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ECONOMICS OF WATERMELON AND MUSKMELON PLANTING SYSTEMS IN NORTH FLORIDA[1]

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Abstract. **Watermelon (*Citrullus lunatus L.*) and muskmelon (*Cucumis melo var. reticulatis*) yield response to polyethylene mulch and transplant planting systems were subjected to an analysis for relative profitability using the VEGBUD standardized fresh vegetable budget generator. Results of the analysis indicated that, for watermelon, the combination of polyethylene mulch and transplants resulted in the greatest cost and the greatest net returns, but not the largest rate of return on additional expenditure over the no mulch/direct-seed standard treatment. The no mulch/transplant treatment had the greatest rate of return to additional costs. For muskmelon, the polyethylene mulch/transplant treatment had the greatest total cost, the greatest net return and the greatest return on additional treatment related expenditure. Under market conditions which prevailed during the 1986-1987 north Florida season, the enhancement of earlier harvests, when higher prices prevailed, had noteworthy positive impacts on the final economic outcomes of production for both watermelon and muskmelon. Additional costs associated with these more expensive cultural techniques were somewhat mitigated by lower hand labor costs (hand weeding), in the case of polyethylene mulch culture, and the cost of thinning, in the case of transplants.**

Interest in fresh market vegetable production among the north Florida agricultural community has been increasing since the decline in feed grain and livestock prices of the early 80's. Growers, agricultural suppliers, and research and Extension faculty of the University of Florida have been actively seeking appropriate production methods for vegetable production for north Florida. The development of a successful vegetable industry to help mitigate the agricultural decline of the region will, to a great extent, depend on efficient production methods, cultivars and timing.

The use of polyethylene mulch on raised beds and the use of transplants for stand establishment have become commonplace within the vegetable industry of south Florida. Renewed interest has developed for the use of these technologies under north Florida conditions (2, 3). Watermelon and muskmelon planting systems utilizing both polyethylene mulch and transplant stand establishment were evaluated at Live Oak in the spring of 1987 (Hochmuth and Meline, IFAS Vegetable Research Reports VEC 87-04 and VEC 87-08). The results indicated that neither polyethylene mulch nor the use of transplants had significant effects on total yields over no mulch or direct seeding. However, these treatments were different with respect to early yields[2].

Studies were conducted to evaluate the relative economic benefits of inclusion of polyethylene mulch or transplant culture into north Florida watermelon or muskmelon production practices, focusing on the magnitude and timing of the yield shifts and the price environment at various stages within the harvest period. Of particular concern was whether or not early yield enhancments adequately mesh with higher early season prices to justify increases in production expenditure.

Materials and Methods

To evaluate differential impacts of polyethylene mulch and transplant culture on watermelon and muskmelon profitability, 4 cost and return estimates were developed. Cost and return estimates were made for transplanted watermelon on polyethylene mulch, transplanted watermelon on bare ground, direct-seeded watermelon on polyethylene mulch and direct-seeded watermelon on bare ground (the standard practice of area producers at the time of the study). The respective estimates present the material, machinery and labor requirements for each treatment. Details on cultural practices and yields from these studies are reported by Hochmuth and Meline (IFAS Vegetable Research Reports VEC 87-04 and VEC 87-08).

The cost and return estimates were developed using VEGBUD (1), a fresh vegetable budget generator developed and distributed by the University of Florida. This computer package was utilized because of its ease of use and because it is to some extent becoming a standardized budget format throughout Florida.

Results and Discussion

Cost estimates for each treatment combination are presented in Tables 1 through 4. Preharvest costs were calculated on a per acre basis, while harvest costs were determined on a per unit basis. Cost values reflect actual local prices for the inputs used.

Differential returns are presented in Table 5. Returns were based on yields of each treatment combination and weekly prices obtained throughout the prospective harvest periods[3].

To determine the effects of yield earliness on returns, final prices used in the analysis were weighted average prices based on the formula:

[1]Florida Agricultural Experiment Station Series No. 9747.

[2]Early yields were defined as those recovered from the the first three harvests. All reported yields were gross yields from the experiment station trials and not necessarily marketable yields.

[3]Weekly f.o.b. muskmelon prices were obtained from the Federal-State Market News Service—Winter Park, Fla., personal communication. Weekly f.o.b. watermelon prices were obtained from *1986-87 Watermelon Report*, Federal-State Market News Service, Thomasville, Ga.

Table 1. Estimated costs for producing one acre of transplanted (transp.) and direct-seeded (dir. sd.) watermelon on polyethylene mulch, 1987.

