

A PRELIMINARY ECONOMIC ASSESSMENT OF GROWING CACTUS FOR FRUIT PRODUCTION IN SOUTH TEXAS

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The reports of high production levels of prickly pear fruits on non-irrigated land (Barrios, 1990; Escalante and Vazquez, 1986; Hernandez *et al.*, 1987; Russell and Felker, 1987; SAG, 1976; and Wessels, 1988) suggested that cactus fruit cultivation might be worthwhile endeavor in Texas. Unfortunately, no cactus fruit plantations exist in Texas and therefore it is not possible to directly measure the economic viability of growing cactus for fruit production.

However detailed reports listing the material costs and labor requirements for growing cactus fruits in both Mexico and Chile are available in Spanish (SAG 1976; Hernandez *et al.*, 1987). The economic returns from these plantations appear quite exceptional in the Chilean (SAG, 1976) and Mexican (Hernandez *et al.*, 1987) reports. However it is not possible to directly convert the profits from this operation into U.S. currency since the labor and machinery rates are different in both Chile and Mexico.

Therefore we assigned costs to the operations deemed necessary in Chile and Mexico using the Texas Custom Rate Guide (Texas Custom Rates, 1985) published jointly by the Texas Department of Agriculture and U.S. Department of Agriculture. We then developed a spreadsheet using Lotus 1 2 3 for the economic returns over a 12 year period. The advantage of this program is that by simply changing any item in the analyses, (such as the labor rate) the profit(loss) statement for all years is automatically computed. This Lotus program is titled Cactus.WK1 and is available free of charge by sending a blank IBM compatible diskette to Peter Felker at Texas A&I University.

The analyses shown in Table 1 assumes a labor charge of \$7/hr for all operations. This is the cost of hiring the employee and not what the employee receives. If the employee benefit package were 33%, then the employee would receive about \$5.25/hr. Costs for disking and bedding the soil approximate the figures provided in the Texas Custom Rate report. The initial planting of 269 plants per acre was based on a recommendation that the plants be grown on beds 16.4 ft apart (5 meters) and 9.84 ft (3 m) apart in the row.

For the lack of a better estimate, the cost of the planting stock was derived from 1989 prices of planting stock in Mexico of about \$0.35 each (Dr. Facundo Barrientos

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Perez-personal communication). If an established planting were available to use for planting stock, there would be little cost associated with this figure.

The number of hours for planting/replanting, trimming and weeding were taken from the Mexican and Chilean data. The use of the herbicide spike at 2.5 lb/acre is based on the research of Felker and Russell (1987). However, this herbicide has not been labeled for use on cactus.

A literature search on pesticides cleared for use on cacti by Annie L. Tyrone of the Texas Department of Agriculture found 34 products registered. However nearly all of these are insecticides and fungicides used for growing cactus for ornamentals and not for human or animal consumption. The only insecticide currently registered for use on cactus fruit is Sevin to control the cochenille.

Treatment with insecticides two times per year was found necessary by the Mexican agronomists. Aerial application costs are generally about \$2.5/acre and material costs for many insecticides is about \$15/application.

The Mexican reports suggest that about 3 months after planting, 22 lb of manure be applied per plant. The Mexican report also recommended 5 ounces (140 g) per plant of ammonium sulfate and 4.6 ounces (130 gram) per plant of super phosphate. Costs for the mineral fertilizers at South Texas Feed and Seed in Kingsville Texas were about \$220/ton.

Fruit yields were reported to be about 1,000 lb/acre, 2440 lb/acre and 4,000 lb/acre in the third, fourth and fifth years respectively. In Mexico it required 8 hr/acre, 14.5 hr/acre and 25 hr/acre to harvest the fruit in the third, fourth and fifth years. Based on the Chilean literature we assumed that only 60% of the fruit would be in the first and second grade of quality and therefore marketable. The yields of fruit past the 5th year were extrapolated based on average of several reports (Barrios, 1990, Escalente and Vazquez, 1986; Hernandez *et al.*, 1987; Russell and Felker, 1987 and Wessels, 1988).

As of this writing we did not have costs required to process the fruit to remove the spines and glochids.

