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COST CONSIDERATIONS FOR GROWING TOMATO TRANSPLANTS[1]

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Abstract. **Estimated costs for growing tomato transplants in southwest Florida are presented. Tomato growers can grow their own transplants competitively with those they can purchase, if they have required managerial and horticultural expertise, and if they can obtain adequate capital to make the initial investments.**

Several Tampa bay area tomato growers are now expressing an interest in growing their own tomato transplants. High quality transplants are an important input in profitable tomato production. A grower must consider financial as well as horticultural aspects of transplant production.

The following analysis assumes the grower has the necessary managerial and horticultural expertise for successful transplant production. Several references including Baker (1), Marlowe (4), and Montelaro (5) provide information on specific horticultural and production practices. Johnson (3) provides information concerning disease, insect, and weed control useful for both transplant and mature vegetable production.

Per Plant Production Costs

Volume of production, initial investment and cost per plant revolve around the type of structure used. In this analysis, a low cost, high maintenance 34 x 224 foot wood frame structure double covered with polyethylene film equipped with automatic side curtains, benches, trays, and L. P. gas heaters is used. Initial investment in the structure with this equipment is estimated at $16,000 or about $2.00 per square foot of growing space. Structures of more substantial construction may have lower maintenance costs, but will result in larger initial capital investment.

Table 1 shows variable and fixed costs for producing 1 crop of 1-inch and 2-inch transplants in this house. The table lists each operation involved in growing the crop and estimates the requirements and costs for each operation. Piece rates and hourly rates include employees' net wage plus employer's and employees' contributions to Social Security and Workmen's Compensation.

Costs for fertilizer and chemicals are the same per house for both size plants. Treatment costs are based on green-

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Table 1. Tomato transplant production costs, Florida 1976.

Item	Size of transplant 1-inch	2-inch
Growing specifications		
No. transplants/house[z]	500,000	175,000
No. transplants/tray	200	72
No. trays/house[z]	2,500	2,431
Variable Costs		
Plant in trays		
coated seed ($0.45/1000)	$ 225	$ 79
soil mix ($1.44/cu. ft.)	642	661
labor (3 min./tray @ $2.50/hr.)	313	305
Daily observation ($40/wk. for 6 weeks)	240	240
Fertilizer (150 lb. 20-20-20 @ $0.40/lb.)	60	60
Chemicals (fungicides & insecticides)	257	257
Remove from trays[y]	500	243
Propane—17 gal./night @ $0.36/ gal. for 7 nights	43	43
Electricity to pump water	30	30
Interest on operating capital (10% for 8 wks.)	39	32
Total variable costs	$2,349	$1,950
Fixed Costs[x]		
Replace plastic annually		
Material	$ 670	$ 670
Labor	50	50
Depreciation ($15,280 investment house without plastic, straight line, 10 yr. life)	1,528	1,528
Taxes (structure & land)	210	210
Insurance (structure & equip.; plastic not ins.)	160	160
Planter depreciation ($850 investment, 10 yr. life)	85	85
Interest ($16,000 structure + $850 planter @ 10%)	1,685	1,685
Total fixed costs	$4,388	$4,388
Total fixed & variable costs	$6,737	$6,338
Fixed & variable cost per plant (100% germination)	$.0135	$.0362
Fixed & variable cost per plant (90% germination)	$.0150	$.0402

[z]The house is 34 ft. x 224 ft. in each case.
[y]Labor @ $0.20/1-inch and $0.10/2-inch tray.
[x]Includes no land or well investment costs.

house production space, rather than on individual plants treated.

Budgeted costs for chemicals are based on 2 applications per week. Fungicides and insecticides will be alternated with each spraying. If an infestation starts, a more intensive spray program will be initiated which could easily double or triple chemical costs.

Interest on operating money is calculated at 10% for an 8 week period or 2 weeks longer than the 6 week transplant production period. It is assumed all inputs will be on hand a week or two before production starts.

Annual fixed costs on the facility include depreciation, taxes, insurance, interest, and plastic. The plastic will be replaced each year. Therefore, it is taken out of the depreciable investment and treated as an annual repair cost. The grower has $16,850 invested in the structure and planter. If he invested this capital at a 10% return he would earn $1,685. This amount is charged as an interest cost for use of capital to the transplant production activity. Individual growers may require a higher or lower return on their investment when deciding whether to grow their own transplants.

