

Costs in Avocado Production

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Consideration of the costs in Avocado production in this paper will be limited generally to items of expense in Avocado grove development on the limerock soils of the lower East Coast.

However, in passing I would like to mention the small but promising Avocado industry in the ridge section, located between Avon Park and Lake Placid, and briefly review production costs in this section compared to that of the lower East Coast.

Mr. W. F. Ward, of Sebring, in an address before the Society in 1928 stated that his average cost per acre through the first year, on a twenty-acre planting at Avon Park, was \$391.00. This represents a saving of approximately \$187.00 per acre over the average costs for the same period on the East Coast.

Although the above represents the experience of one man against eighteen who supplied the data on the East Coast, it is still worthy of consideration as the factors that caused this increase in cost on the coast are entirely foreign to the ridge section. I refer more particularly to such items as scarifying and removing rock, dynamiting holes for setting, etc.

The following itemized statement of cost per acre for Avocado grove development in the Miami-Homestead district represents the opinions and personal experiences of responsible growers interviewed by the writer. The average initial costs are based on reports made by eighteen growers, while the average maintenance costs are based on reports made by seventeen growers. The acreage represented is approximately 400 which is about one-half the productive planting in Dade County.

ITEMIZED STATEMENT OF COST PER ACRE	
Land	\$150.00
Clearing land	86.39
Scarifying and removing rock	58.33
Trees, 101 at \$1.25	126.25
Setting	109.16

Total Initial Cost	\$530.13
Interest at 8% for five years	212.05

TOTAL	\$742.18

ANALYSIS OF FIGURES IN THE TABLE

Unimproved land adapted to the production of Avocados may be purchased for \$150.00 an acre, and on the other hand, there is land which is desirable at \$400.00 per acre. The former figure quoted is regarded as a representative one for the location and time under consideration. Changes are taking place rapidly and these figures can not possibly be reliable for any length of time.

AVERAGE MAINTENANCE COST PER ACRE					
	1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.
Fertilizer	\$18.21	\$32.41	\$55.75	\$80.53	\$108.19
Hauling and applying fertilizer	1.25	1.75	2.96	4.28	5.59
Harrowing	8.76	8.94	8.76	8.18	8.12
Spraying	2.62	3.15	9.07	12.26	12.73
Pruning				1.22	1.89
Hoeing	13.91	13.37	13.42	12.89	12.13
Mowing	3.65	4.06	4.65	5.33	4.53
TOTALS	\$48.40	\$63.68	\$94.61	\$124.71	\$153.18
GRAND TOTAL					\$484.58
Interest at 8% on maintenance charges					94.64
*Total Maintenance Cost					579.22
GRAND TOTAL COST PER ACRE					\$1,321.40

*\$20.00 added to this amount for taxes and unclassified items of expense.

The cost of clearing land varies considerably from grove to grove. Where the timber has been cut for several years the stumps are loose and easily pulled out with a tractor. While the lands with standing timber or recently cut over present much more difficulty in clearing because of the roots being firmly imbedded in the rock. Clearing costs in this report represent the expense necessary to remove and burn the trees, stumps, roots and palmettoes. The cost averaged \$86.39 per acre.

Scarifying is a practice that has come into use within the last few years and consists of plowing up the rock to a depth of six or eight inches with a heavy steam tractor and a specially designed plow. This practice levels the land and permits greater root expansion of the tree and facilitates cultivation. The early plantings of Avocados were made without scarifying which prevents a satisfactory maintenance system. Many growers plant vegetables between the rows of Avocados on scarified land for the first two or three years, and the practice is recommended to prospective grove owners as a source of income prior to the bearing of the grove. Scarifying is done by concerns or individuals who own steam tractor outfits at a fixed price per acre, depending upon the condition of the rock on the land. To properly scarify land several plowings are often necessary. The first plowing is the most difficult and the charge is correspondingly higher. The writer was advised by a concern doing scarifying that on an average they charged \$25.00 for the first plowing and \$10.00 for each additional plowing. The

consensus of opinion among growers interviewed was that four plowings would usually be sufficient for proper scarification. The average cost for this item was \$58.33 per acre.

