Commercial Sweetpotato Production in Mississippi

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Abstract

This report provides an estimate of selected costs incurred in sweetpotato production in Mississippi, 1999. Land, management and general farm overhead costs were not included. Per acre returns above specified costs are estimated at approximately $1,100.00 per acre.

Keywords: sweetpotatoes, production costs, net returns, cash flow, price sensitivity, equipment, chemicals.

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Foreword

This report is designed to provide necessary planning data to farmers, research and extension staffs, lending agencies, and others in agriculture. Readers are cautioned that returns presented are labeled "**Returns Above Specified Expenses**." A further-edited version of this report is forthcoming in early 2000 as a bulletin of the Mississippi Agricultural and Forestry Experiment Station.

Acknowledgments

Appreciation is expressed to producers who provided information on crop practices used. Acknowledgment is extended to Gail Gillis for providing assistance in the areas of computer applications and data management. Special appreciation is expressed to Debra Price for organizing and typing this manuscript.

Acknowledgment is made to the Mississippi State University Extension Service and the Mississippi Agricultural and Forestry Experiment Station staffs for the excellent cooperation that made this report possible.

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INTRODUCTION

U.S. growers harvested sweetpotatoes from 83,200 acres in 1998 (Table 1). North Carolina and Louisiana, the top two sweetpotato producing states, accounted for 63% of the 1998 acreage. In 1983, California, Texas, Alabama, and Mississippi ranked third through sixth in acreage. Mississippi became fifth in 1985, fourth in 1994, and third in 1998. Based on current sweetpotato insect trapping information, Mississippi's 1999 planted acreage is estimated at 10,600 acres.

U.S. sweetpotato acreage has been decreasing since 1970. During 1978-82, harvested acres averaged 110,720 (33% above the average for 1994-1998).

Sweetpotatoes are usually grown as part of a vegetable and field crop enterprise mix. In North Carolina, several of the largest sweetpotato growers are primarily tobacco producers. In Louisiana, sweetpotato farms frequently produce cotton, soybeans, corn, and rice.

About 60 to 65 % of sweetpotatoes sold for human consumption are to the fresh market; 35 to 40% move into the processed market. Following World War II, per capita consumption of sweetpotatoes began a slow downward trend which continued through the 1980's. Per capita use stabilized at about 4 pounds (fresh weight) in the early 1990's (Table 2) and may be trending slightly upward since 1993.

The marketing season price pattern for sweetpotatoes is stable compared with

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prices of many vegetables that are highly perishable. Prices for the new marketing year (beginning September 1) become established during September and October, when production prospects become known. They remain relatively flat or rise slowly through May or June with peaks in late November or December since sweetpotatoes are largely perceived as a holiday food [Thanksgiving, Christmas, New Year, and Easter are the periods of greatest consumption]. Prices sometimes rise sharply in July and August as storage stocks become depleted.

U.S. sweetpotato yields for selected states are given in Table 3. Average yields indicate that half the acreage and approximately half of the producers experience higher yields. None of the Mississippi producers surveyed as part of this study reported average yields as low as the estimates of average yield listed in Table 3 for Mississippi's acreage.

Worldwide, the U.S. ranks sixth in annual production [5, 18]. Asia and Africa account for 95% of the world's sweetpotatoes. China plants 16 million acres (compared to the U.S.'s 1998 acreage of approximately 83,000).

Sweetpotatoes can be stored 10-12 months with proper curing and storage conditions [14, 18]. In the U.S., fresh and processed (primarily canned) sweetpotatoes are available year round. The Center for Science in the Public Interest [7] ranks sweetpotatoes as the most nutritious vegetable - over twice as nutritious as the next most nutritious vegetable, the Irish potato. Per capita consumption of the Irish potato is about 126 pounds compared to approximately 4.0 pounds for the sweetpotato.

Estimates of Mississippi's sweetpotato acreage are available since 1869.

Mississippi's highest acreage occurred in 1934 with 103,000 acres. Acreage trended downward after 1934, dropping below 40,000 in 1948, and below 20,000 in 1958. From 1973-1998 it remained less than 10,000 acres, with the lowest acreage occurring in 1989 at 3,000. Since 1989 Mississippi's acreage has shown a strong positive trend, with 1998 acreage 3.3 times larger than 1989 acreage.

Currently, commercial sweetpotato production in Mississippi is centered primarily in the Vardaman area, in Calhoun and Chickasaw counties in the north-central region of the state. However, sweetpotatoes are grown commercially in more than half of Mississippi's counties [17]. They can be grown throughout the state since all areas provide the necessary (150) frost-free days. However, infestation by the sweetpotato weevil has led to a quarantine of much of the state south of Interstate 20.

When commercial sweetpotato production is defined as operations larger than four acres, sweetpotatoes are grown commercially in less than one-third of Mississippi's counties. Sweetpotatoes produced in sweetpotato weevil infested areas have market restrictions and additional insect control costs not incurred in weevil free areas of the state.

The availability of additional acreage in the Vardaman area with soils suitable for sweetpotato production will allow continued expansion in that area. However, the Federal Agricultural Improvement Act (FAIR) of 1996, and the current low price for cotton, is causing some Mississippi cotton producers, especially in the Yazoo-Mississippi Delta, to consider sweetpotatoes as an alternative crop. The Delta region is large with a

high percentage of suitable land irrigated (Table 4). Soils groups 1 and 2, Mississippi's best cotton soils, thought to be well suited for sweetpotato production, and total more than 600,000 acres, with more than 50% irrigated..

Rapid expansion in the Delta could have a disastrous impact on the price of sweetpotatoes. However, the Delta currently has very limited storage, cleaning, and packing capacity, and rapid expansion will not be possible until additional facilities are constructed. But, moderate expansion is expected in the Delta in the short-run.

A return of per capita consumption from the current (1996-97) level of 4.6 pounds per year (Table 2) to the 1982 level of 5.5 would support a 16% increase in production (approximately 13,000 acres nationally) without exerting pressure on prices. Additionally, because of the nutritional value of sweetpotatoes and current consumer interest in a healthy diet, etc., an effective advertising effort by the industry could dramatically shift the demand curve to the right.

