

AVOCADO FEASIBILITY STUDY

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Avocado feasibility and variety selection began on Rio Farms in the late 1940's in cooperation with the Texas A&M Agricultural Experiment Station. After extensive screening it was found that the Lula, accepted as a West Indian Guatemalan hybrid, was the best variety suited for production in the Lower Rio Grande Valley of Texas.

The Lula, a seedling hybrid, was found in South Florida about 1915 and came into commercial production in 1921. It has been accepted by the market trade and produces good crops of high quality fruit. The fruit is pear shaped, 3 to 4 inches in diameter, weighs 12 to 20 ounces, dark green smooth to light pebbly skin and has creamy and sweet flesh. The foliage and small twigs and branches are cold tender; temperatures of 27°F, (-3°C) for several hours will cause some foliage and wood injury.

Severe freezes for the Valley, below 22°F, in 1949, 1951 and 1962 interrupted much of the early experimental work. However, by the late 1960's, exploratory plantings at Rio Farms and elsewhere in the Valley indicated that avocados could be grown successfully in this area. To more accurately determine the feasibility of commercial production Rio Farms planted 13.69 acres with Lula avocados in 1970.

Procedure

Care was taken in selecting the avocado orchard site. It is higher than the surrounding land and surrounded on all sides by an established windbreak of Athel (*Tamarix aphylla*) trees about 25 to 30 feet tall. The soil is a Willacy fine sandy loam with good surface and subsurface drainage.

The previous crop for several years was milo. The land was machine bench leveled flat, prior to planting, to obtain uniform distribution of irrigation water and to minimize runoff from rains.

Avocado trees, one year old, grown by Rio Farms, were planted in the fall of 1970 at two spacings, one 12 x 24 feet and the other 11 x 22 feet, or 151 and 180 trees per acre respectively. A drip irrigation system was installed in December 1971. Both chemical and mechanical cultivation have been used to control weeds, with main reliance on the use of herbicides.

No appreciable amount of fertilizer was applied to the planted trees until 1974. In 1974 one fourth pound of nitrogen was used per tree, this has gradually been increased to one pound of nitrogen per tree by 1977. The fertilizer is applied at intervals through the drip irrigation system.

To protect the young tree trunks from freeze injury they were soil-banked until 1976. In December 1973, a moderate freeze killed the trees back to the earthen banks. The injured trees were pruned back to live wood. The pruned trees recovered rapidly by bud sprouts above the bud or graft union. The freeze delayed coming into production by one to two years.



Figure 1. Avocado trees, 15-20 feet tall, planted in fall of 1970, frozen back to the banked soil in December 1973; recovered, and produced a good crop in 1976 and 1977.



Figure 2. High quality avocados packed in one-layer cartons for the fresh fruit market.

Table 1. Cost of establishing a 13.69 acre avocado grove, yearly maintenance and yields, 1970-77.

	1970-71	1971-72	1972-73	1973-74	1974-1975	1975-76	1976-77	Total	Avg. annual cost per acre
Land leveling touchup	\$ —	\$ 203.65	\$ —	\$ —	—	\$ 41.25	\$ 24.80	\$ 269.70	\$ 2.81
Pruning trees and wind break	421.00	—	432.80	211.65	297.60	34.80	130.1	1528.02	15.95
Planting	7783.55	—	—	—	—	—	—	7783.55	81.22
Re-planting	4.20	492.50	210.80	261.20	151.60	418.80	—	1539.10	16.06
Weed control	283.35	1725.25	1236.74	1730.62	2941.01	3530.54	2921.50	14369.01	149.94
Insect Control	63.00	139.22	(2.26)	11.10	—	—	145.00	356.06	3.72
Irrigation ¹	26.75	2835.50	343.40	373.98	449.62	391.40	1456.25	5876.90	61.33
Fertilizer	—	10.00	—	12.00	77.65	244.90	563.22	907.77	9.47
Banking	39.60	89.70	228.40	—	736.10	863.45	—	1957.25	20.42
Heating and shade	87.05	1637.15	193.70	120.90	290.25	125.70	309.51	2764.25	28.85
Harvest and packing ²	—	—	—	—	—	600.07	4080.00	4680.07	—
Management supervision and overhead	629.60	2470.41	1322.58	880.75	1426.38	1675.96	1893.17	10298.85	107.47
Annual orchard cost:									
Total cost	9338.10	9603.38	3966.15	3602.20	6370.21	7326.80	7443.62	47650.46	
Cost per acre	682.11	701.49	289.71	263.13	465.32	535.90	543.73	3480.68	497.24
Yield, pounds per acre					140	3,500	9,340	12,980	