The early plantings were made in about the same manner as citrus fruits with 48 to 69 trees to an acre. The tendency has been in the last few years to plant them much closer using a hundred or more trees per acre. Experience of growers is to the effect that close planting soon shades the ground which is a material asset to better growth of the Avocado in this section. Also the additional production secured by the increase in number of trees per acre will far offset the additional expenses of extra trees, planting, fertilizer and cultivation. The number of trees per acre reported by growers varied from 48 to 170, the average being 101. The average price being charged for trees by nurseries at this time is \$1.25 each.

The costs of setting include the dynamite and labor for blasting holes in the rocks, labor for cutting around hole and working in fertilizer, planting the tree, shading and watering. The solid rock formation of the soil in this section makes it necessary to use dynamite for making a hole in which to set the trees. The average cost for the dynamite and labor for this item was sixty-seven cents per tree. After the hole has been blasted it is necessary to chop the rock and soil, and a little fertilizer, together in the hole before setting. The average cost per tree for this performance and setting the tree was 14.7 cents. The trees are usually shaded their first summer with a simple covering of lath and burlap. The trees are watered liberally at planting and re-watered at frequent intervals until safely established. The combined average cost for these operations was twenty-eight cents per tree, approximately sixty-five per cent of which was for watering. Forty-one per cent of the growers did not shade at all, while others used palmetto fans instead of lath and burlap which materially reduced the cost.

Avocados are heavy feeders and fertilizer is by far the largest item of expense in maintenance. The analysis of fertilizer used on young or old trees varied very little; the usual formulas being 6-6-5 or 5-5-5. The nitrogen used in Avocado fertilizers was derived from organic sources and the cost was higher because of this condition. Calculations in this report are based on \$50.00 per ton and the hauling and applying is figured at \$2.50 per ton. The average amount of fertilizer applied per tree the first year was 7.2 pounds. The highest amount applied by any individual was twelve pounds and the lowest three pounds.

The second year the average amount applied was 12.9 pounds with a high of twenty and a low of six pounds. The average for the third year was twenty-two pounds; the highest amount applied being fifty-one pounds and the lowest twelve pounds. For the fourth year the average yearly application was 32.8 pounds; the highest application being seventy-five pounds and the lowest fifteen pounds. The fifth year the average amount applied was 42.8 pounds with a high figure of eighty-one pounds and a low of twenty-one. The average number of applications made the first two years was four, while three applications a year was made thereafter. From the variations in the above figures it is to be observed that it is a difficult matter to overfeed an Avocado tree.

The item of harrowing, or "dragging" according to the local term, is a practice employed by all growers more as a protection against fires than for cultivation. The system followed is to drag a heavy iron wheel or bar behind a tractor which in passing over the

rocky soil produces an effect similar to the grinding of millstones. This grinds up the grass and weeds, reducing the fire hazard yet do not disturb in any way the root systems of the trees. The usual practice was to drag the grove two or three times a year and the average cost for this work was \$8.55 an acre per year.

Fifty-three per cent of the growers practiced spraying the first year. Only one application was made which was either lime-sulphur for red spider or Bordeaux mixture for the bark fungus which is often fatal to young trees. The average cost per acre for the first year was \$2.62. Sixty-five per cent of the growers sprayed the second year with the same materials and for the same troubles as listed for the first year. The average cost was \$3.15 per acre.

Eighty-eight per cent of the growers sprayed the third year and three to four applications were made. Usually an application of lime-sulphur was made to control red spider, and two or three applications of Bordeaux mixture (3-3-50) for the control of scab which affects the fruit and foliage; and for "black spot" which affects the fruit. The average cost for spraying the third year was \$9.07 per acre. Ninety-four per cent of the growers sprayed the fourth and fifth years. The kind and number of applications were practically the same as described for the third year. The average cost for spraying the fourth year was \$12.26 and for the fifth year \$12.73 per acre.

