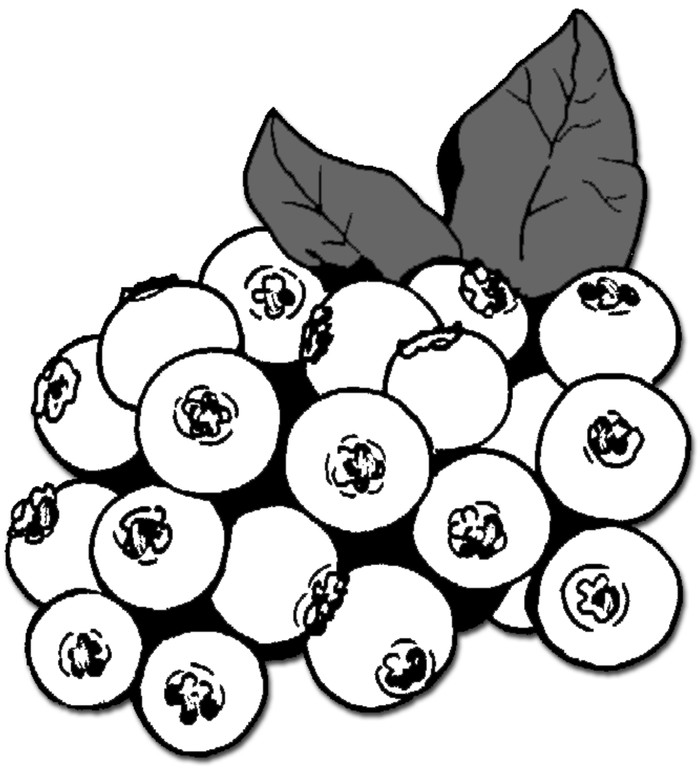
Economic Analysis of Producing Southern Highbush Blueberries in Soil in Georgia



AGECON 04 93 **August 2004**

The University of Georgia

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ACKNOWLEDGEMENT

The authors would like to thank Drs. D.S. NeSmith, Mark Rieger, Cesar Escalante and Curt Lacy, all of the University of Georgia for their review and insightful comments. We are equally indebted to George Westberry, W.O. Mizelle, D. Stanaland, B. Celine, M. Mainland, B. Lisec, T. Cross and B. Strik for whom their work was used as a starting point for developing this research.

ECONOMIC ANALYSIS OF PRODUCING SOUTHERN HIGHBUSH BLUEBERRIES IN SOIL IN GEORGIA

INTRODUCTION:

Blueberries are a fast emerging crop with a bright future in Georgia. However, blueberry, like other fruit crops, embrace price fluctuation. This price volatility depends on several factors, including the variety produced and sold (i.e. fresh or frozen), locality, aggregate productivity, targeted market and timing. As a result, profit margin is hard to determine. Estimating total costs of cultivating southern highbush blueberry would be beneficial in determining profitability. These costs include fixed (machinery, irrigation, recaptured establishment costs, land, overhead and management) and variable costs (i.e. pre-harvest, harvesting and marketing costs) respectively.

Several blueberry orchards were visited to study blueberry operations and collect the necessary primary data needed to estimate cost of production. Various blueberry specialists, Extension Agricultural Economists, Horticulturists, Biological and Ag Engineers, and county agents were visited to gather agronomic, irrigation and equipment data required for this estimate. Vendors of agricultural inputs (fertilizers, chemicals and equipment) were contacted to obtain latest prices needed to generate variable and fixed costs components concomitantly. USDA, NASS and other publications were consulted to obtain historical information on productivity, marketing, price and overall outlook of blueberries. The objective of this research was to analyze cost of production, to project profit margin and analyze investment alternatives.

Blueberries are one of only a few commercially grown native fruit crops. Although the production of highbush and rabbiteye blueberries as a planted crop dates back only about 100 years, wild low-bush blueberries have been commercially harvested for over 150 years. Modern highbush blueberry breeding started in New Jersey and New Hampshire in 1908. A farm in New Jersey was the first to grow, harvest and ship fruit from hybrid blueberry plants in 1916. Prior to that, the crop was primarily harvested from the wild. It was not until 1930s that many improved cultivars were successfully developed and introduced to North Carolina and Michigan.

Although blueberry is a native of North America, several countries around the world are engaged in commercial production of this crop. Presently, the United States is the leading producer with 55% of total world supply, a position that was held by Canada prior to 1970s. Canada has a large acreage of wild low-bush blueberries. Canada now produces 28%, Poland 10% and 7% from the rest of the world.