Item	Quantity	Price	Cost	
			Transp.	Dir. sd.
Total Yield (cwt/acre)	540		540	558
Total $/acre			$1,650.93	1,619.10
Preharvest			$/acre	
Material inputs				
Fertilizers				
13-4-13 (lb.)	1000.00	0.10	103.00	103.00
Fungicides				
Manzate (qt.)	9.00	2.63	23.63	23.63
Bravo (pt.)	14.00	2.93	41.02	41.02
Insecticides				
Lannate (pt.)	4.80	3.71	17.81	17.81
Thiodan (pt.)	1.80	4.36	7.85	7.85
Nematicide				
Methyl bromide (lb.)	140.00	1.00	140.00	140.00
Miscellaneous				
Transplants (1,000)	1.30	59.00	76.70	
Seed (lb.)	2.00	7.50		15.00
Pro-mix (cu. ft.)	2.72	1.33		3.61
Plastic mulch (roll)	1.40	85.00	119.00	119.00
Micro irri. tape (ft.)	6000.00	0.02	120.00	120.00
and fittings (pc.)	1.00	31.12	31.12	31.12
Custom Work & Other				
Land rent			55.00	55.00
Tractor labor (hr.)	7.52	4.50	33.84	33.84
Other labor (hr.)	13.00	4.50	58.50	67.50
Machinery cost				
Ownership			84.69	84.69
Operating			56.19	56.19
Supervision			0.00	0.00
Overhead cost			38.73	36.77
Interest cost			28.82	27.23
Total preharvest	....		$1,035.90	$983.25
			$/cwt	$/cwt
Total preharvest	....		$1.92	$1.76
Harvest & haul				
Harvesting			1.01	1.01
Hauling			0.03	0.03
Total harvest & haul	....		1.04	1.04
Pack & market				
Selling			0.10	0.10
Packing materials				
Total pack & market	....		0.10	0.10
Total cost	....		$3.06	$2.90

Table 2. Estimated costs for producing one acre of transplanted (transp.) and direct-seeded (dir. sd.) watermelon on bare ground, 1987.

Item	Quantity	Price	Cost	
			Transp.	Dir. sd.
Total yield (cwt/acre)			647	503
Total $/acre			$1,570.30	1,345.12
Preharvest			$/acre	
Material inputs				
Fertilizers				
13-4-13 (lb.)	1000.00	0.10	103.00	103.00
Fungicides				
Manzate (qt.)	9.00	2.63	23.63	23.63
Bravo (pt.)	14.00	2.93	41.02	41.02
Insectecedes				
Lannate (pt.)	4.80	3.71	17.81	17.81
Thiodan (pt.)	1.80	4.36	7.85	7.85
Nematicide				
Miscellaneous				
Transplants (1,000)	1.30	59.00	76.70	
Seed (lb.)	2.00	7.50		15.00
Pro-mix (cu. ft.)	2.72	1.33		3.61
Micro irri. tape (ft.)	6000.00	0.02	120.00	120.00
and fittings (pc.)	1.00	31.12	31.12	31.12
Custom work & Other				
Land rent			55.00	55.00
Tractor labor (hr.)	7.52	4.50	33.84	31.03
Other labor (hr.)	28.00	4.50	126.00	135.00
Machinery cost				
Ownership			85.24	83.23
Operating			57.29	54.69
Supervision			0.00	0.00
Overhead cost			31.14	28.88
Interest cost			22.64	20.86
Total preharvest	....		$832.27	$771.72
			$/cwt	$/cwt
Total preharvest	....		$1.29	$1.53
Harvest & haul				
Harvesting			1.01	1.01
Hauling			0.03	0.03
Total harvest & haul	....		1.04	1.04
Pack & market				
Selling			0.10	0.10
Packing materials				
Total pack & market	....		0.10	0.10
Total cost	....		$2.43	$2.67

$$\frac{EY * EP + LY * LP}{TY}$$

where:

EY = Early Yield
EP = Early Price
LY = Late Yield
LP = Late Price
TY = Total Yield

Those treatment combinations with the greatest portion of their yield falling within the first 3 harvests would face the highest final prices (Table 5). Differential net returns per acre took into account differences in early yield and total yield and average weekly prices during the 2 harvest periods.

For watermelon, profitability appeared to be closely related to the effects of various treatments on earliness. Crops which were both mulched and transplanted had the greatest early yields, the greatest final prices, and the highest net return per acre. Direct-seeded plants produced on bare ground had the lowest percent of total yield occurring within the first 3 harvests, had correspondingly the lowest final prices, and the least profit per acre (Table 6).

Like watermelon, mulched and transplanted muskmelon had the greatest early yield, the highest final price, and the greatest net returns per acre. Muskmelon grown with the basic nonmulched / direct-seeded method produced the lowest early yield, the lowest final price, and the smallest net return per acre (Table 6).

An alternative way of assessing the relative merit of the various treatment combinations was by treating the additional expenditure associated with moving from the the traditional production method of direct seeding without mulch to one of the treatment combinations, as if it were simply a type of investment. One would wish to know the rate of return, expressed as a percent.