The wholesale price per pound is undoubtedly an area of considerable uncertainty. It is our observation that the retail price of prickly pear ranges from about \$1.80/lb in peak season to over \$4./lb in the middle of the winter when little fruit is available. Therefore we assumed that a price of \$0.50/lb would be a reasonable price for the farmer.

Given these assumptions it appears as if an outlay of \$623/acre would be required before any sales occurred. During the third year, sales would exceed costs, but the initial

investment would not be recovered until the fifth year. From the 7th year on, annual returns would be about \$1500/acre.

However some caution is necessary. Texas A&I has identified two clones that appear especially promising for the Kingsville area. These are accession number 1288 that is a thorny plant that produces a lime-green fruit and accession number 1287 that is a thorny plant that produces a peach colored fruit. In the winter of 1989, cladodes taken from these plants after they had been subjected to 20 F had no damage. However 2 days later when the mother plants experienced 20 hrs below 20 F freezing and a minimum of 10 F, the 5 year old plants froze to the ground and did not resprout. However, single cladodes planted the previous year of the same clones did resprout. We believe that a secondary infection (maybe a bacterial soft rot) set in after the freeze that was responsible for the death of the plants.

Since 20 F freezes normally occur only every 10 years and 10 F freezes normally occur only every 50 years, freeze damage should not be a problem for these clones in south Texas. If a net profit of \$1700/acre could be obtained in 6 years from a \$623 investment, it would be still be economically viable to have the crop entirely frozen to the ground every 6 years.

The clones 1287 and 1288 are in very short supply due to the freeze of 1989. Fortunately the Driscoll Foundation provided funds to hire an undergraduate student to propagate these clones by tissue culture. As of August 1990 excellent progress has been made with tissue culture propagation. With a little additional funding for supplies, thousands of these plants could be available by the spring of 1991.

Without a processing facility in South Texas to remove the spines and glochids, these fruits will not be marketable. Hopefully the Texas Prickly Pear council will be able to develop a central processing facility for the cactus fruit.

Despite possible catastrophic losses from freezes and hurricanes, lack of processing equipment, lack of registered pesticides, and small numbers of proven fruit cultivars, there are no unmanageable obstacles to cactus fruit production in South Texas. With hard work and dedicated team effort, cultivation of cactus for fruit could be very rewarding economically for landowners both large and small.

Table 1. Prickly Pear Fruit Production Cost Estimates.