METHODOLOGY

The purpose of this report is to provide an overview of production practices, and estimates of costs and returns for sweetpotato production in Mississippi for 1999. Due to the detailed nature of the cost computations, a computerized budget generator procedure was employed. The microcomputer enterprise budget generator developed at Mississippi State University [10, 16] was utilized because its procedure(s) for computational purposes

and output formats (the budget tables) are widely accepted.[1]

The Department of Agricultural Economics at Mississippi State University routinely publishes budgets for most major crops by regions of the state (for example, see [9, 12]). These publications contain information on tractors and towed equipment, such as performance rate (hours/acre to complete a task), purchase price, useful life, etc., necessary to compute direct and fixed cost per acre. They also include input prices for fertilizers, herbicides, insecticides, etc. The Department's most current estimates of these parameters were used in this report. Items unique to sweetpotato production were estimated by the authors by surveying producers, machinery and input dealers, etc., in the Vardaman area. A complete listing of the items used in this report are found in Appendix Tables 1, 2, 3, 4, and 5.

Budgets for Sweetpotatoes

This publication provides economic and technical information in the form of enterprise budgets for sweetpotatoes produced by Mississippi farmers. The purpose of this section is to present the methods and procedures used to calculate costs and returns.

Enterprise budgets represent a type of information that can be used by a wide variety of individuals in making decisions. They are used:

- by farmers for planning,

- by extension personnel in providing educational programs to farmers,

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[1] This section was developed from [9, 10, 12, 15, 16]. Formulas and much of the discussion pulled directly from [9].

- by lenders as a basis for credit, and

- to provide basic data for research.

> **Enterprise budgets should be prepared with a specific objective in mind. The budgets in this report were prepared to provide general information for several different uses. They provide information concerning general levels of costs and returns for a "representative" farm operation. These cost and return estimates will need to be adjusted for specific situations. Most users should think of these budgets as a first approximation and then make appropriate adjustments for their own operations, using the "Your Farm" column provided, to add, delete, or change costs or incomes to reflect their own specific situations**.

Methods and Procedures

Production Practices. - The production practices listed in each budget represent those practices that producers are using. Data collected from producers were used as the basis for selecting the practices included. Quantities of materials are based on survey data from producers.

Machinery. - Published data and information from machinery dealers form the basis for machinery prices. A performance rate reflects the time required to perform a given task or operation and is expressed as hours per acre. The estimated life of machinery is based on using the equipment until it no longer has value. Repairs and maintenance as a percentage of new cost are estimated for the life of the equipment and include oil and lubricants.

Estimates of Direct Costs. - Direct costs include estimated costs of repairs and

maintenance (R&M) for all machinery and include fuel costs for powered machinery

(Appendix Tables 1 and 2). Direct costs are estimated on an hourly basis and are then

converted to a per-acre basis using the performance rate for the particular operation.

R&M costs for towed equipment and powered equipment are estimated as follows:

$$RPH \ = \ \frac{RLC \ x \ RP}{THL}$$

$$RPA \ = \ RPH \ x \ PR$$

where:

RPH = R&M cost per hour of use
RLC = Replacement cost of machine
RP = R&M percentage (percent of RLC)
THL = Total hours of machine life
RPA = R&M cost per acre
PR = Performance rate

Direct costs include an estimate of fuel cost based on average fuel consumption

per hour of use for the power unit. Other components of direct costs include quantities of

materials used in production multiplied by the price per unit of these inputs, custom rates,

hourly wage rates, and interest charges on short-term capital (Appendix Tables 4 and 5).

The labor wage rate per hour includes social security, accident, and unemployment

insurance, and some perquisites [8]. Labor costs are routinely estimated for four labor categories: operator labor, hand labor, irrigation labor, and unallocated labor. Operator labor and hand labor represent estimates of labor required to perform   in-field tasks. Operator labor is that labor required to operate all power-driven equipment. Irrigation labor is used to perform tasks associated with an irrigation system. Unallocated (or overhead) labor is an estimate of labor that is not used directly in producing the enterprise. Its cost is estimated as a percentage of operator labor [8]. Special labor represents estimates of labor that are of particular interest to users of sweetpotato budgets.

Interest on operating capital is determined by using a short-term interest rate obtained from agricultural lenders and making a charge against capital outflows as the production process takes place. Interest is accumulated until the crop is harvested.

Estimates of Fixed Costs. - Annual fixed cost estimates for machinery are based on a budgeting technique which computes the annual capital recovery charge [2, p. 143]. When a combination of machines or equipment is required to perform a single operation, the total fixed cost per acre for all equipment used in the operation is estimated. The fixed cost of machinery ownership is calculated by first computing the capital recovery factor and then using it to estimate the annual capital recovery charge.

$$CRF = \frac{IIR}{1 - (1 + IIR)^{-TYL}}$$

where:

CRF = Capital recovery factor
IIR = Intermediate-term interest rate
TYL = Total years of life

$$CRCPY \ = \ [(RLC \ - \ SV) \ x \ CRF] \ + \ (SV \ x \ IIR)$$

where:

CRCPY = Capital recovery charge per year
RLC = Replacement cost
SV = Salvage value (at end of useful life)

Capital recovery change per year (CRCPY) is then converted to its per-hour (CRCPH)

and per-acre (CRCRA) equivalent values:

$$CRCPH \ = \ \frac{CRCPY}{HAU}$$

$$CRCPA \ = \ CRCPH \ x \ PR$$

where:

CRCPH = Capital recovery charge per hour
HAU = Hours of annual use
CRCPA = Capital recovery charge per acre
PR = Performance rate

Estimates of Returns. - Crop yields used in the budgets, which are greater than

the regional average, are based on producer surveys. To estimate returns, a price for

sweetpotatoes must be used. Output prices used are based on recent prices.

To evaluate the sensitivity of net returns to price variability, returns are computed at three different price levels. The "Average Price" is the expected price used in the basic budget tables. The "High Price" is 25% above the "Average Price" and the "Low Price" is 25% below the "Average Price."

A "sensitivity" table is presented to illustrate the effects of alternate levels of yields and prices on net returns. The budgeted yield and the budgeted price are used as base values (100%). Yields are then varied from 50 to 150% of the base yield while prices are varied from 75 to 125% of the base price. Net returns are computed for each combination of yield and price.

RESULTS

Estimated resource use and costs per acre for sweetpotato production are presented in Table 5. Per acre costs total $2,231.85 including $84.42 for interest on operating capital.

Some growers custom apply selected materials by air. Most apply their own spray materials by ground. The budgets reflect ground application of all spray materials with a tractor mounted boom.

Preplant Tillage

Some growers hip in the fall after disking. Most growers start with a burndown in the spring. The budget shows a burndown spray of Round-Up, followed by two diskings (see column labeled "times over"). Next, fertilizer is custom applied and two

trips with a hipper form the beds.