The largest U.S. blueberry producing states are Maine and Michigan. These two states produce over 50% of the total U.S. production. Maine continues to dominate wild blueberry production with an average of 83 million pounds, equivalent to 30% of total U.S. supply (wild and cultivated combined) for the past three years. Michigan produces about 20% of total U.S. supply and is the largest producer of cultivated blueberries. In 2000, Michigan had 16,800 acres, representing 40% of the nation's total cultivated acreage. Other states such as New Jersey, Oregon, Georgia, North Carolina and Washington together produced 40% of the nation's total cultivated blueberry crop. For the past decade, other small emerging producing states include Indiana, New York, Alabama, Arkansas and Florida.

ASSUMPTIONS:

Although there are several ways of doing a budget, this economic analysis adopted the risk-rated method. The risk-rated return assumes five different yields and prices per pound at the top of the budget namely: "Best", "Optimum", "Median", "Pessimistic" and "Worst". The "Best" and "Worst" yields or prices levels were expected to occur "once in a blue moon" high or low price or yield. The "Median" yield and price level were expected 50 % of the time. The "Optimistic" level would be surpassed about one year in six, while the "Pessimistic" level would occur one year in six.

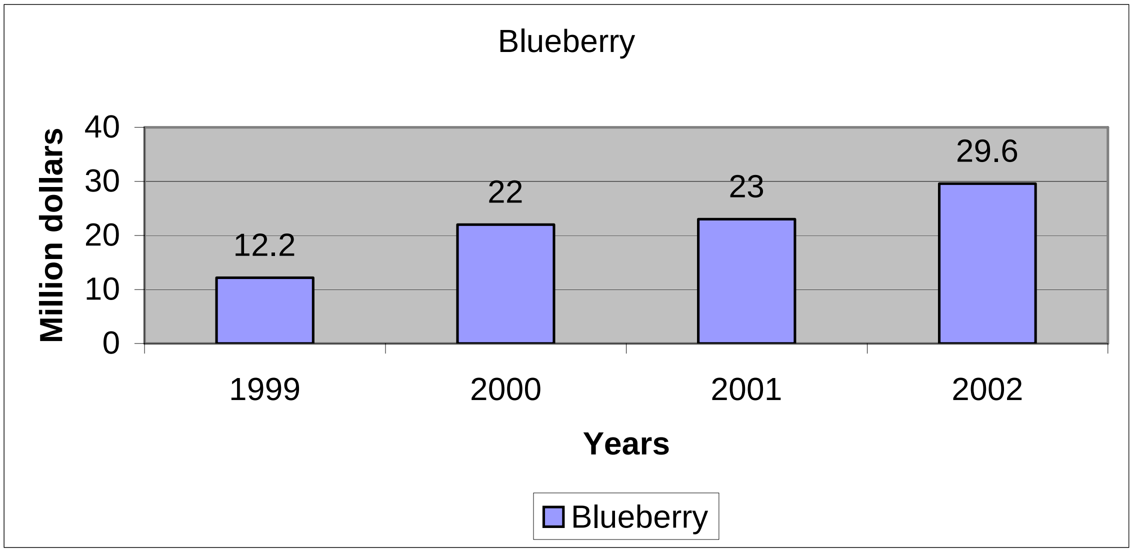
The fourth year was assumed to be in full production. Plant spacing was four feet by ten feet. Variable interest rates of 6.25 % of total operating/variable costs were used for each year. Cost per flat was based on custom packaging. Hired utilized labor was contracted at a flat rate of $7 per hour. Harvesting yields were calculated based on 95 % fruit recovery rate, thus 5% field and packaging loss. Brokerage fee was 15% but it included cooling and handling. Overhead and management fee was 15 % of total operating/variable cost. Compounded recaptured costs were based on 7 % fixed interest rate and the expected life-span of the farm under Georgia condition was 20 years. Machinery and equipment operation costs calculations were based on agricultural engineering estimate on 50 acres and 7% fixed interest rate.

All the calculations included such items as percentage use for crop, purchase price, salvage value, life span, depreciation, interest, tax and insurance. All equipments were assumed to be new. Solid set irrigation was calculated based on 4 acres, a sprinkler spacing of 40 feet by 45 feet, and an eight inch well capable of pumping about 600 gallons/minute. Risk rated marketing prices and yields were obtained from growers and The MBG Marketing Inc. while input and equipment prices were obtained from vendor and machinery dealers respectively. The adopted variable interest rates for operating/variable costs were for the short-term loans while the fixed interest rates used for fixed, machinery and compounded establishment costs were for the long-term loans and these rates were recommended and/or obtained from Ag-Georgia Farm Credit.