Accordingly, changes in total cost and total returns were calculated for each of the watermelon and muskmelon planting system alternatives relative to no mulch/direct-seed production (the standard local practice which provided the basis for comparison. From these, rates of return

Table 3. Estimated costs for producing one acre of transplanted (transp.) and direct-seeded (dir. sd.) muskmelon on polyethylene mulched beds, 1987.

Item	Quantity	Price	Cost	
			Transp.	Dir. sd.
Total yield (cwt/acre)			361	267
Total $/acre			$2,232.55	1,790.92
Preharvest			$/acre	
Material inputs				
Fertilizers				
13-4-13 (lb.)	1000.00	0.10	103.00	103.00
Fungicides				
Manzate (qt.)	9.00	2.63	23.63	23.63
Bravo (pt.)	14.00	2.93	41.02	41.02
Insecticides				
Lannate (pt.)	4.80	3.71	17.81	17.81
Thiodan (pt.)	1.80	4.36	7.85	7.85
Nematicide				
Methyl Bromide (lb.)	140.00	1.00	140.00	140.00
Miscellaneous				
Transplants (1,000)	5.00	67.50	337.50	
Seed (lb.)	.75	150.00		112.50
Pro-mix (cu. ft.)	2.72	1.33		3.61
Plastic mulch (roll)	1.40	85.00	119.00	119.00
Micro irri. tape (ft.)	6000.00	0.02	120.00	120.00
and fittings (pc.)	1.00	31.12	31.12	31.12
Custom work & other				
Land Rent			55.00	55.00
Tractor labor (hr.)	7.52	4.50	33.84	39.47
Other labor (hr.)	13.00	4.50	58.50	67.50
Machinery cost				
Ownership			84.69	94.21
Operating			56.19	65.62
Supervision			0.00	0.00
Overhead cost			49.17	41.65
Interest cost			37.30	30.90
Total preharvest	....		$1,315.61	$1,113.88
			$/cwt	$/cwt
Total preharvest	....		$3.64	$4.18
Harvest & haul				
Harvesting			1.01	1.01
Hauling			0.03	0.03
Total harvest & haul	....		1.04	1.04
Pack & market				
Selling			1.50	1.50
Packing materials				
Total pack & market	....		1.50	1.50
Total cost	....		$6.18	$6.72

Table 4. Estimated costs for producing on acre of transplanted and direct-seeded muskmelon on bare ground, 1987.

Item	Quantity	Price	Cost	
			Transp.	Dir. sd.
Total yield (cwt/acre)			361	267
Total $/acre			$2,232.55	1,790.92
Preharvest			$/acre	
Material inputs				
Fertilizers				
13-4-13 (lb.)	1000.00	0.10	103.00	103.00
Fungicides				
Manzate (qt.)	9.00	2.63	23.63	23.63
Bravo (pt.)	14.00	2.93	41.02	41.02
Insecticedes				
Lannate (pt.)	4.80	3.71	17.81	17.81
Thiodan (pt.)	1.80	4.36	7.85	7.85
Nematicide				
Miscellaneous				
Transplants (1,000)	5.00	67.50	337.50	
Seed (lb.)	0.75	150.00		112.50
Pro-mix (cu. ft.)	2.72	1.33		3.61
Micro irri. tape (ft.)	6000.00	0.02	120.00	120.00
and fittings (pc.)	1.00	31.12	31.12	31.12
Custom work & other				
Land Rent			55.00	55.00
Tractor labor (hr.)	7.52	4.50	33.84	31.03
Other labor (hr.)	28.00	4.50	126.00	135.00
Machinery cost				
Ownership			85.24	83.23
Operating			57.29	54.69
Supervision			0.00	0.00
Overhead cost			41.57	32.78
Interest cost			31.11	24.03
Total preharvest	....		$1,111.97	$876.29
			$/cwt	$/cwt
Total preharvest	....		$4.50	$4.25
Harvest & haul				
Harvesting			1.01	1.01
Hauling			0.03	0.03
Total harvest & haul	....		1.04	1.04
Pack & market				
Selling			1.50	1.50
Packing materials				
Total pack & market	....		1.50	1.50
Total cost	....		$7.04	$6.79

on additional capital expended to support the various planting system alternatives were calculated (Table 7).

For watermelon, the mulch/transplant treatment had the greatest incremental increase in cost, followed by mulch/direct seed and no mulch/transplant. In terms of changes in net returns, however, mulch/transplant was greatest, but non mulched/transplanted watermelons was a close second, followed by mulched/direct seeded watermelons. With respect to returns to additional expenditures, the non-mulched / transplanted treatment resulted in the largest returns, relative to both mulch/transplanted and mulch/direct-seeded melons. This indicates that, while the addition of both transplanting and mulching systems provided significant returns to their incremental additions to cost, each dollar expended on transplants tends to provide greater benefits than did a dollar spent on polyethylene mulch alone or taken together. Data from the analysis shows that the watermelon grower would achieve the greatest rate of return from cash invested in these technological improvements by utilizing transplants for stand establishment but not using polyethylene mulch, assuming suitable land is available for annual rotation.

