'Minilee' and 'Mickylee' were evaluated at Leesburg as breeding lines for several years and approved for release in 1984. Fruit shapes for both are round and rind color is light gray green, with a faintly discernible net. 'Mickylee' has a slightly thicker rind than 'Minilee'; the rind of both is hard and tough. The red flesh color is more intense than that of 'Charleston Gray' or 'Jubilee' but is not as intense as that of 'Dixielee'. Seeds are small and black and the number of seeds per unit weight of melon is considerably less than for other cultivars.

Total marketable yields of 'Minilee' and 'Mickylee' were among the highest each year they were evaluated (Table 3). Soluble solids content of the flesh was high in 1984 and 1985.

In general, icebox cultivars mature from 7 to 10 days earlier than standard watermelon cultivars and are productive over a longer period of time. Since early watermelons ordinarily sell for a higher price than midseason or late watermelons the grower might realize a better return with icebox melons. Their fruits are similar in size to large muskmelons and honeydews and would likely be sold by the piece rather than weight. This could result in an even higher return to the grower.

A significant portion of the Florida production of watermelons goes to the hotel and restaurant trade and large melons have satisfactorily met the demands of this segment of the market. Large-size melons, however, have less appeal to individual home consumers, and retail market outlets have adopted the practice of merchandising watermelons in less than whole portions in order to promote melon sales. We think the 3 new icebox cultivars, 'Minilee', 'Mickylee', and 'Baby Fun', which are productive under Florida conditions and have high internal quality, may contribute significantly to overcoming the decline in per capita watermelon consumption in the U.S. We view these new cultivars as supplementary to rather than competitive with large-melon-size cultivars. In addition, these cultivars may be well adapted to shipment by air in cartons or bins to foreign markets.

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COST COMPARISON OF CONVENTIONAL AND DIRECT SEEDED PLASTIC MULCH WATERMELONS IN NORTH FLORIDA

L. A. HALSEY
University of Florida, IFAS
Jefferson County Cooperative Extension Service
Monticello, Florida 32344

Additional index words. budget, breakeven price, marginal fixed cost, cost analysis.

Abstract. **An economic comparison of conventionally planted and polyethylene mulch-plug mix planted watermelons was made. The increased variable cost of materials used in the mulch method was compensated by reduced fertilizer, tractor, and labor cost. Difference in per acre costs of the 2 systems resulted from slightly higher fixed ownership or investment costs for mulch equipment and the planter, but lower variable or cash costs. Earlier yields from mulch culture watermelons and in-season price declines appear to be more dominant decision variables than per acre costs for the producer who is considering a shift from conventional to mulch production.**

An economic comparison of conventionally produced and polyethylene mulch produced watermelons was made early in 1985 prior to watermelon planting. The comparison is a set of enterprise budgets, estimating costs and returns for the 2 production methods. Technical coefficients and costs in the budgets were validated by interviewing growers throughout the 1985 season.

Although vegetable crops including watermelons have been grown under polyethylene mulch culture in Florida for decades, the technique is relatively new for producers in north and west Florida. During the 1984 season, producers throughout the panhandle region participated in demonstrations conducted by county and state extension personnel. Two demonstrations conducted by county and state extension personnel. Two demonstration plantings totalling 6 acres were made in Jefferson County.

Leading into the 1985 season, grower interest in polyethylene mulch methods was heightened by the 1984 demonstrations and by the increasing adoption of plastic mulch production technology by South Carolina and Georgia watermelon producers seeking earlier markets in competition with North Florida producers.

Cost and return data based on accounting records of producers from South Florida (5), and conventional budgets from North Florida (2) and Georgia (3) were inappropriate measures of costs related to mulch production in North Florida.

Methods

Fixed Costs. Fixed costs are ownership costs which vary little, in the short term, with variable yield. Depreciation on equipment and interest on capital invested in equipment, buildings and facilities are examples of fixed costs. Fixed costs are incurred whether or not production is carried out and play little role in production decisions, except at the time of investment. Producers considering an alternative production technology which requires additional investment must analyze the impact of the additional or marginal fixed cost associated with the technology. Comparison is made of current variable costs of the established methods versus variable plus marginal fixed costs of the alternative method or enterprise. In this case, producers must analyze the additional contribution to annual fixed costs associated with the alternative mulch production method.

Annual fixed costs for a 1-row high speed bedder and mulch layer, with a purchase price of $3,000, and for a transplanter/plug-mix planter priced at $2,500 were calculated using straight-line depreciation and 10% salvage value, with interest at 13% on the average investment using the method in Halsey and Hewitt (1). Two different anticipated wear-out or economic lives were used. Annual fixed costs are shown in Table 1. Annual fixed costs of $900 for 10 years or $1395 for 5 years resulted. Spreading fixed costs over a range of 75 to 600 acres' use per year gave a range of annual fixed costs allocated per acre of production of $1.50 to $18.60. For the purpose of this analysis, a conservative 5 year depreciation and a typical 150 acres usage gives an annual marginal fixed costs per acre of $9.30 for the equipment not already owned for use in conventional watermelon production.