GEORGIA BLUEBERRY INDUSTRY OVERVIEW:

Blueberries are a fast emerging crop with a bright future in Georgia. Blueberries already rank 34th in the 2002 Georgia Agricultural Commodity rankings, generating about $29.6 million, equivalent to 0.34% of the total Georgia farm gate value for 2002. This also represents a 28% and 34.5% increase in farm gate value compared with 2001 and 2000 respectively (Fig. 1).

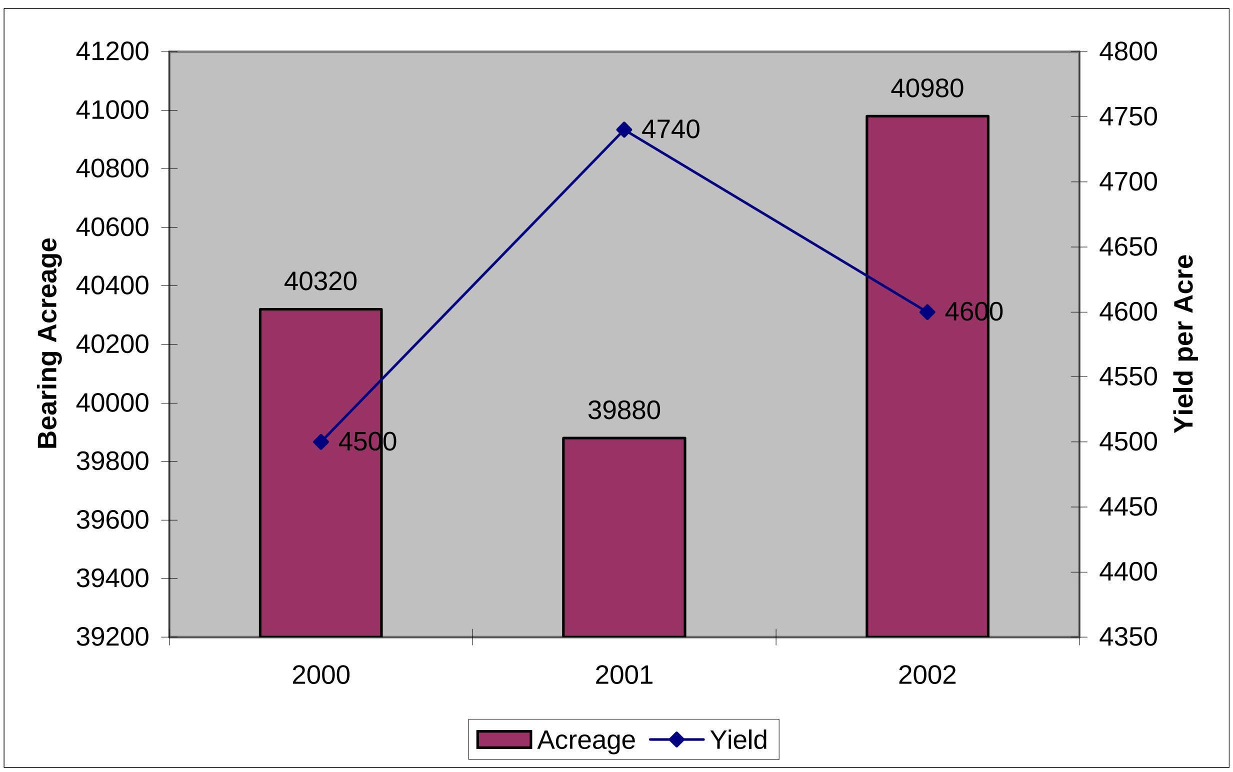
Fig. 1: Blueberry Farm Gate Value 1999-2002



Source: 2002 Georgia Farm Gate Value Report, AR 03-01

According to Non-citrus Fruits and Nuts 2002 Summary report (2003), the overall cultivated blueberry production acreage in the United States has been fluctuating slightly. In 2001, total production acreage was 39,880, a 1% decrease from 2000 and a 2.8% increase in 2002 compared with 2001 (Fig 2). Additionally, yield also fluctuated from year-to-year, with 2001 being the best as 4740 pounds per acre was recorded.