1. Drip irrigation system installed - December 1971.

2. Harvesting and packing costs not included in orchard care costs.

Results

In October 1975, 140 pounds of fruit per acre were harvested from the grove. Avocados were harvested in September through November in both 1976 and 1977. In 1976, 3500 pounds per acre and 9340 pounds per acre in 1977, field run, were harvested; 85 percent of which was marketable, Table 1. The amount of culled fruit was below 15 percent.

A planting cost of \$568.56 per acre was incurred. Some of the major costs for the past 7 years were management supervision and overhead \$107.47 annually per acre. Heating and shade averaged \$28.85 per acre and banking cost \$20.42 annually. Irrigation costs averaged \$61.33 per acre per year. Weed control averaged \$149.94 per acre annually. These costs represent the greatest dollar outlay in bringing the avocado orchard into production, Table 1. The average annual orchard care cost per acre for 7 years was \$497.24.

Discussion and Conclusions

Certain horticultural practices are of the utmost importance in establishing and caring for an avocado orchard; good drainage of excess water, both surface and sub-surface; and a low soil salt concentration head the list of priorities. A 3 to 5 percent mortality rate in new plantings is not uncommon. It is important to replant the skips soon after they occur. If the skips are left unplanted, then heating, irrigation and fertilization will not be used to the best advantage. A wind break developed prior to planting is a big help during the winter and windy spring months and especially if heating efforts are going to be made.

Good weed control is a must. Weeds can take their toll in soil nutrients and water and a winter weed cover increases the freeze hazard over weed-free soil during sub-freezing weather. A combined mechanical and chemical weed control program should be used because young avocado trees are sensitive to many herbicides. The major insects causing damage in the avocado orchard are ants and termites. Some scale insects infest avocados but they have not been a problem in the Rio Farms' orchards.

Any irrigation system that can supply sufficient water without overwatering can be used in an avocado orchard. Rio Farms decided to use a drip irrigation system because avocado trees are sensitive to over and under irrigation. With a drip system the delicate balance between too much and too little soil moisture can be maintained more easily. Other advantages of the drip system are: fertilizer can be applied through the system; reduces excess growth of weeds in the row spaces between the trees; and materially reduces irrigation labor costs.

The fertilizer needs of a young avocado orchard are fairly light and as a general rule close monitoring of the foliage is important. A commercial producing orchard would normally require around 150 pounds of nitrogen per acre annually. If the fertilizer is all applied at one time, it would be best to put it on in January or February, before the blooming period. Split applications will usually result in better growth responses. Zinc and iron levels in the leaves should be closely monitored for deficiencies. Leaf symptoms can be verified by having a leaf analysis done.

Freeze protection of the avocado orchard is important. Young avocado trees, up to 3 to 4 years old, should be banked or wrapped with insulation to protect the basal part of the stem. Young orchards, before coming into production, are difficult to heat because of lack of a canopy cover. Some form of heating should be should be provided that will give several degrees of protection from sub-freezing temperatures. Maintaining an avocado orchard without implementing a heating system in the Rio Grande Valley is quite risky. At Rio Farms a solid petroleum brick block has been used when heat is needed.

Young planted avocado trees may be injured by sun burn. Partial shade may be needed until the trees are 2 to 3 years old. Palm fronds are frequently used or burlap fastened to two stakes may be placed to give protection from the direct sun rays during mid-day.

Loss of mature fruit to thieves and rodents is often a problem in a productive orchard. Adequate protection from such losses can be expensive. A well constructed vandal type link or electrified fence will give considerable protection. However, cost of protection

increases rapidly if it is necessary to hire a guard patrol. Approved rodent control measures should be used when rodents become a problem.

Land value, interest on investment, harvesting and marketing costs, were not taken into consideration in Rio Farms' avocado feasibility study. Even though orchard care and management cost reached \$3480.68 per acre at the end of 7 years it is believed that avocado production has a place in the economy of the Lower Rio Grande Valley.