It is assumed that a typical mixed cropping farm in North Florida faces approximately $120 per productive acre in annual fixed costs. Thus, fixed cost for the conventional watermelon enterprise of $120 per acre is budgeted, while $129.30 were allocated per acre annually for 150 acres for watermelons in the full bed mulch enterprise.

Table 1. Fixed costs of additional equipment for watermelons under full bed polyethylene mulch production, North Florida, 1985.

Equipment item	Purchase price ($)	Annual fixed cost ($) if depreciated over 10 yr	5 yr
1-Row high speed mulch laying rig w/bed press	3000	490	760
1-Row plug mix planter w/ 3 pockets	2500	400	635
Total	5500	900	1395
Per acre allocation of fixed cost if spread over: 75 acres' annual use		12.00	18.60
150 acres' annual use		6.00	9.30
300 acres' annual use		3.00	4.65
600 acres' annual use:		1.50	2.32

Table 2. Variable costs of producing watermelons in North Florida, 1985, using conventional methods of production.

Input item	Units of input	Quantity /acre	Cost /unit	Total $ /acre
Cash out-of-pocket costs				
Lime	T	.5	18.50	9.25
Seed	lb.	1.25	12.50	15.63
Fertilizer				
initial	cwt	7	9.75	68.25
sidedress	cwt	4.5	9.15	41.18
Insect-nematicide	lb.	12	1.30	15.60
Fungicide	appl	5	10.25	51.25
Insecticide	appl	2	4.10	8.20
Tractor & Equipment operations				
Job	Times over hours/time		Total	
Plow	2	.45	.9	
Disk	4	.35	1.4	
Plant	1	.35	.35	
Sidedress	2	.24	.5	
Cultivate	5	.25	1.25	
Spray	5	.15	.75	
Tractor	hr	5.15	10.50	54.08
Equipment	hr	5.15	1.75	9.01
Preharvest labor				
Job	Times over hours/time		Total	
Tractor	1	5.15	5.15	
Hoe	1.5	10	15	
Move Irr	4	1	4	
Other	(25% of operator)		1.2	
Preharvest labor	hr	25.35	4.50	114.08
Irrigation	acre inch	5	7.75	38.75
Interest	months, %	4	13	18.03
Total preharvest cash cost ($/acre)				434.04
Preharvest cost ($/cwt)/acre)				1.24

Table 3. Variable costs of producing watermelons in North Florida, 1985, using full-bed black polyethylene mulch and plug mix planter.

Input item	Units of input	Quantity /acre	Cost /unit	Total $ /acre
Cash out-of-pocket costs				
Lime	T	.5	18.50	9.25
Seed	lb.	1.25	12.50	15.63
Fertilizer	cwt	10	9.57	95.70
Polyethylene mulch	rolls	1.25	45.00	56.25
Plug mix peat	bags	1.25	7.30	9.13
Insect/nematicide	lb.	3		
1.30	3.90			
Fungicide	appl	5	10.25	51.25
Insecticide	appl	2	4.10	8.20
Tractor & equipment operations				
Job	Times over hours/time		Total	
Plow	2	.45	.9	
Disk	4	.35	1.4	
Lay/pull	2	.45	.9	
Plant	1	.45	.45	
Cultivate	2	.25	.5	
Spray	5	.15	.75	
Tractor	hr	4.9	10.50	51.45
Equipment	hr	4.9	1.75	8.58
Preharvest labor				
Job	Times over hours/time		Total	
Tractor	1	4.9	4.9	
Thin	1	2	2	
Pull Mul	1	3	3	
Move Irr	4	1	4	
Other (50% of operator)			2.4	
Preharvest labor	hr	16.3	4.50	73.35
Irrigation	acre inch	5	7.76	38.75
Interest	months, %	4	13	17.86
Total preharvest cash cost ($/acre)				412.18
Preharvest cost ($/cwt) (350 cwt/acre)				1.18

Table 4. Variable cost to harvest watermelons in North Florida, 1985.