Fig. 2: U.S. Blueberry: Cultivated Bearing Acreage and Yield, 2000-2002



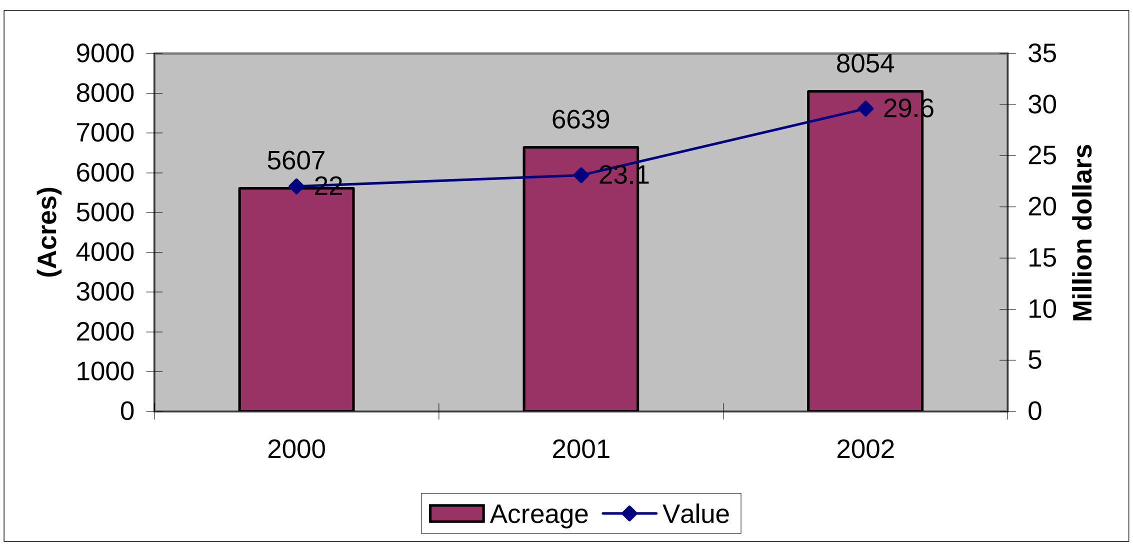
Source: Noncitrus Fruits and Nuts 2002 Summary (2003) ASB, NASS,
USDA, July and 2002 Georgia Farm Gate Value Report, AR 03-01

Nationwide, cultivated blueberries are considered the second most important berry after strawberries. They generated over $200 million in farm gate value, equivalent to 13% of total berries produced in the United States from 2000 to 2002. Although strawberries generated over $1.0 billion over the same time period, the difference is largely due to the quantity produced. For instance, an average of 1.8 billion pounds of strawberries was produced compared with only 273 million pounds for cultivated blueberries. Price wise, blueberries are relatively more valuable (ERS/USDA, 2003).

According to Krewer and NeSmith (2002) blueberry production in Georgia has experienced a steady growth since 1955 when virtually nothing was produced to 4600 acres in 2000. Blueberries are the Georgia's second most important fruit crop, after peaches. Nationwide, Georgia ranks third in acreage and between fourth and fifth in total production of cultivated blueberries in the United States (Fig. 2). The reasons are multifold: (a) a state supported blueberry breeding program released well-suited rabbiteye blueberry cultivars, (b) the formation of the Georgia Blueberry Association cooperative and creation of the first large-scale commercial plantings and packing facility in the 1970s, (c) expansion of Michigan Blueberry Growers Association cooperative and penetration of the domestic and export markets in 1980s and 1990s and (d) establishment of the new early season southern highbush blueberry industry in mid-1990s.

There has been a steady increase in overall production of blueberries in Georgia. For instance, 18% increase was recorded for 2001 compared with 2000 while there was 21% increase in 2002 compared with 2001. Presently Georgia blueberry productive area stands at 8054 acres compare to 6639 acres for 2001 (Fig. 3), according to Georgia Farm Gate Value Report. However, this figure is about 79% higher than total acreage reported by the Georgia Agricultural Statistics Service.