Fertilizer

Mississippi State University recommends that fertilizer rates be based on a soil test. A 1:2:3 (N:P:K) ratio appears best for most sweetpotato fields in north central Mississippi. However, growers appear to prefer a 1:4:6 ratio. The budget reflects 50-200-300 pounds of liquid N-P-K per acre, supplemented with 15 pounds of sulfur and one pound of boron per acre. The fertilizer is custom blended and custom applied with ground equipment.

Transplant

Slips are generally planted 12-16 inches apart in 38, 40, or 44 inch rows. Most growers produce their own transplants. The authors have not identified all the technical parameters associated with plant beds. There is a limited local market for slips. Local prices range from $10 to $30 per thousand (depending on availability and time of transplant season). The budget assumes 11,000 slips priced at $16.50 per thousand.

Costs reflect a 4-row transplanter towed by a 75 hp. tractor. The transplanter requires a <u>minimum</u> of 10 people (2 per row on the transplanter and 2 walking). An acre requires 0.600 hours. Hence, "transplant labor" is 6 hours per acre at a <u>minimum</u>. The budget shows 10 hours. The transplant operation is supported by a towed utility trailer and water trailer. The operation requires three tractors, and the budget indicates three tractor drivers. A "crate" is a six-gallon milk carton. It is used to handle or store slips. A crate holds 1,000 slips. The budget assumes that two crates are replaced per acre per

year.

Weed Control

Table 5 lists a weed control program comprised of two herbicide applications

and two cultivations. Specifically it is: 2.0 pints of Command 4EC, followed by two

cultivations and 1.0 pint of Poast. Some growers are able to delete the second herbicide

application.

Insect Control

The insect control program begins with 4.0 pints of Lorsban mixed with the

fertilizer and hipped into the beds. Thiodan (1.0 pint) is tank-mixed with the initial

herbicide application (Command 4EC). The budgets summarize a foliar spray program of

four alternating applications of Imidan and Penncap-M, followed by an application of

SpinTor. Specifically they are:

        1)   1.3 pounds of Imidan,

        2)   2.0 pints of Penncap-M,

        3)   1.3 pounds of Imidan,

        4)   2.0 pints of Penncap-M, and

        5)   6.0 ounces of SpinTor.

Some growers do not utilize the initial four foliar sprays. Some apply their final

application to less than 100 percent of their acreage.

Harvest

The plants are de-vined with a shredder prior to harvest. Harvesting requires

2.0 hours per acre. The 2-row harvester is towed by a 75 hp tractor and requires 12

laborers (24 hours per acre). The budget indicates that the harvester is supported by a

utility trailer, three trucks, and a forklift (Bobcat front-end loader). Many growers run

more than one harvester (digger) in a group to spread the costs associated with the utility

trailer, trucks, and forklift. To approximate this "gain in efficiency", the budget reflects

0.50 "times over" for the trucks so that only 50 percent of their cost is assigned to an acre.

A "bin" is a wooden box which holds 1,000 pounds of sweetpotatoes. The

budget assumes that two per acre are replaced each year.

Storage

After harvest, most sweetpotatoes to be sold graded or by the 40-pound box

are stored. Culls or canners (25% of yield) are sold fresh weight (high moisture - green

weight) directly from the field. Some graded or boxed sweetpotatoes are sold uncured

(high moisture with little or no storage time). The budget reflects storage cost ($1.00 per

cwt.) for 65% of the yield.

Sweetpotatoes suffer a 2-5% weight loss during curing. Weight loss during

storage runs 1-3% per month (0.5-1.5% with supplemental humidification [14]). Budget

yields represent product sold. They reflect losses in curing, storage, grading, etc.

Clean, Grade, Pack

The budget assumes custom cleaning, grading, and packing at a charge of

$1.75 per box. Additionally, the grower is charged for the box ($1.10 per box). The

budgeted yield (discussed below) requires 330 boxes. When yield changes, the number of

boxes per acre is adjusted, and the per acre change for "clean, grade, pack" is recalculated for the new yield.

Per Acre Costs and Returns

Estimated per acre costs and returns are summarized in Table 6.

Income. - Expected budget yield per acre is 172 hundredweight. It is made up of 25% culls, 50% No. 1's, 15% No. 2's, and 10% Jumbos. Culls are priced per hundredweight and the balance per 40-pound box. Culls are assigned an expected budget price of $3.00/cwt. No. 1's are given an expected budget price of $12.00 per box. No. 2's are priced at half of No. 1's and Jumbos are priced at $1.00 per box more than No. 2's.

Estimated total income is $3,435.00 per acre.

Direct costs. - The high cost items are:

Item	$/Acre
Fertilizer	125.00
Slips	181.50
Boxes	363.00
Custom Pack	577.50
Transplant and Harvest Labor	288.75

Herbicide and insecticide costs are $34.90 and $75.87 per acre, respectively.

Total direct expenses are estimated at $2,229.30.

Fixed costs. - Towed equipment, tractors, and trucks are the components of

fixed expenses. Total fixed expenses sum to $86.98 per acre.

Returns above total specified expenses. - In the budgets, direct and fixed

expenses sum to total specified expenses. Returns above total specified expenses are

estimated at $1,118.73 per acre. Profits are returns above **all** expenses. Cost items not

included are land, management, and general farm overhead. A charge of $250.00 per acre

(Land - $85.00, Management - $90.00, General farm overhead - $75.00) would be

reasonable for large sweetpotato farms in north central Mississippi. Then profits, or

returns to risk, would be approximately $870.00 per acre.

Sensitivity Analysis

Table **7** reports estimated returns for a range of yield and price combinations.

Returns are negative for only the lowest yields <u>and</u> lowest prices. If yield is 80% of

expected and price is 90% of expected, per acre returns above total specified expenses are

$407.99. Or, more than enough to cover the land, management, general farm overhead

cost.

LIMITATIONS

Sweetpotato farming operations can have three components: plant beds,

production, and packing sheds. Plant beds produce the slips for transplanting. Future

research will address the detailed cost of plant beds.

Packing sheds store, cure, clean, grade, and pack. Climate controlled storage

was observed on some farms. Often, storage buildings were physically separate from the

facilities utilized to clean, grade, and pack. Future research will address the costs

associated with packing sheds. Negative horizontal ventilation (NHV) curing and storage

facilities [1, 3, 4] may be more efficient than conventional systems since field or pallet bins

are not handled during storage/curing and individual storage compartments do not require

cooling, etc., when not in use. Future studies should address, in greater detail, the costs

associated with existing packing sheds and provide cost data and analysis on packing

sheds incorporating NHV systems.

Technical parameters (prices of specialized equipment, length of life, repair

costs, and performance rates) associated with sweetpotato production systems need

additional study, especially in the area of support personnel and equipment at harvest.