COSTS	YEARS												12 TOTALS	
	1	2	3	4	5	6	7	8	9	10	11			
INITIAL SOIL PREPARATION DISK & PREPARE SEED BED (COST/ACRE)	\$12.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$12.00	
BED THE SOIL (COST/ACRE)	\$10.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$10.00	
PLAN SPACING OF PLANTS (HOURS/ACRE) (\$/HOUR) (COST/ACRE)	8 \$7.00 \$56.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8 \$7.00 \$56.00	
INITIAL PLANTING STOCK 269 P/AC @ .35/EA	\$94.15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	\$94.15	
PLANTING/REPLANTING (HOURS/ACRE) (\$/HOUR) (COST/ACRE)	16 \$7.00 \$112.00	3.5 \$7.00 \$24.50	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	\$7.00 \$0.00	19.5 \$7.00 \$136.50	
TRIMMING (HOURS/ACRE) (\$/HOUR) (COST/ACRE)	\$7.00 \$0.00	\$7.00 \$77.00	\$7.00 \$105.00	\$7.00 \$101.50	\$7.00 \$126.00	\$7.00 \$157.50	\$7.00 \$189.00	\$7.00 \$220.50	\$7.00 \$252.00	\$7.00 \$283.50	\$7.00 \$315.00	\$7.00 \$346.50	\$7.00 \$2,173.50	
WEEDING: MANUAL (COST/ACRE) (SPIKE 2.5 LBS @ 10/LB) DISKING (COST/ACRE)	\$56.00 \$25.00 0	0 \$25.00 \$12.00	0 \$25.00 \$12.00	0 \$25.00 \$12.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	0 \$25.00 \$6.00	\$56.00 \$300.00 \$84.00
FERTILIZATION ORGANIC (3 T/AC@20/T) AM SULF (.03LB/P@220/T) SUP. PHOS. (.29LB/P@220/T)	\$60.00 0 0	\$0.00 0 0	\$0.00 10 10	\$0.00 0 0	\$60.00 0 0	\$0.00 10 10	\$0.00 0 0	\$0.00 0 0	\$0.00 10 10	\$60.00 0 0	\$0.00 0 0	\$0.00 10 10	\$0.00 10 10	\$180.00 \$40.00 \$40.00
INSECTICIDES (COST/AC) 2 APP @ \$15/APP	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$30.00	\$360.00	
HARVESTING (HRS/ACRE) (\$/HOUR) (COST/ACRE)	0 \$7.00 \$0.00	\$7.00 \$7.00 \$0.00	8 \$7.00 \$56.00	14.5 \$7.00 \$101.50	25.45 \$7.00 \$178.15	30 \$7.00 \$210.00	36 \$7.00 \$252.00	42 \$7.00 \$294.00	48 \$7.00 \$336.00	54 \$7.00 \$378.00	60 \$7.00 \$420.00	66 \$7.00 \$462.00	\$383.95 \$7.00 \$2,687.65	
YIELDS (LBS/ACRE)	0	0	1000	2440	4000	5000	6000	7000	8000	9000	10000	11000	63440	
TOTAL COSTS	\$455.15	\$168.50	\$248.00	\$270.00	\$425.15	\$448.50	\$502.00	\$575.50	\$669.00	\$782.50	\$796.00	\$889.50	\$6,229.80	
TOTAL FRUIT PRODUCTION	0	0	1000	2440	4000	5000	6000	7000	8000	9000	10000	11000	63440	
% OF FIRST AND SECONDS	0	0	600	1464	2400	3000	3600	4200	4800	5400	6000	6600	38064	
WHOLESALE PRICE/LB	\$0.00	\$0.00	\$300.00	\$732.00	\$1,200.00	\$1,500.00	\$1,800.00	\$2,100.00	\$2,400.00	\$2,700.00	\$3,000.00	\$3,300.00	\$19,032.00	
ANNUAL PROFIT (LOSS)	(\$455.15)	(\$168.50)	\$52.00	\$462.00	\$774.85	\$1,051.50	\$1,298.00	\$1,524.50	\$1,731.00	\$1,917.50	\$2,204.00	\$2,410.50	\$12,802.20	
NET PROFIT (LOSS)	(\$455.15)	(\$423.65)	(\$571.65)	(\$109.65)	\$665.20	\$1,716.70	\$3,014.70	\$4,539.20	\$6,270.20	\$8,187.70	\$10,391.70	\$12,802.20	\$12,802.20	

LITERATURE CITED:

- Barrios, E.P. 1990. El Nopal Tunero. Universidad de Guadalajara. 246 pp.
- Escalante, F.B. and Vazquez, N.B. 1986. El Nopal. Universidad Autonoma Agraria Antonio Narro, Buenavista Saltillo, Coahuila, Mexico. 202 pp.
- Felker, P., and Russell, C.W. 1987. Influence of herbicides and cultivation on the growth of Opuntia in plantations. *Journal of Horticultural Science* 63: 149-155.
- Hernandez, J.P., Aguilar, C.F.G., Martinez, R.R., Barrientos, J.P.M., Arrellano, M.S.L., and Uribe, G.R. 1987. El cultivo del nopal. Departamento de asistencia tecnica, Secretaria de Agricultura y Recursos Hidraulicos, Mexico, D.F. Mimeo 183 pp.
- Russell, C.W. and Felker, P., 1987. The prickly pears (Opuntia spp) as a source of human and animal food in semiarid regions. *Economic Botany* 41: 433-445.
- SAG (1976). Cultivo de tunales. Boletin Divulgativo No. 44 (Ceditec. 0/I5/77.1.500aja 11/3/77.R.30) (An extension publication of the Chilean Agricultural Service) 35 pp.
- Texas Custom Rates, 1985. United States Department of Agriculture, National Agricultural Statistics Service, Agricultural Statistician, Austin Texas. Bulletin 236. 22 pp.
- Wessels, A.B. 1988. Spineless Prickly Pears. Perskoo Publishers, Johannesburg Cape Town, South Africa.