Table 1 indicates that when 100% seed germination is achieved, a grower can produce 1-inch transplants for $0.0135 and 2-inch transplants for $0.0362 per plant. If less than 100% germination is obtained, costs will be higher. Additional plants will have to be transplanted into tray cells, thus increasing costs. Alternatively, the cells can be left empty. In this case the surviving plants will have to carry all the fixed and variable costs for the total house. Assuming cells are left empty, cost per plant increases about 11% for each 10% decrease in seed germination regardless of size of plant produced.

Impact on Cost of More Fully Utilizing the House

Significant cost reductions are obtained by growing more crops in 1 house. Table 2 shows that by producing both a fall and spring crop, cost per plant is reduced by 33% and 35% for 1-inch and 2-inch plants, respectively. It is assumed all variable costs except heat are the same for spring and fall production; it is assumed no heat is necessary for fall production.

Table 2. Transplant production costs for one spring and one fall crop.

Item	Cost per house 1-inch	Cost per house 2-inch
Variable costs[z]		
1 spring crop	$2,349	$1,950
1 fall crop	2,306	1,907
Fixed costs	4,388	4,388
Total fixed & variable costs	$9,043	$8,245
Costt per plant—100% germination		
Plants produced	1,000,000	350,000
Cost per plant	$0.0090	$0.0236
Cost per plant—90% germination		
Plants produced	900,000	315,000
Cost per plant	$0.0100	$0.0262

[z]Difference in cost due to heat for spring crop.

Discounted Cash Flow Analysis

In addition to evaluating the profitability of transplant production on an annual basis, the grower will likely be interested in the profitability of the investment over the life of the project. Discounted cash flow analysis can assist the grower in analyzing various grow or buy alternatives. Discounting annual cash flows puts the cost streams for different methods of acquiring transplants on a common net present value basis. All other factors being equal, the grower would select the method with lowest discounted cash flow to acquire his transplants.

Discounting is the inverse of the more widely understood compounding technique. If $1,000 is invested today at 10% compound interest, it will be worth $2,594 at the end of 10 years. Reversing the perspective to a future-back-to-present view, $2,594 10 years from now is worth $1,000 today at a 10% discount rate.

Table 3 summarizes initial investment, first year operating and fixed costs and annual cash expense in each succeeding year to grow quantities of 2 sizes of transplants. Annual cash costs to purchase an equivalent number of plants are also presented. For example, a grower can spend $19,569 this year and $3,439 each year for 9 years and produce 450,000 1-inch transplants annually. Alternatively, he can buy 450,000 transplants each year for $6,750.

Table 3. Comparison of cost to grow with cost to buy tomato transplants.

Costs	1-inch 1-crop	1-inch 2-crops	2-inch 1-crop	2-inch 2-crops
Grow				
No. plants grown[z]	450,000	900,000	157,500	315,000
Year 1				
House & planter	$16,850	$16,850	$16,850	$16,850
Cash costs—spring	2,349	2,349	1,950	1,950
Cash costs—fall	—	2,306	—	1,907
Taxes & ins.	370	370	370	370
TOTAL	$19,569	$21,875	$19,170	$21,077
Succeeding years				
Cash costs—spring	$ 2,349	$ 2,349	$ 1,950	$ 1,950
Cash costs—fall	—	2,306	—	1,907
Plastic	720	720	720	720
Taxes & ins.	370	370	370	370
TOTAL	$ 3,439	$ 5,745	$ 3,040	$ 4,947
Buy				
No. plants bought	450,000	900,000	157,500	315,000
Each year				
Cost per plant	$ .015	$ .015	$ .035	$ .035
Annual cost	$ 6,750	$13,500	$ 5,513	$11,025

[z]90% seed germination.

Table 4 shows discounted cash flows for various growing alternatives and comparable purchasing methods. For example, at an 8% discount rate the net present value of the cost stream to grow 1 crop (450,000 plants) of 1-inch transplants annually is $41,052. The value of the discounted cost

Table 4. Discounted cash flow for various grow and buy alternatives over a 10-year period.