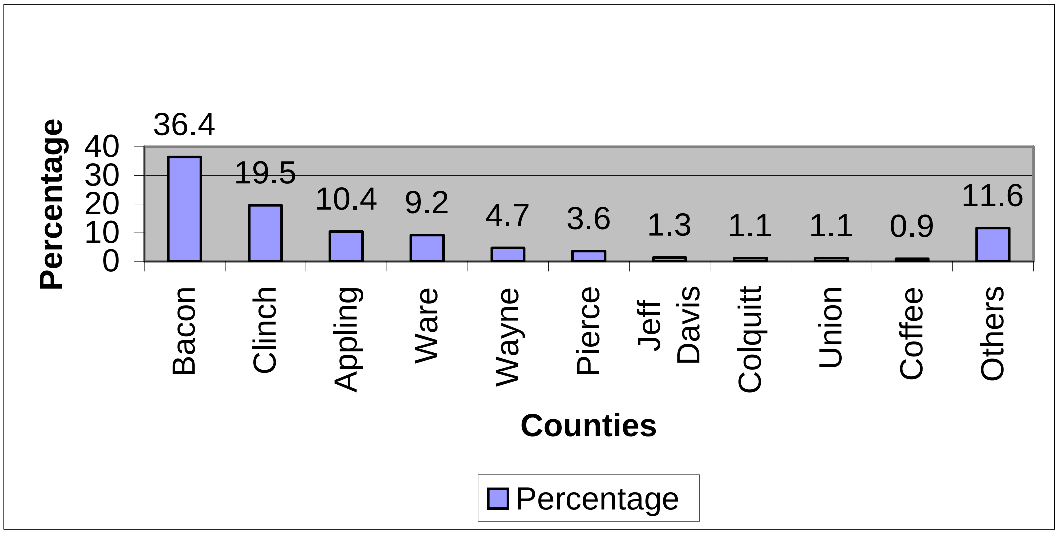
Fig: 3: Georgia Blueberry Acreage and Farm Gate Value, 2000-2002



Source: Georgia Farm Gate Value Report, Various Issues, CSR No. 5, SR-01-07, AR 02-02, and AR 03-01.

Blueberry production is centered in Southern Georgia. Bacon, Clinch, Appling, Ware and Wayne counties are the most productive areas thus far, supplying 36.4%, 19.5%, 10.4%, 9.2% and 4.7% of total Georgia blueberry production respectively (Fig. 4). Other producing counties on the top ten ranking include Pierce, Jeff Davis, Colquitt, Union and Coffee, according to the 2002 Georgia Farm Gate Value Report.

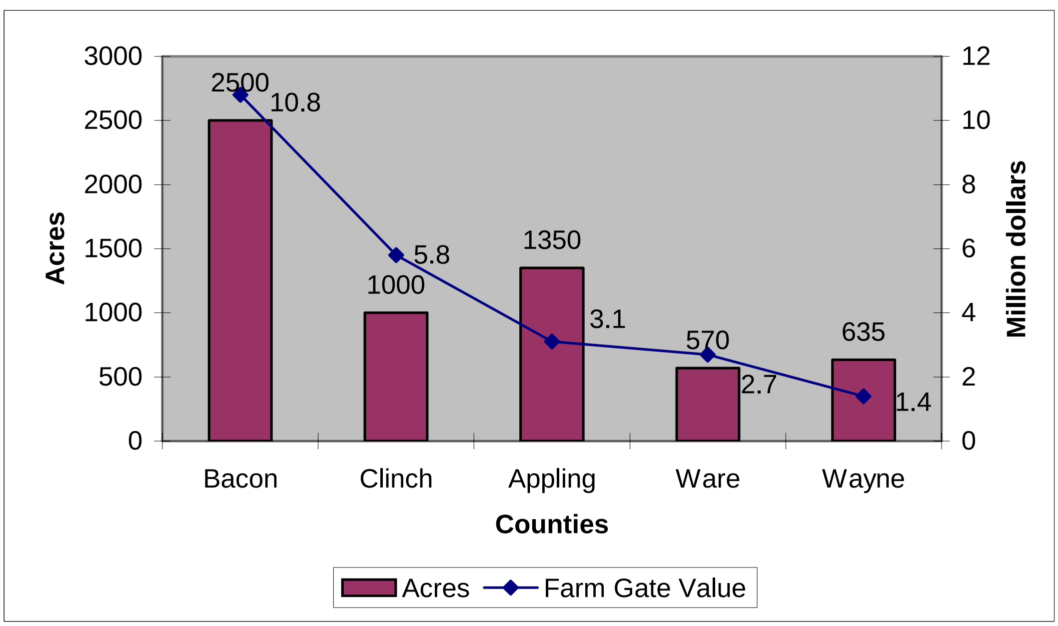
Fig. 4: Georgia Top Ten Counties Producing Blueberries



Source: 2002 Georgia Farm Gate Value Report, AR 03-01.