Also, hauling costs from the field to storage location(s) and from detached storage

locations to packing sheds need additional study.

Table 1. United States sweetpotato harvested acres, selected states, 1978-1998.

Year	North Carolina	Louisiana	California	Texas	Alabama	Mississippi	U.S. Total
1978	37,000	28,000		9,500	5,500	4,700	112,200
1979	40,000	27,000		7,900	5,700	4,700	114,200
1980	37,000	25,000		6,500	5,300	4,600	102,000
1981	39,000	26,000		7,800	5,400	5,200	109,800
1982	44,000	25,000		7,200	5,500	5,000	115,400
1983	37,000	24,000		7,100	4,900	4,700	102,400
1984	38,000	23,000		7,300	5,900	4,800	102,900
1985	40,000	21,000		7,700	5,400	5,500	103,300
1986	34,000	20,000		6,600	4,700	5,200	90,800
1987	35,000	19,000	6,600	7,300	4,000	4,500	88,900
1988	34,000	17,000	7,100	7,400	4,100	3,500	85,500
1989	34,000	18,000	8,300	7,000	3,900	3,000	86,000
1990	34,000	21,000	8,300	6,200	4,900	3,500	89,500
1991	30,000	16,000	8,200	5,500	4,700	3,500	77,800
1992	35,000	16,000	9,000	5,500	4,900	4,000	82,400
1993	32,000	16,500	8,300	6,000	4,400	5,500	80,200
1994	34,000	19,000	8,200	5,400	4,200	5,500	82,800
1995	32,000	21,000	9,600	5,200	4,100	5,500	83,600
1996	31,000	21,000	9,600	5,500	4,200	8,100	84,800
1997	31,000	20,000	9,700	5,800	3,600	8,400	83,300
1998	32,000	20,000	9,100	6,000	3,700	9,700	83,200

Source: [11]

Table 2. United States per capita consumption of sweetpotatoes, 1978-1998.

Year	Pounds
1978	4.9
1979	5.1
1980	4.4
1981	4.7
1982	5.5
1983	4.6
1984	4.9
1985	5.4
1986	4.4
1987	4.4
1988	4.1
1989	4.1
1990	4.6
1991	4.0
1992	4.3
1993	3.9
1994	4.7
1995	4.5
1996	4.6
1997	4.6

Source: [11]

Table 3. Sweetpotato average yields[1], selected states and United States, 1978-1998.

Year	North Carolina	Louisiana	California	Texas	Alabama	Mississippi	U.S. Average
1978	130	95		110	100	95	117
1979	120	95		130	110	95	117
1980	115	85		80	100	90	107
1981	120	100		95	115	95	117
1982	135	100		135	120	100	129
1983	120	95		120	105	95	118
1984	135	105		110	115	105	125
1985	150	120		130	120	120	141
1986	150	125		120	110	100	136
1987	130	130	205	115	90	110	131
1988	130	145	170	70	115	100	128
1989	120	160	175	90	120	95	132
1990	145	160	175	60	120	120	141
1991	135	150	185	140	145	140	144
1992	120	170	205	140	165	130	146
1993	130	125	210	150	160	120	138
1994	155	160	205	155	190	170	162
1995	150	150	200	125	165	150	154
1996	140	160	205	135	170	160	159
1997	160	170	205	155	150	130	162
1998	170	100	205	135	170	140	

[1]cwt per acre
Source: [11]

Table 4. Textural and drainage distribution of soils within the Yazoo-Mississippi Delta counties[1].

Soils Group	Texture	Soil Drainage Class[2]	Percent of Delta	Acres	Cumulative Acres
1	Sandy Loam	WD	4.72	182,423	182,423
2	Silt Loam	MWD	12.40	479,248	661,671
3	Silty Clay Loam	SPD	9.82	379,533	1,041,204
4	Silty Clay Loam	PD	2.12	81,936	1,123,140
5	Silty Clay	PD	6.29	243,102	1,366,242
6	Clay	VPD	53.25	2,058,059	3,424,301

[1]Ten all Delta counties and the Delta portion of Tallahatchie.
[2]WD,MWD,SPD,PD and VPD represent *well*, *moderately well*, *somewhat poor*, *poor*, and *very poor* internal and surface drainage, respectively.

Source: [13]

Table 5. Estimated resource use and costs for field operations, per acre, sweetpotato, 2-row Harvester, Custom Pack, Mississippi, 1999.