Item	Units	Quantity	$/unit	Total $
Harvest cost per acre at normal yield				
Labor (.2 hr/cwt)	hr	70	3.85	269.50
Tractor	hr	5	10.50	52.50
Equipment	hr	5	1.75	8.75
Operator	hr	5	4.50	22.50
Marketing fees	cwt	350	0.10	35.00
Transport	miles	50	0.21	10.50
Total harvest cost				398.75
Harvest cost ($/cwt)				1.14

Variable Costs. Cash out-of-pocket or variable costs to produce one acre of watermelons using conventional methods are itemized in Table 2. Costs to produce an acre of watermelons, using 48-inch, 1.25 mil black polyethylene mulch on beds with 12-ft row widths and planting with a plug mix planter are itemized in Table 3. Slight reductions in fertilizer costs, attributed to reduced leaching, in soil applied insecticide/nematicide costs, and in equipment use costs are realized in the mulch method. Significant reductions in field labor costs, particularly for hand hoeing and increased expenditures for polyethylene and plug mix are associated with mulch production. Cost reductions and increases for the various inputs are countervailing: total preharvest cash cost for mulch is approximately 5% lower than that for the conventional manner. Harvest cost of $1.14/hundredweight (cwt) for the 2 methods is presented in Table 4.

Comparison of costs and anticipated returns. To measure the potential profitability of the 2 methods, Tables 5 and 6 summarize variable and fixed costs and possible returns. Five yield levels based on North Florida production estimates (6) and 3 price levels are arrayed for sensitivity analysis. Normal yields of 35,000 lb. (350 cwt) are represented by costs from Tables 2 and 3. Two below-normal yield levels are assumed to have preharvest cash costs of 10% and 20% below normal costs. Two higher-than-normal yield levels are budgeted at 15% and 30% above normal preharvest cash costs. Pre-harvest cash costs per acre, harvest cost related to yield levels at $1.14/cwt, land rent, and allocated fixed cost compromise total cost per acre. Breakeven prices necessary for each yield level are included. Breakeven for normal yields on conventional melons is $2.85 per cwt and $2.81 per cwt for mulch watermelons. Prices which are typical for the North Florida marketing season of mid-June through early July are assumed at $2.75, $4.00, and %5.25 per cwt. Net returns—returns to management and risk—are arrayed for the ranges of 5 yield levels and 3 prices.

Discussion of Results

Although preharvest cash costs for growing watermelons under the plastic regime are approximately 5% below those using conventional methods, total costs vary by slightly more than 1%. Budgeting as a preplant business planning tool is not sufficiently accurate to call a 1% variation significant.

Trials in Madison County, Florida, 1985 (G. Hochmuth and J. Breman, Univ. of Florida, personal communication) confirm results from other regions (4) that mulch affects earliness of yield. Observations of fields in 1984 and 1985 indicate yields of 4-10 days earlier from spring watermelons produced using full-bed plastic mulch. Additionally, a higher percentage of total yield appears to reach marketable maturity early in the harvest period from mulch production, although total yield per acre is assumed to be equal in the mulch and conventional methods. Weekly prices recorded at the Thomasville, Ga. Farmers' Market from 1979-83 indicate an average weekly decline of $0.51 per cwt per week in the 17 June-8 July period, historically

Table 5. Summary of costs and returns for conventional watermelons with a range of possible yields and market prices, 1985.

		Yield level (cwt/acre)				
		V low	Low	Normal	High	V high
Yield	(cwt/acre)	200	300	350	400	450
Preharvest	($/acre)	347.23	390.64	434.04	499.15	564.25
Harvest at	1.14 $/cwt	227.86	341.79	398.75	455.71	512.68
Fixed cost	($/acre)	120.00	120.00	120.00	120.00	120.00
Land rent	($/acre)	45.00	45.00	45.00	45.00	45.00
Total cost	($/acre)	740.09	897.42	997.79	1119.86	1241.93
Breakeven price	($/cwt)	3.70	2.99	2.85	2.80	2.76
Expected price	$4.00	4.00	4.00	4.00	4.00	4.00
Gross return	($/acre)	800.00	1200.00	1400.00	1600.00	1800.00
Net return at	$2.75	−190.09	−72.42	−35.29	−19.86	−4.43
Net return/acre	$4.00	59.91	302.58	402.21	480.14	558.07
Net return at	$5.25	309.91	677.58	839.71	980.14	1120.57

Table 6. Summary of costs and returns for polyethylene mulch watermelons with a range of possible yields and market prices, 1985.

