendidly as far as yield is concerned, as far as quality is concerned, and the other factors that go to make up a desirable commercial fruit. Those are the trees from which we should select our buds for future nursery plantings. The individual grower and prospective planter should take time enough to investigate the source of the scions that go into the

trees he is going to plant.

**Proper Soil Moisture Control:** You are going to hear more about that during the session. In this arid Southwest, irrigation practice, soil moisture control is one of the fundamental factors in good orchard management. We cannot consider the practice of irrigation as an operation which simply affects the application of water but it affects all other phases of orchard management. You cannot divorce irrigation practice from your fertilizer practice. The two go hand in hand. Desirable irrigation practice will conserve your fertilizer elements in the soil and keep them within the bounds of the root zone on your lighter soils, particularly where there may be any possibility of leaching. Too often do we go into orchards that are located on the lighter soils and find that the penetration of the water is going down seven, eight, ten, or twelve feet when as a matter of fact the root system only goes down two and a half, three or four feet. What is the consequence? One is not only using twice as much water as is necessary on that particular area but you are also depleting the supply of soluble plant food elements in that area and carrying them down below the useful area in which the roots are penetrating. So you see in the lighter soils particularly that you can conserve and get the maximum results from the fertilizer application by proper irrigation practice. On the heavier soils, just in brief, I would say we must be very careful about the amount of water and frequency of water application. The avocado tree is very susceptible to excessive irrigation. I think we are beginning to realize that more and more as time goes on and as we make more contacts with you growers in the field. We are finding that irrigation practice has a very close relationship to the health, vigor, and production of the avocado grove. If I were to emphasize any one of the five management factors, probably Irrigation practice would be one of the most important.

**Fertilization:** As a general rule in California, our soils are low in organic matter and available nitrogen. As a general rule, they are fairly well supplied with the other plant-food elements that go to make up the requirements of the tree. So it seems to us at the present time, a least for the want of better information, that we should place our expenditures for fertilizer on these two elements—organic matter and available nitrogen. The amounts to be applied will be discussed later on by Mr. Rounds. Satisfactory avocado production is unlikely without the application of fertilizing materials. In some soils that may fortunately have a good supply to start with, the artificial application of fertilizer may be delayed for some time but there is no question, as we watch these older orchards and see them draw upon the native supplies of that soil, that they are going to require good amounts of fertilizing materials.

**Exposure:** The avocado tree is a sub-tropical plant. It comes to us from the more tropical regions of Mexico and Central America, where the climatic conditions are ordinarily comparatively mild. That means then in their natural habitat, during the ages of growth in the past, they have accustomed themselves to a comparatively mild environment. So it behooves us then in transplanting this sub-tropical tree into our local conditions that if we are going to get the best results, we must endeavor to imitate the

environment that it is accustomed to. That is the reason we are looking for these thermal belts, so-called, and selecting the higher elevations to get away from the lower temperatures. If we do not have a location that presents this favorable mild climate during the cold season, then it is probably economic and advantageous to provide artificial means of maintaining those temperatures so as not to jeopardize the production and quality of this fruit. There are some orchards in this coastal belt that are right on the border line in respect to winter temperatures. It is a matter of economic study in those areas to determine whether or not the installation of orchard heaters to protect that production is desirable. From a broad, general standpoint, in considering the location of a new grove, it is necessary to keep this exposure factor in mind.

The avocado also is very susceptible to wind injury. As the trees mature, they become more susceptible to wind injury. Young orchards apparently are less susceptible, that is after they have reached four or five years of age. There is a period in some areas of Orange County at least, where trees four to eight years of age do not show the effects of wind injury as do the trees older than that—eight years and upwards. Extensive observations convince us that the avocado tree needs protection from the wind. Probably the most practical method is the use of living windbreaks. Just what is the best type of living windbreak for your particular region may be a problem for you to work out. For our conditions in the coastal area of Orange County the Eucalyptus gives the fastest-growing protection. We can get that protection over a broader area in a shorter time by growing Eucalyptus globules. The damage due to windfalls and fruit injured on the trees through scarring is sufficient to justify the planting of a windbreak, and in some cases, if necessary, to do away with a row of avocados in order to afford that protection over the entire orchard. There is a place for the windbreak in some of the avocado orchards that do not have it at the present time. We are speaking of the experience we have in Orange County and I wouldn't be surprised if that is true in other counties. There has been a tremendous depreciation in the quality and quantity of fruit following desert winds because of lack of proper protection. Some of you are going to considerable expense to put in artificial wooden windbreaks. Where you have only two or three valuable trees on a point and it is not practical to protect with a living windbreak, you may be justified in that but it seems in some cases the expense is pretty high where these lattice windbreaks are being used. However, those favorable to wooden windbreaks feel that the lack of competition justifies the extra expense in providing that protection. More investigation will be justified in the comparative values of giving us artificial windbreaks.