OPERATION/ OPERATING INPUT	SIZE/ UNIT	TRACTOR SIZE	PERF RATE	TIMES OVER	MTH	TRACTOR COST DIRECT	TRACTOR COST FIXED	EQUIP COST DIRECT	EQUIP COST FIXED	ALLOC LABOR HOURS	ALLOC LABOR COST	OPERATING INPUT AMOUNT	OPERATING INPUT PRICE	OPERATING INPUT COST	TOTAL COST
						-----------dollars----------					dollars	-------dollars--------			
Trapping	acre			1.00	Apr							1.0000	0.50	0.50	0.50
Spray (Broadcast)	27'	50 hp	0.061	1.00	Apr	0.22	0.29	0.14	0.20	0.092	0.72				1.57
Roundup Ultra 4SL	pt											1.0000	5.68	5.68	5.68
Disk Harrow	14'	50 hp	0.134	2.00	Apr	0.97	1.27	0.87	1.73	0.268	2.23				7.06
Custom Spread(Truck)	appl			1.00	Apr							1.0000	4.00	4.00	4.00
Fert 5-20-30 +S+B	cwt											10.0000	12.50	125.00	125.00
Lorsban 4E	pt											4.0000	5.57	22.28	22.28
Disk Bed (Hipper)	4R-40	50 hp	0.141	2.00	May	1.02	1.33	1.12	2.06	0.282	2.34				7.88
Trailer utility	10 ft	50 hp	0.600	1.00	May	2.17	2.84	0.25	1.18	0.600	4.99				11.41
sweetpotato slips	thoud											11.0000	16.50	181.50	181.50
Trailer water	10 ft	50 hp	0.600	1.00	May	2.17	2.84	0.58	2.28	0.600	4.99				12.84
Transplanter	4 row	75 hp	0.600	1.00	May	3.17	4.05	0.79	3.29	0.600	4.99				16.28
Transplant labor	hr											10.0000	7.50	75.00	75.00
Crate	each											2.0000	6.00	12.00	12.00
Spray (Broadcast)	27'	50 hp	0.061	1.00	May	0.22	0.29	0.14	0.20	0.092	0.72				1.57
Command 4EC	pt											2.0000	9.70	19.40	19.40
Thiodan 3 EC	qt											1.0000	9.09	9.09	9.09
Ditcher		50 hp	0.020	1.00	May	0.07	0.09	0.01	0.04	0.020	0.17				0.38
Spray (Broadcast)	27'	50 hp	0.061	1.00	May	0.22	0.29	0.14	0.20	0.092	0.72				1.57
Imidan 50-WP	lb											1.3000	5.90	7.67	7.67
Cultivate (Early)	4R-40	50 hp	0.190	1.00	May	0.69	0.90	0.36	0.76	0.190	1.58				4.28
Ditcher		50 hp	0.020	1.00	May	0.07	0.09	0.01	0.04	0.020	0.17				0.38
Spray (Broadcast)	27'	50 hp	0.061	1.00	Jun	0.22	0.29	0.14	0.20	0.092	0.72				1.57
Penncap-M 2F	pt											2.0000	2.79	5.58	5.58
Spray (Broadcast)	27'	50 hp	0.061	1.00	Jun	0.22	0.29	0.14	0.20	0.092	0.72				1.57
Imidan 50-WP	lb											1.3000	5.90	7.67	7.67
Cultivate (Late)	4R-40	50 hp	0.128	1.00	Jun	0.46	0.61	0.24	0.51	0.128	1.06				2.88
Ditcher		50 hp	0.020	1.00	Jun	0.07	0.09	0.01	0.04	0.020	0.17				0.38
Spray (Broadcast)	27'	50 hp	0.061	1.00	Jul	0.22	0.29	0.14	0.20	0.092	0.72				1.57
Penncap-M 2F	pt											2.0000	2.79	5.58	5.58
Poast	pt											1.0000	9.82	9.82	9.82
Spray (Broadcast)	27'	50 hp	0.061	1.00	Jul	0.22	0.29	0.14	0.20	0.092	0.72				1.57
SpinTor	oz											6.0000	3.00	18.00	18.00
Shredder	4 row	50 hp	0.230	1.00	Sep	0.83	1.09		1.85	0.230	1.91				5.68
Trailer utility	10 ft	50 hp	0.600	1.00	Sep	2.17	2.84	0.25	1.18	0.600	4.99				11.41
Harvest labor	hr											1.0000	7.50	7.50	7.50
Truck	1/2 ton		1.000	0.50	Sep			1.54	2.11	0.500	4.16				7.80
Truck	2 ton		1.000	0.50	Sep			2.22	4.43	0.500	4.16				10.80
Harvest labor	hr											3.5000	7.50	26.25	26.25
Harvester towed	2 row	75 hp	2.000	1.00	Sep	10.55	13.51	9.00	19.38	2.000	16.62				69.06
Harvest labor	hr											24.0000	7.50	180.00	180.00
Bin	each											2.0000	42.00	84.00	84.00
Fork lift			1.000	1.00	Sep			2.48	6.72	1.000	8.31				17.51
Truck	2 ton		1.000	0.50	Sep			2.22	4.43	0.500	4.16				10.80
Storage	cwt			1.00	Sep							112.0000	1.00	112.00	112.00
Clean,grade,pack	box			1.00	Sep							330.0000	1.75	577.50	577.50
Box	each											330.0000	1.10	363.00	363.00
Broker	box			1.00	Sep							330.0000	0.50	165.00	165.00
TOTALS						25.94	33.57	22.93	53.41	8.698	71.99			2024.02	2231.85
INTEREST ON OPERATING CAPITAL															84.42
UNALLOCATED LABOR															0.00

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TOTAL SPECIFIED COST                                                    2316.27
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Note: Cost of production estimates are based on last year's input prices.
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Table 6.  Estimated costs and returns per acre, sweetpotato, 2-row Harvester, Custom Pack,
          Mississippi, 1999.
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ITEM	UNIT	PRICE	QUANTITY	AMOUNT	YOUR FARM
		dollars		dollars	
INCOME					
Sweetpotato #1	box	12.00	215.0000	2580.00	_____
Sweetpotato #2	box	6.00	70.0000	420.00	_____
Sweetpotato -Jumbo	box	7.00	45.0000	315.00	_____
Sweetpotato -cull	cwt	3.00	40.0000	120.00	_____

TOTAL INCOME				3435.00	_____
DIRECT EXPENSES					
FERTILIZERS					
Fert 5-20-30 +S+B	cwt	12.50	10.0000	125.00	_____
HERBICIDES					
Roundup Ultra 4SL	pt	5.68	1.0000	5.68	_____
Command 4EC	pt	9.70	2.0000	19.40	_____
Poast	pt	9.82	1.0000	9.82	_____
INSECTICIDES					
Lorsban 4E	pt	5.57	4.0000	22.28	_____
Thiodan 3 EC	qt	9.09	1.0000	9.09	_____
Imidan 50-WP	lb	5.90	2.6000	15.34	_____
Penncap-M 2F	pt	2.79	4.0000	11.16	_____
SpinTor	oz	3.00	6.0000	18.00	_____
SEED/PLANTS					
sweetpotato slips	thoud	16.50	11.0000	181.50	_____
FEES					
Trapping	acre	0.50	1.0000	0.50	_____
Broker	box	0.50	330.0000	165.00	_____
CUSTOM FERT/LIME					
Custom Spread(Truck)	appl	4.00	1.0000	4.00	_____
CRATES,BINS,BOXES					
Crate	each	6.00	2.0000	12.00	_____
Bin	each	42.00	2.0000	84.00	_____
Box	each	1.10	330.0000	363.00	_____
SPECIAL LABOR					
Transplant labor	hr	7.50	10.0000	75.00	_____
Harvest labor	hr	7.50	28.5000	213.75	_____
CUSTOM PACK					
Clean,grade,pack	box	1.75	330.0000	577.50	_____
STORAGE					
Storage	cwt	1.00	112.0000	112.00	_____
OPERATOR LABOR					
Tractors	hour	8.31	5.9850	49.74	_____
Self-Propelled Eq.	hour	8.31	2.5000	20.78	_____
HAND LABOR					
Implements	hour	6.91	0.2135	1.48	_____
DIESEL FUEL					
Tractors	gal	0.65	18.7490	12.19	_____
Self-Propelled Eq.	gal	0.65	6.4500	4.19	_____
REPAIR & MAINTENANCE					
Implements	acre	14.46	1.0000	14.46	_____
Tractors	acre	13.75	1.0000	13.75	_____
Self-Propelled Eq.	acre	4.27	1.0000	4.27	_____
INTEREST ON OP. CAP.	acre	84.42	1.0000	84.42	_____

TOTAL DIRECT EXPENSES				2229.30	_____
RETURNS ABOVE DIRECT EXPENSES				1205.70	_____
FIXED EXPENSES					
Implements	acre	35.73	1.0000	35.73	_____
Tractors	acre	33.57	1.0000	33.57	_____
Self-Propelled Eq.	acre	17.68	1.0000	17.68	_____

TOTAL FIXED EXPENSES				86.98	_____

TOTAL SPECIFIED EXPENSES				2316.27	_____
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				1118.73	_____

Note: Cost of production estimates are based on last year's input prices.