It is important to note here that, there is no correlation between acreage and farm gate value. Bacon County cultivated 2500 acres and generated $10.8 million whereas Clinch County cultivated 1000 acres and generated $5.8 million (Fig. 5). This is due to greater amount of high value southern highbush production in Clinch County.

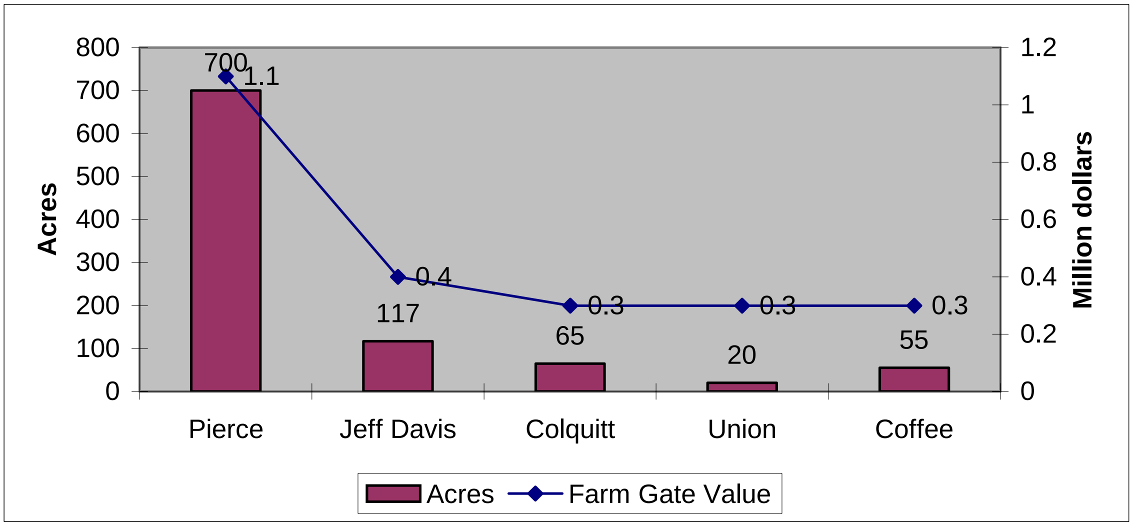
Fig. 5: Acreage and Farm Gate Value of Top 10 Blueberry Producing Counties



Source: 2002 Georgia Farm Gate Value Report, AR 03-01.

Furthermore, Pierce County cultivated 700 acres and generated $1.1 million (Fig 6) whereas Ware County cultivated 570 and generated $2.7 million (Fig. 5). This reflects a larger percentage of higher value southern highbush production in Ware County.

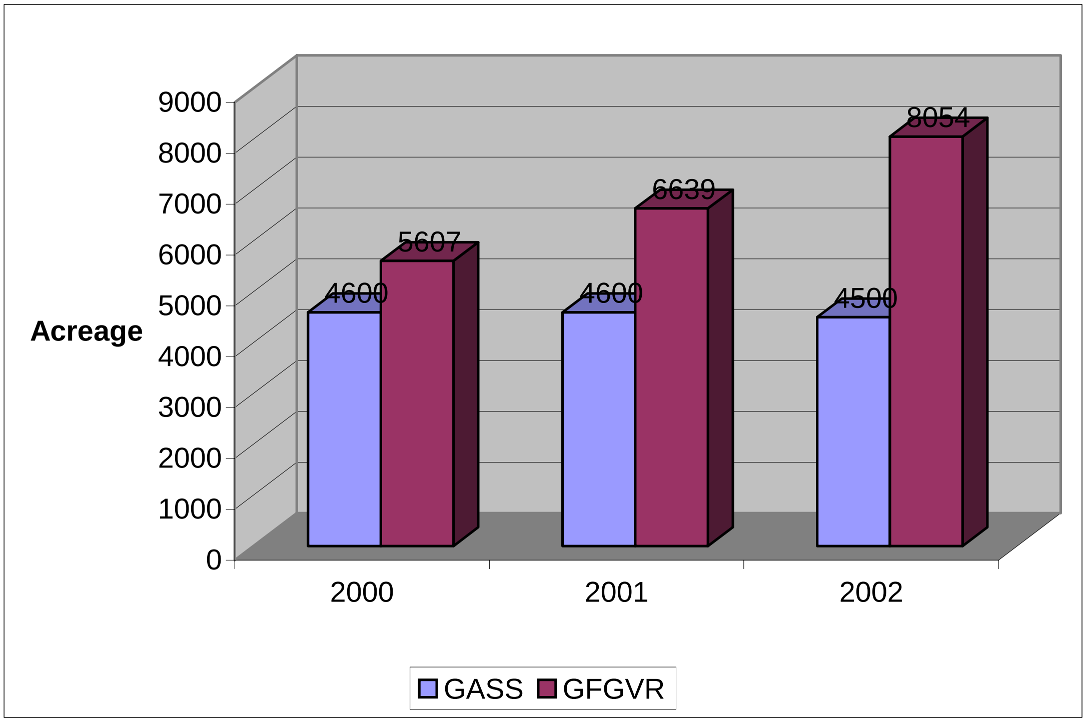
Fig 6: 2002 Acreage and Farm Gate Value of Top 10 Blueberry Producing Counties Continues.