Now, coming over to the less important features in orchard management:

**Pruning:** Pruning in the earlier period of the grove's history is necessary and desirable from the standpoint of establishing the structure of that tree, getting a good shape, etc. But I am speaking now of the general practice throughout the later history of the average grove—pruning is not an essential factor. Production will be obtained even though you happen to miss a year of pruning now and then. Certainly we can't get along without pruning entirely but we can get along without pruning where we couldn't get

along without fertilization or irrigation. There is room for considerable conservation on pruning in many groves. I have gone into some groves where there had been a riotous cutting out, pruning out valuable fruiting wood that ought to be on the trees. We are going to hear something about pruning from Mr. Newman, a practical grower, tomorrow.

**The Cover Crop:** The cover crop is one of the less important features in orchard management. It is one of the cheapest sources of fertilization and provides cheap organic matter where the trees do not cover the entire ground. In younger orchards I believe it is desirable but the welfare of the orchard does not depend on a cover crop as it does on the other important factors. There are different types of cover crops that will be mentioned in other talks on the program.

**Cultivation:** Cultivation is a bone of contention. The way some of you go after this cultivation business, you would think the life of the orchard depended upon it. Cultivation costs on bearing groves varied from $1.00 an acre up to $25.00 an acre, as reported in our cost summary. The $1.00 an acre didn't accomplish any cultivation to speak of but there is room for conservation in that $25.00 figure. That is a fairly high cost. Of course, if you are doing a lot of hand-work around terraces on a hillside, it doesn't take long for hand-labor to go up. But we have gone into many orchards where they had formed a habit of cultivating. I asked, "Why are you cultivating here today?" The answer was, "It is time to cultivate," or "We aim to cultivate once a month." When I asked, "Why do you do it?" the answer was, "Oh, well, it makes the orchard look nice, we are kind of proud of this piece of ground and I want it to look smooth and look well-kept." That is the attitude of a good many growers in cultivation practice. Pride is the motive of a good deal of cultivation that goes on. Pride is all right in the proper place provided it doesn't cut into the pocket-book too much or affect the yield or growth of the tree.

We cultivate simply to prepare the ground for furrowing out or getting the ground ready for irrigation. We cultivate to reduce competitive weed growth if it grows to such an extent that it draws unnecessarily upon the moisture content of the orchard. We do not cultivate primarily to conserve moisture. In the old school that used to be the gospel—to cultivate to conserve moisture —but we have learned better today—that cultivation does not necessarily conserve moisture except insofar as it reduces vegetative growth on that area on which you are growing trees which in turn take out moisture. There is room for some thought on cultivation. It is not an essential. The welfare and the yield of your grove don’t depend on high costs spent in cultivation. I take it and I am satisfied that many of the other men who have had an opportunity of seeing a lot of this work done in the South feel that thousands of dollars can be saved in this business of orchard cultivation. To give you an idea in relationship to citrus—the other large industry in our county is citrus. Some of our larger citrus orchards in this area have cut down their cultivation costs from fifty to sixty per cent. They have cut down their mechanical power and horse-power on the ranch fifty per cent. Many of the large operators have learned in these last few years that they have simply been wasting money on cultivation and are now getting as good if not better returns and a better condition of tree with less

cultivation. I think we are going to learn the same lesson in avocado growing. We are going to have a fuller development of these discussions. I am simply offering a few remarks as an introductory discussion for the school today. My time is up and I will yield the floor to Judge Halm.