Table 7. Estimated returns for various price/yield combinations, per acre, sweetpotato,2-row Harvester,
  Custom Pack, Mississippi, 1999.

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_____
                         ----------------------------------------PERCENT----------------------------------------
PRODUCT                   75       80       85       90       95      100      105      110      115      120      125
--------------------     ----------------------------------------PRODUCT PRICE----------------------------------
Sweetpotato    #1         9.00     9.60    10.20    10.80    11.40    12.00    12.60    13.20    13.80    14.40    15.00
Sweetpotato    #2         4.50     4.80     5.10     5.40     5.70     6.00     6.30     6.60     6.90     7.20     7.50
Sweetpotato -Jumbo        5.25     5.60     5.95     6.30     6.65     7.00     7.35     7.70     8.05     8.40     8.75
Sweetpotato -cull         2.25     2.40     2.55     2.70     2.85     3.00     3.15     3.30     3.45     3.60     3.75
_____
PERCENT   YIELD   UNIT   ----------------------------------------dollars----------------------------------------

   50    107.50   box   -313.51 -227.63 -141.76  -55.88    29.99   115.87   201.74   287.62   373.49   459.37   545.24
          35.00   box   -400.49 -314.61 -228.74 -142.86   -56.99    28.89   114.76   200.64   286.51   372.39   458.26
          22.50   box
          20.00   cwt

   60    129.00   box   -181.42  -78.37    24.68   127.73   230.78   333.83   436.88   539.93   642.98   746.03   849.08
          42.00   box   -268.40 -165.35   -62.30    40.75   143.80   246.85   349.90   452.95   556.00   659.05   762.10
          27.00   box
          24.00   cwt

   70    150.50   box    -49.32    70.90   191.13   311.35   431.58   551.80   672.03   792.25   912.48  1032.70  1152.93
          49.00   box   -136.30   -16.08   104.15   224.37   344.60   464.82   585.05   705.27   825.50   945.72  1065.95
          31.50   box
          28.00   cwt

   80    172.00   box     82.77   220.17   357.57   494.97   632.37   769.77   907.17  1044.57  1181.97  1319.37  1456.77
          56.00   box     -4.21   133.19   270.59   407.99   545.39   682.79   820.19   957.59  1094.99  1232.39  1369.79
          36.00   box
          32.00   cwt

   90    193.50   box    214.86   369.44   524.01   678.59   833.16   987.74  1142.31  1296.89  1451.46  1606.04  1760.61
          63.00   box    127.88   282.46   437.03   591.61   746.18   900.76  1055.33  1209.91  1364.48  1519.06  1673.63
          40.50   box
          36.00   cwt

  100    215.00   box    346.95   518.70   690.45   862.20  1033.95  1205.70  1377.45  1549.20  1720.95  1892.70  2064.45
          70.00   box    259.98   431.73   603.48   775.23   946.98  1118.73  1290.48  1462.23  1633.98  1805.73  1977.48
          45.00   box
          40.00   cwt

  110    236.50   box    479.05   667.97   856.90  1045.82  1234.75  1423.67  1612.60  1801.52  1990.45  2179.37  2368.30
          77.00   box    392.07   580.99   769.92   958.84  1147.77  1336.69  1525.62  1714.54  1903.47  2092.39  2281.32
          49.50   box
          44.00   cwt

  120    258.00   box    611.14   817.24  1023.34  1229.44  1435.54  1641.64  1847.74  2053.84  2259.94  2466.04  2672.14
          84.00   box    524.16   730.26   936.36  1142.46  1348.56  1554.66  1760.76  1966.86  2172.96  2379.06  2585.16
          54.00   box
          48.00   cwt

  130    279.50   box    743.23   966.51  1189.78  1413.06  1636.33  1859.61  2082.88  2306.16  2529.43  2752.71  2975.98
          91.00   box    656.25   879.53  1102.80  1326.08  1549.35  1772.63  1995.90  2219.18  2442.45  2665.73  2889.00
          58.50   box
          52.00   cwt

  140    301.00   box    875.33  1115.78  1356.23  1596.68  1837.13  2077.58  2318.03  2558.48  2798.93  3039.38  3279.83
          98.00   box    788.35  1028.80  1269.25  1509.70  1750.15  1990.60  2231.05  2471.50  2711.95  2952.40  3192.85
          63.00   box
          56.00   cwt

  150    322.50   box   1007.42  1265.04  1522.67  1780.29  2037.92  2295.54  2553.17  2810.79  3068.42  3326.04  3583.67
         105.00   box    920.44  1178.06  1435.69  1693.31  1950.94  2208.56  2466.19  2723.81  2981.44  3239.06  3496.69
          67.50   box
          60.00   cwt
_____
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The top number in each cell is Returns Above Direct Expenses.
The bottom number in each cell is Returns Above Total Specified Expenses.
Note: Cost of production estimates are based on last year's input prices.

APPENDIX

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Appendix Table 1. Tractors: estimated useful life, annual use, purchase price, repair cost,
                   fuel consumption rate, and direct and fixed cost per hour, Mississippi, 1999.
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ITEM NAME	SIZE	USEFUL LIFE	ANNUAL USE	PURCHASE PRICE	REPAIR COST	FUEL CONS RATE	--DIRECT COST--	--FIXED COST--
		years	hours	dollars	percent	/hour	$/hr	$/hr
Tractor 40-59 hp	50 hp	14	600	21,700	75	2.57	3.61	4.73
Tractor 60-89 hp	75 hp	14	600	31,000	75	3.86	5.28	6.76
Tractor 90-119 hp	105 hp	14	600	50,200	60	5.41	7.10	10.94
Tractor 120-139 hp	130 hp	14	600	67,200	60	6.69	9.15	14.64
Tractor 140-159 hp	150 hp	14	600	74,300	60	7.72	10.33	16.19
Tractor 160-179 hp	170 hp	14	600	79,400	60	8.75	11.36	17.30
Tractor 180-199 hp	190 hp	14	600	88,000	60	9.78	12.64	19.18
Tractor 200-219 hp	210 hp	14	600	97,800	50	10.81	12.85	21.31
Tractor 220-229 hp	225 hp	14	600	117,600	50	11.58	14.53	25.63

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Appendix Table 2. Self-propelled machines: estimated performance rate, useful life, annual use, purchase price, repair cost, fuel consumption rate, and direct and fixed cost per hour and per acre, Mississippi, 1999.