Source: 2002 Georgia Farm Gate Value Report, AR 03-01.

A comparison of Georgia Agricultural Statistics Service (GASS) blueberry data and that of Georgia Farm Gate Value Report (GFGVR) show discrepancies for all the years under studies. That largest difference was in 2002. GASS data is collected from producers and GFGVR is collected from county agents (Fig. 7).

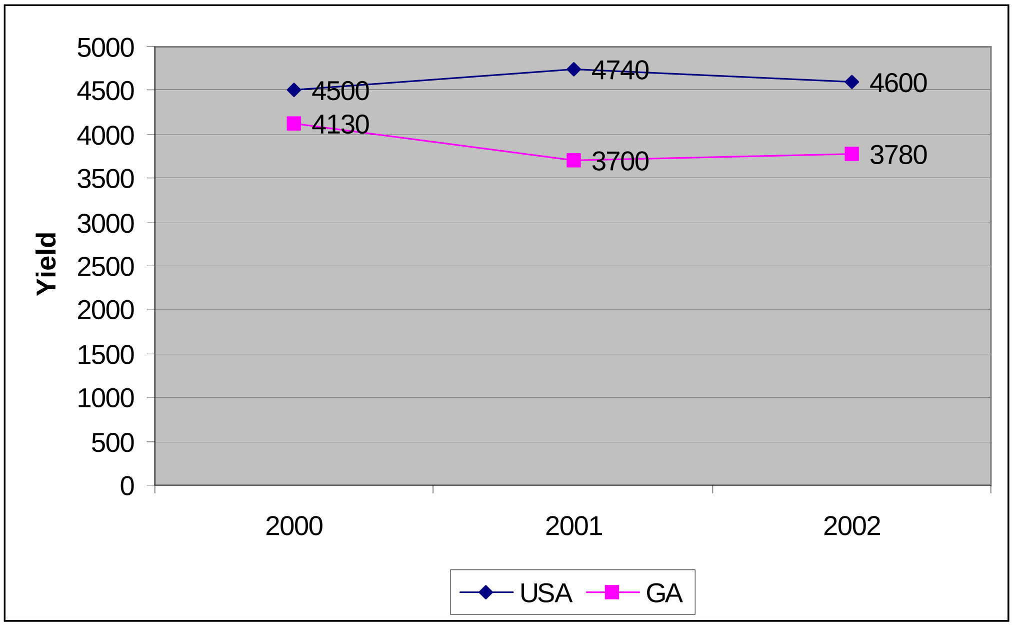
Fig 7: Comparison of GASS and GFGVR DATA, 2000 - 2002



Source: Non-citrus Fruits and Nuts 2002 Summary (2003) ASB, NASS, USDA, July.

USDA report revealed that for the past three years, Georgia supplied over 11% of the total cultivated blueberries produced in the United States (Fig. 2 & 7). Furthermore, a comparison of yields reveals that yield per acre is lower than United States average and while the U.S average is increasing, Georgia is either reducing or remaining constant (Fig. 8). This illustrates need for Georgia producers to adopt and improve their agricultural practices to remain competitive, especially in the processed market.