Discount rate	1-inch 1-crop Grow	1-inch 1-crop Buy	1-inch 2-crops Grow	1-inch 2-crops Buy	2-inch 1-crop Grow	2-inch 1-crop Buy	2-inch 2-crops Grow	2-inch 2-crops Buy
8	41,052	$48,916	$57,763	$97,833	$38,161	$39,948	$51,980	$79,899
10	39,375	45,623	54,961	91,247	36,677	37,259	49,567	74,518
12	37,893	42,716	52,486	85,431	35,368	34,884	47,436	69,769
14	36,580	40,138	50,292	80,276	34,207	32,779	45,547	65,559
16	35,411	37,844	48,340	75,688	33,174	30,906	43,866	61,812
18	34,367	35,795	46,596	71,591	32,251	29,233	42,364	58,466
20	33,431	33,959	45,033	67,918	31,424	27,733	41,018	55,466
22	32,590	32,307	43,627	64,615	30,680	26,384	39,808	52,769
24	31,831	30,817	42,359	61,634	30,009	25,167	38,716	50,335

stream to purchase 450,000 1-inch transplants per year is $48,916.

Selecting an appropriate discount rate is crucial to successful discounted cash flow analysis. A grower will want to use the discount rate reflecting the return he could obtain in his highest alternative use for his capital.

At low discount rates, growing transplants results in a lower discounted cash flow than the companion purchasing method for all growing techniques considered. As the discount rate increases, the present value of future dollars decreases. After the initial capital investment in facilities is made, annual growing costs are less than annual purchase costs. Thus, purchasing transplants with a higher annual cost becomes more competitive with growing as the discount rate increases.

Purchasing 1 crop of 1-inch transplants has a lower discounted cash flow expense stream for discount rates of 22% and higher. Thus, a grower who cannot invest his capital and receive greater than a 22% return would be advised to grow his own transplants. Buying 1 crop of 2-inch transplants costs less in present dollars when a 12% discount rate is reached. For both cases where 2 crops of transplants are needed, purchasing does not become competitive for the discount rates analyzed.

Points to Remember

1. This analysis is based on a low initial investment structure. A higher initial investment structure would probably result in higher costs per plant.
2. Costs in Table 1 are calculated for both 100 and 90% germination and no reseeding. If a different germination rate is expected, or missing plants are reseeded, costs should be adjusted accordingly.
3. If only a portion of the structure is used to grow transplants, those plants must bear all fixed costs for the structure.
4. It is assumed that adequate land for the structure and a well with a pump able to supply adequate water are available without additional capital investment.
5. It is assumed that supervisory and full-time hired labor will be utilized in other aspects of the tomato business when not in transplant production. If a grower must hire a full-time horticulturist whose only responsibilities will be overseeing 1 or 2 crops of transplants, costs will be much higher than those indicated in Tables 1 and 2.
6. A grower may want to consider producing alternative greenhouse crops when the structure is not needed for transplants production.
7. The analysis assumes horticultural practices will be followed which result in successful transplant production.
8. The transplant purchase price includes the transplant grower's profit margin, whereas growing costs in Tables 1 and 2 do not.
9. Building higher initial cost structures will probably increase the discounted cash flow of the expense stream associated with growing transplants.

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MARKETING FLORIDA CELERY: WHOLESALE AND RETAIL PRACTICES AND PROBLEMS

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Abstract. **Celery is one of Florida's leading vegetable crops. Florida produces about one-third of the nation's supply of celery, second only to California. During the December-May season, Florida accounts for three-fourths or more of the celery consumed in major urban centers east of the Mississippi River.**

The competitive position of Florida celery in major eastern markets has improved substantially in recent years. Wholesalers in Philadelphia, Boston, and Detroit were generally complimentary of product characteristics and pack quality of Florida celery. This quality improvement, coupled with a substantial and widening transportation cost advantage over California, has made Florida celery more attractive in many market areas.

Nearly half of the retailers contacted in the study, representing over half the celery volume, preferred the waxed carton to the wooden wirebound crate, but wholesalers generally preferred the crate to the carton. Many wholesalers and retailers noted that cartons of Florida celery were not precooled as thoroughly as California cartons. Improving precooling would remove many objections to Florida celery in the waxed carton.

Celery is one of Florida's leading vegetable crops. It has accounted for five to eleven percent of the state's vegetable value in the past five seasons. During this period an average harvested acreage of 10,700 acres has produced an average of 7.2 million crates[1] per year with an annual average farm value of $29 million. On an annual basis, Florida produces about one-third of the nation's celery. However, during the December-May period, Florida accounts for three-fourths or more of the celery supplied to major markets east of the Mississippi River (4).

The purpose of this paper is to report wholesale-retail trade acceptance of Florida celery in three major U. S.

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[1]One crate is approximately 60 pounds (27.2 kilograms).