ITEM NAME	SIZE	PERF RATE	USEFUL LIFE	ANNUAL USE	PURCHASE PRICE	REPAIR COST	FUEL CONS RATE	--DIRECT COST--		--FIXED COST--	
		hrs/ac	years	hours	dollars	percent	/hour	$/hr	$/ac	$/hr	$/ac
ATV - 4 Wheeler (CL)	10'	0.040	8	100	6,500	60	1.00	5.92	0.24	11.88	0.48
Fork lift		1.000	20	350	21,000	50	1.50	2.48	2.48	6.72	6.72
Hi-Clear Sprayer	40'	0.049	8	350	49,600	80	2.00	15.47	0.76	25.91	1.27
Hi-Clear Sprayer	60'	0.033	8	350	57,000	80	2.00	17.59	0.58	29.77	0.98
Truck	½ ton	1.000	5	800	13,000	45	2.50	3.09	3.09	4.21	4.21
Truck	2 ton	1.000	19	400	31,000	50	3.70	4.44	4.44	8.85	8.85

Appendix Table 3.   Implements: estimated performance rate, useful life, annual use, purchase price, repair cost, and direct and fixed cost per hour and per acre, Mississippi, 1999.

ITEM NAME	SIZE	PERF RATE	USEFUL LIFE	ANNUAL USE	PURCHASE PRICE	REPAIR COST	--DIRECT COST--		--FIXED COST--	
		hrs/ac	years	hours	dollars	percent	$/hr	$/ac	$/hr	$/ac
Chisel Plow	12'	0.156	12	150	4,900	70	1.91	0.30	4.64	0.72
Chisel Plow	16'	0.117	12	150	6,120	70	2.38	0.28	5.79	0.68
Chisel Plow	24'	0.078	12	150	7,960	70	3.10	0.24	7.53	0.59
Chisel Plow	32'	0.059	12	150	9,790	70	3.81	0.22	9.26	0.55
Cult & Post (Early)	4R-40	0.199	12	200	7,680	80	2.56	0.51	5.45	1.08
Cult & Post (Early)	6R-40	0.133	12	200	11,080	80	3.69	0.49	7.86	1.05
Cult & Post (Early)	8R-40	0.100	12	200	15,750	80	5.25	0.53	11.18	1.12
Cult & Post (Late)	4R-40	0.134	12	200	7,680	80	2.56	0.34	5.45	0.73
Cult & Post (Late)	6R-40	0.089	12	200	11,080	80	3.69	0.33	7.86	0.70
Cult & Post (Late)	8R-40	0.067	12	200	15,750	80	5.25	0.35	11.18	0.75
Cultivate (Early)	4R-40	0.190	12	200	5,610	80	1.87	0.36	3.98	0.76
Cultivate (Early)	6R-40	0.127	12	200	8,770	80	2.92	0.37	6.22	0.79
Cultivate (Early)	8R-40	0.095	12	200	12,240	80	4.08	0.39	8.68	0.83
Cultivate (Late)	4R-40	0.128	12	200	5,610	80	1.87	0.24	3.98	0.51
Cultivate (Late)	6R-40	0.085	12	200	8,770	80	2.92	0.25	6.22	0.53
Cultivate (Late)	8R-40	0.064	12	200	12,240	80	4.08	0.26	8.68	0.56
Disk Bed (Hipper)	4R-40	0.141	8	160	6,380	80	3.99	0.56	7.29	1.03
Disk Bed (Hipper)	6R-40	0.094	8	160	7,140	80	4.46	0.42	8.16	0.77
Disk Bed (Hipper)	8R-40	0.070	8	160	9,490	80	5.93	0.42	10.84	0.76
Disk Harrow	14'	0.134	10	180	7,340	80	3.26	0.44	6.44	0.86
Disk Harrow	24'	0.078	10	180	16,830	80	7.48	0.58	14.78	1.15
Disk Harrow	32'	0.059	10	180	26,010	80	11.56	0.68	22.83	1.35
Ditcher		0.020	10	200	2,330	60	0.70	0.01	1.84	0.04
Fert Appl (Liquid)	4R-40	0.147	8	150	10,510	50	4.38	0.64	12.81	1.88
Fert Appl (Liquid)	6R-40	0.098	8	150	10,810	50	4.50	0.44	13.18	1.29
Fert Appl (Liquid)	8R-40	0.074	8	150	11,120	50	4.63	0.34	13.55	1.00
Harvester towed	2 row	2.000	15	300	15,500	88	3.03	6.06	6.53	13.06
Heavy Disk	14'	0.167	10	180	13,260	80	5.89	0.98	11.64	1.94
Heavy Disk	21'	0.112	10	180	17,850	80	7.93	0.89	15.67	1.76
Heavy Disk	27'	0.087	10	180	26,520	80	11.79	1.03	23.28	2.03
Shredder	2 row	0.400	10	150	2,650	0	0.00	0.00	2.79	1.12
Spray (Broadcast)	27'	0.061	8	200	3,630	100	2.27	0.14	3.32	0.20
Spray (Broadcast)	42'	0.039	8	200	4,010	100	2.51	0.10	3.67	0.14
Spray (Broadcast)	60'	0.027	8	200	4,770	100	2.98	0.08	4.36	0.12
Trailer utility	10 ft	0.600	15	200	3,100	40	0.41	0.25	1.96	1.18
Trailer water	10 ft	0.600	10	150	3,600	40	0.96	0.58	3.79	2.28
Transplanter	4 row	0.600	10	150	5,200	38	1.32	0.79	5.48	3.29

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Appendix Table 4.  Operating inputs: estimated prices, Mississippi, 1999.