The growers reported expense for pruning and this was incurred only during the fourth and fifth years. The growers generally agreed that Avocados require little pruning if properly headed at planting time. Some dead twigs and small branches must be removed every year but this work is usually accomplished when the trees are hoed. The expense is small and is absorbed in the charge for hoeing. The average cost as given for the fourth year is \$1.22 per acre and for the fifth year \$1.89.

Practically all the growers hoed their trees from two to four times a year. The general practice was to hoe the trees after each fertilization so as to incorporate the fertilizer into the soil. The average cost per acre for hoeing had decreased slightly in the fifth year. This is due to the fact that a hundred or more trees planted on an acre begin to shade the ground to such an extent that weeds and grass, are being choked out and less hoeing is required.

Approximately fifty-nine per cent of the growers reported the practice of mowing. Where mowing was done frequently, only one dragging a year was usually made. The number of mowings varied from one to three and the average cost per year was \$4.45 per acre.

The setting of 100 or more trees to an acre will shade the ground sufficiently after the fifth year so that the expense for dragging, mowing, and hoeing will be materially reduced. However, the expense for fertilizing and spraying will continue to increase year to year.

Mr. Ward: In the last year or two there seems to have been quite a little discussion by the East Coast growers about the use of fertilizer, and there has been great variation in opinion. During the last year, have they come any nearer getting together as to what they really need as to fertilizer? Do they still use as much potash as they were trying out a couple of years ago? Have they found heavy application was detrimental or beneficial?

R. A. Carlton: I have not talked to any of the growers this spring about this, but the practice last year continued about the same. However, the storm so upset production in that area that it would be hard to make any definite statement as to what would have occurred had the season finished normally.

Mr. Ward: There seemed to be a diversity of opinion. Some growers maintained they should use large amounts, and others maintained only two to three per cent of potash, but some growers were using from two per cent up to twelve or thirteen per cent of potash, and we do not know absolutely what is best. That is why we are seeking information from the outside. We are hoping our experiment station will be in a position to start some tests at the Avocado station.

Mr. Carlton: In the course of this data a few individuals were using a rather high potash analysis at that time, but the average were not using more than five or six per cent. That is the basis I used in this report.

Air. Dorn; We have had some unintentional experiments in Dade County in high and low potash fertilizer. We have one grower who has been using a great amount of nitrate of soda. One block of Waldens started dropping about the first of August, and dropped heavily during August. It was forced by the ammonia. Another man is going in the opposite extreme, using very high potash, and his trees did not have the typical dark green appearance of most trees, nor did his fruit drop as freely. It would seem that about the proportion used on citrus would be correct for Avocados.

Mr. Futch: I think Mr. Jefferies could enlighten us on that, if he is here.

Mr. C. I. Brooks: He is not here. Mr. Roux has Avocado groves he fertilizes himself, and knows the formula from the standpoint of manufacturing and application. Mr. Roux, I wish you would tell us what you find as to that.

Mr. Roux: In regards to potash, we have tried it, low and high, but the storms have practically taken all our tests. This year we are staying low in order to develop all the tree growth we can get. We do find that potash on the Avocado will retard tree growth. We want our trees to get all the growth they can, in order to produce fruit the coming year, so we are holding our potash down. I believe the Guatemalan variety will do better with higher potash content, while with the West Indian variety we are going on the theory that high phosphoric acid content with considerable nitrogen and lower potash will mature that variety quickly. We haven't anything definite yet, that we can give out, as being authoritative. We have an Experiment Station starting now, and that will be worked out in that new station. We hope in five or ten years, however, to be able to give you something that will be valuable, but I would not attempt to give you anything now. I do not know. One time I think I do, and then another time I know I don't.