For muskmelons, cost increases again were greatest for the mulched/transplanted treatment followed by the mulched/direct-seeded and no mulch/transplanted treatments. Net returns also followed this pattern. In comparison with watermelon, rates of return on additional expenditure for all planting systems were substantially less dramatic yet very satisfactory. In this case mulched/transplanted muskmelons were superior, followed by the mulch/direct-

Table 5. Net returns per acre for watermelon and muskmelon by treatment.

Treatment	Net returns ($/acre)	
	Watermelon	Muskmelon
Mulch/transplant	2,566	403
Mulch/direct seed	1,389	62
No mulch/transplant	2,411	51
No mulch/direct seed	796	3

Table 6. Early yield (lb./acre) and final prices[z] of watermelon and muskmelon. Early yield as a percent of total yield in parentheses.

Treatment	Watermelon Yield (% of total)	Watermelon Price	Muskmelon Yield (% of total)	Muskmelon Price
Mulch/transplant	23,470 (44)	7.81	3,825 (11)	7.30
Mulch/direct seed	8,964 (16)	5.39	1,365 (5)	6.95
No mulch/transplant	16,102 (25)	6.15	2,560 (10)	7.25
No mulch/direct seed	1,494 (9)	4.26	530 (3)	6.81

[z]Weighted average of early harvest and late harvest prices expressed as $/cwt.

Table 7. Change in total cost and net returns per acre and return on additional treatment cost for watermelon (WM) and muskmelon (MM).

Treatment	Change in: Cost WM	Cost MM	Net return WM	Net return MM	Return on additional cost (%) WM	MM
Mulch/transplant	306	833	1,770	400	578	48
Mulch/direct seed	274	391	593	59	216	15
No mulch/transplant	225	339	1,615	48	717	14
No mulch/direct seed	—	—	—	—	—	—

Table 8. Rankings of treatments for total yield, early yield, and rate of return (ROR) on additional investment, watermelon and muskmelon.

Treatment	Watermelon Total	Watermelon Early	Watermelon ROR	Muskmelon Total	Muskmelon Early	Muskmelon ROR
Mulch/transplant	3	1	2	1	1	1
Mulch/direct seed	2	3	3	2	3	2
No mulch/transplant	1	2	1	3	2	3
No mulch/direct seed	4	4	–	4	4	–

seed and non mulched transplanted treatments, which were about the same. For muskmelons, the grower would achieve his greatest rate of return per dollar invested in the early yield enhancing technologies by combining polyethylene mulch and transplants for stand establishment.

Rankings for total cost, net returns and rate of return on additional expenditure for both watermelon and muskmelon are summarized in Table 8.

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VEGETABLE MARKETING SURVEY FOR NORTH FLORIDA

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Abstract. **Thirty firms, 12 of which were brokers, that operate in the marketing chain were interviewed. Seventeen firms were located in Florida, 4 in south and central Georgia and 9 in south and central Alabama. The focus of the interviews was on 10 vegetables that are grown commercially on a small scale throughout the Florida panhandle region, but are not major commercial vegetables.**

Only 1 firm handled all 10 products. The vegetables that were most widely handled were cucumber and bell pepper (20 firms each), eggplant (18 firms) and sweet corn (17 firms). Eight firms indicated that they would carry fall icebox watermelons if they were available and 2 indicated that they already did so. None of the respondents indicated that they had consistent difficulty obtaining the quantities of vegetables that they required in the quality desired. Three firms had never purchased specific vegetables produced in the area of interest and 2 firms had stopped doing so. Most firms indicated a willingness to buy more vegetables from the tri-state area if they were available consistently.

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Over the past few years there has been much discussion by agricultural extensionists and producers about diversification of the mix of farm product. The discussion has been directed towards improving—in terms of income—the product mix of the family farm. Vegetables have been frequently highlighted in these discussions. North Florida has been the geographic target of much of the discussion and of some related activity and investment. For example, the Florida Department of Agriculture and Consumer Services opened a new State Farmers Market in White Springs and the Institute of Food and Agricultural Sciences (IFAS) of the University of Florida has held several conferences and meetings related to vegetable production and marketing in north Florida.

Materials and Methods

The research summarized in this document was conducted in order to learn which vegetables that are presently grown in north and west Florida have strong market potential as indicated by marketing firms. Toward this end, a survey of 30 operators of a variety of marketing