ITEM NAME               UNIT      PRICE
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                                  dollars

CUSTOM SPRAY
  App by Air ( 2 gal)   appl        2.20
  App by Air ( 3 gal)   appl        2.60
  App by Air ( 5 gal)   appl        3.25
FERTILIZERS
  Amm Nitrate (34% N)   cwt         9.15
  Anhy Ammonia (82% N)  cwt        11.15
  Boron (Solubor)       lb          0.60
  Fert 0-20-20          cwt        10.90
  Fert 10-34-0          cwt        11.00
  Fert 13-13-13         cwt        10.53
  Fert 5-20-20          cwt        11.78
  Fert 5-20-30 +S+B     cwt        12.50
  Fert 8-24-24          cwt        13.05
  Phosphorus(46% P2O5)  cwt        12.47
  Potash (60% K2O)      cwt         8.35
  Sulfur                lb          0.40
  UAN (32% N)           cwt         6.03
FUNGICIDES
  Benlate 50 WP         lb         16.57
  Captan 50 WP          lb          2.78
  Rovral 4f             pt         20.35
  Terraclor Super X EC  pt          3.37
  Vitavax 200           oz          0.35
HERBICIDES
  Atrazine 4L           pt          1.34
  Banvel                pt         10.31
  Basagran              pt          8.65
  Bladex 4L             qt          6.83
  Blazer 2L             pt          7.62
  Buctril 4EC           pt         13.25
  Classic               oz         11.13
  Command 4EC           pt          9.70
  Cotoran 4L            pt          4.19
  Fusilade DX           oz          0.92
  Gramoxone Extra       pt          4.41
  Karmex DF             lb          4.57
  Lasso 4E              qt          5.53
  Poast                 pt          9.82
  Prowl 3.3 EC          pt          3.16
  Roundup Ultra 4SL     pt          5.68
INSECTICIDES
  Ammo 2.5 EC           oz          1.70
  Baythroid 2           oz          3.14
  Decis 1.5EC           oz          3.56
  Guthion 2L            pt          3.65
  Imidan 50-WP          lb          5.90
  Lorsban 4E            pt          5.57
  Malathion             pt          3.07
  Methyl 4EC            pt          3.50
  Orthene 90S           lb          9.41
  Sevin 4F              qt          0.00
  Spintor               oz          3.00
  Temik 15G             lb          3.19
  Thiodan 3 EC          qt          9.09
  Tracer                oz          5.84
SEED/PLANTS
  Sweet potato slips    thoud      14.50
FEES
  Bt Cotton             acre       32.00
  Broker                box         0.50
  Trapping              acre        0.50
CUSTOM FERT/LIME
  App Fert by Air       cwt         4.10
  Apply Liquid Fert     acre        2.50
  Custom Spread(Truck)  appl        4.00
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   Lime (Spread)        ton        26.73
CUSTOM HARVEST/HAUL
   Haul Corn            bu          0.16
   Haul Cotton          lb          0.02
   Haul Soybeans        bu          0.16
```

Appendix Table 4. Operating inputs: estimated prices, Mississippi, 1999.

ITEM NAME	UNIT	PRICE
		dollars
CRATES, BINS, BOXES		
Bin	each	42.00
Box	each	1.10
Crate	each	6.00
SPECIAL LABOR		
Cut-slip labor	hr	7.50
Harvest labor	hr	7.50
Transplant labor	hr	7.50
CUSTOM PACK		
Clean, grade, pack	box	1.75

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Appendix Table 5.  Estimated fuel prices, labor wage rates, and interest rates,
                   Mississippi, 1999.

ITEM NAME                      UNIT        PRICE

                                           dollars
FUEL TYPES
  Diesel Fuel                  gal          0.65
  Gasoline                     gal          1.04

LABOR TYPES
  Operator                     hour         8.31
  Hand                         hour         6.91
 Irrigation                    hour         6.91

INTEREST RATES
  Short-term                   %            9.32
  Intermediate-term            %            9.32
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Literature Cited

1.   Abrams, C. F., et al. Bulk Harvesting and Handling of Fresh Market
        Sweetpotatoes, Paper No. 76-1528. American Society of Agricultural
        Engineers, St. Joseph, MI.

2.   Boehlje, M. D. and V. R. Eldman. Farm Management. New York: John Wiley
        and Sons, 1984.

3.   Boyette, M. D. and H. E. Stewart. Horizontal Ventilation for Long-Term
        Storage of Sweetpotatoes, Paper No. 94-6583. American Society of
        Agricultural Engineers, St. Joseph, MI.

4.   Boyette, M. D., et al. The Postharvest Handling of Sweetpotatoes. North
        Carolina Cooperative Extension Service, AG-413-10-B, June 1997.

5.   Cannon, Mike. Ten Years After Beauregard: Where do we go from here?
        Louisiana Agricultural Experimental Station, Vol. 40, No. 4, Fall 1977.

6.   Census of Agriculture (1987). NASS/USDA, Washington, D.C.

7.   Center for Science in the Public Interest. http://209.8.150.31/

8.   Cox, L. R. Overhead Labor Cost in the Delta Area of Mississippi. Master of
        Science Thesis, Department of Agricultural Economics, Mississippi State
        University, October 1982.

9.   Delta 1999 Planning Budgets. Agricultural Economics Report 100, Mississippi
        State University, December, 1998.

10.   Laughlin, D. H. and S. R. Spurlock. Mississippi State Budget Generator
        User's Guide-Version 5.0 for Windows.
        http://www.agecon.msstate.edu/laughlin/msbg5.0.htm

11.   National Agricultural Statistical Service, selected information.
        http://usda.mannlil.cornell.edu/data-sets/specialty and
        http://www.nass.usda.gov/ipedlb/report.htm

12.   Parvin, D. W., et al. Crop Budget and Planning Data for Major Farm
        Enterprises for the Mississippi and Louisiana Delta. Research Bulletin 484.
        Mississippi State University, June 1975.

13.   Pettiet, Joe. An Interpretive Evaluation of Soils in the Yazoo-Mississippi
        Delta Area for Crop Production. MAFES, MSU Bulletin 808, May 1974.

14.   Picha, David. Postharvest Handling and Physiology of Sweetpotatoes. Louisiana Agricultural Experiment Station, Vol. 40, No. 4, Fall 1977.

15.   Projected Costs and Returns and Whole Farm Analysis for Major Agricultural Enterprises, Louisiana - 1999. A.E.A. Info. Series, No's. 169-176. LSU Ag. Center, January 1999.

16.   Spurlock, S.R. and D. H. Laughlin. Mississippi State Budget Generator User's Guide Version 3.0. Agricultural Economics Technical Publication No. 88, Mississippi State University, July 1992.

17.   Thompson, Paul, et al. Commercial Sweetpotato Production in Mississippi. Publication 1678. Mississippi State University Extension Service, Mississippi State University, August 1998.

18.   Wilson L. G., et al. Growing and Marketing Quality Sweetpotatoes. North Carolina Agricultural Extension Service, AG-09, January 1989.