		Yield level (cwt/acre)				
		V low	Low	Normal	High	V high
Yield	(cwt/acre)	200	300	350	400	450
Preharvest	($/acre)	1329.74	370.96	412.18	474.00	535.83
Harvest at	1.14 $/cwt	227.86	341.79	398.75	455.71	512.68
Fixed cost	($/acre)	129.30	129.30	129.30	129.30	129.30
Land rent	($/acre)	45.00	45.00	45.00	45.00	45.00
Total cost	($/acre)	731.90	887.04	985.22	1104.02	1222.81
Breakeven price	($/cwt)	3.66	2.96	2.81	2.76	2.72
Expected price	$4.00	4.00	4.00	4.00	4.00	4.00
Gross return	($/acre)	800.00	1200.00	1400.00	1600.00	1800.00
Net return at	$2.75	−181.90	−62.04	−22.72	−4.02	14.69
Net return/acre	$4.00	68.10	312.96	414.78	495.98	577.19
Net return at	$5.25	318.10	687.96	852.28	995.98	1139.69

the North Florida marketing period(3). An advance of 4-10 days, with a higher percentage of the crop marketed early represents a $0.25 to $0.85 per cwt marketing advantage for polyethylene mulch, whereas, on a cost-of-production basis, no real advantage is apparent.

In the 1985 watermelon season, 5 producers in Jefferson County, Florida adopted the polyethylene mulch methods on approximately 320 acres. An intangible, or nonmonetary, advantage indicated by several producers concerned production logistics and input management. Reduction of labor costs was accompanied by a reduction in labor supervision and personnel management. Mulch appears to have preserved soil moisture during a spring drought, extending by 50% the efficiency of irrigation. That is, time between irrigation events was extended from once every 2 days to once every 3 days. Management of the irrigation system was simplified although total volume of irrigation water applied was constant between mulch and conventional plantings.

The decision by watermelon producers to adopt full bed polyethylene mulch production or to continue production using conventional methods will probably not be made on a basis of cost. The additional cost of equipment ownership is relatively minor. Per acre variable or cash costs are similar. Production decisions will be based on timeliness of yield, given a fairly constant decline in market price during the harvest period. If availability and reliability of labor decline melon producers will substitute inputs such as mulch, machines, and plug mix for labor, regardless of whether there is a change in labor costs.

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INFLUENCE OF SEED PRIMING AND ROW COVERS ON EARLY MATURITY IN WATERMELON

G. W. ELMSTROM
Agricultural Research and Education Center
IFAS, University of Florida
P.O. Box 388, Leesburg, FL 32749

Abstract. **In Florida, spring watermelons, *Citrullus lanatus* (Thunb.) Matsum. & Nakai, are usually planted in late winter when low soil temperatures delay both germination and seedling emergence. Priming seeds in aerated solutions of 2% KNO_3 or 1.5% KNO_3 + 1.5% KH_2PO_4 prior to field planting resulted in faster emergence and seedlings that were more vigorous and darker green than those of non-primed treatments. Rows covered with slitted polyethylene had higher soil temperatures, faster seedling emergence, more rapid vince growth, and earlier induction of female blossoms than rows not covered. A combination of early-maturing watermelon cultivars, seed priming, and row covers resulted in earliest maturing watermelon fruits.**

Florida is a major supplier of spring and summer watermelons for the domestic U.S. market. Total crop value for Florida in 1984 was over $62 million which represented 5.9 percent of the total fresh market vegetable income of the state that year. South Florida growers supply the first domestically-produced watermelons of the season and receive a price higher than the average statewide price for the season. Prices paid to Florida watermelon producers decline as the season advances. North Florida growers plant and harvest later than those in the south and receive lower prices for their crop because they must compete with domestic producers in other states who have a location advantage to major eastern and midwestern markets (3). The weekly average price for the seasons from 1966 through 1977 declined from about $6.00/hundredweight (cwt) in mid-May to less than $3.00/cwt on the first of July.

Slow germination of watermelon seed in cool soil is one reason for the late harvest of fruits in central and north Florida. The optimum temperature for watermelon seed germination is 35°C. Using "salt primed" watermelon seed, Sachs (2) germinated seed at 20°C. Seedlings developed well up to the stage of "fully expanded cotyledons" but further root and shoot development was slow in cold soil. Perforated, or slitted, polyethylene row covers have been used to increase earliness and total yield of muskmelons (1,4,5). These benefits are due to higher temperatures under the covers.

The objective of this study was to evaluate "salt priming" of watermelon seeds and the use of slitted polyethylene row covers as means of producing earlier-maturing watermelons in Florida.

Materials and Methods

In 1980, primed and unprimed seeds of 'Dixielee' watermelon were planted directly in the field on 15 Feb. They were planted 10 seeds/hill with hills spaced 4 ft apart in rows 10 ft apart and 24 ft long. The 2-row plots were replicated 3 times. Primed seeds were soaked for 4 days in an aerated 2% KNO_3 solution at 20°C, rinsed, and dried at 20°C.

In 1981, 'Sugarlee' and 'Jubilee' watermelon seed was primed as in 1980 with a 1.5% KNO_3 + 1.5% KH_2PO_4 solution. Primed and unprimed seeds of 'Sugarlee' were planted directly in the field with, or without, row covers. Seeds were planted 10/hill with 10 hills/plot. Hills were

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