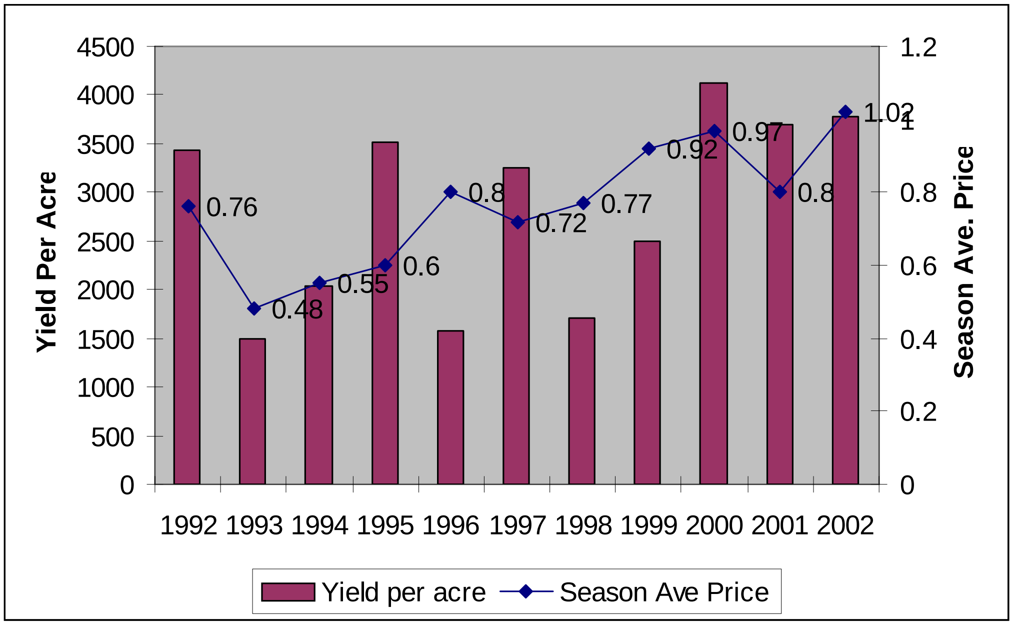
Fig. 8: United States and Georgia Yield Comparison, 2000 -2002



Source: Noncitrus Fruits and Nuts 2002 Summary (2003) ASB, NASS, USDA, July and 2002 Georgia Farm Gate Value Report, AR 03-01.

The official Georgia Agricultural Statistics Service Report reveals that Georgia blueberry best yield was obtained in 2000 as 4130 pounds per acre was produced (Fig. 9). Thereafter, yield per acre decreased 10.4% and 8.5% in 2001 and 2002 respectively. On the other hand, the best price was obtained in 2002 as an average of $1.02 per pound was received.

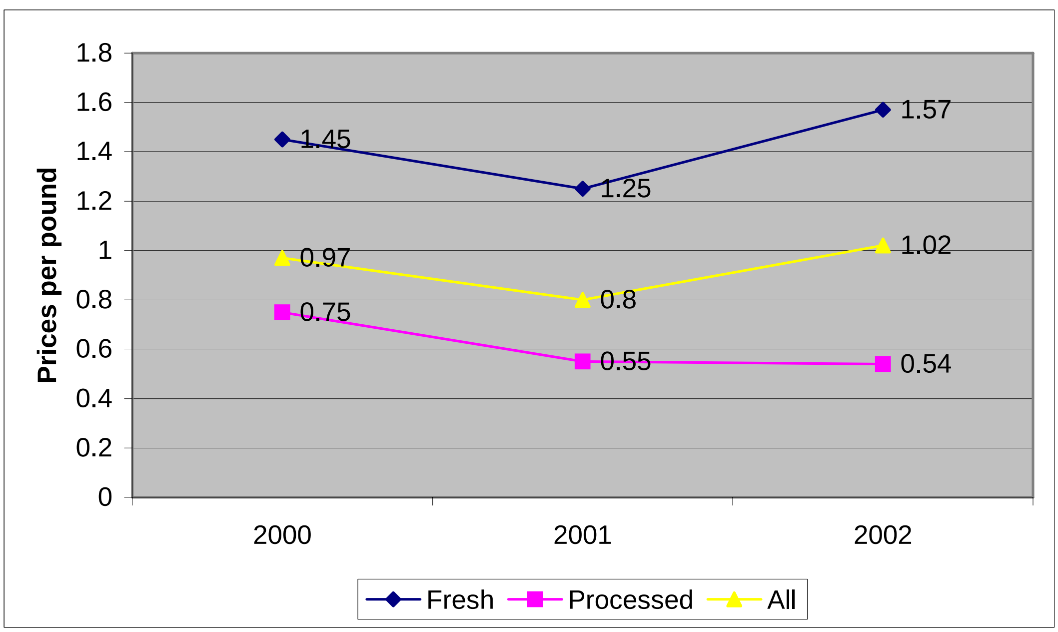
Fig. 9: Georgia Blueberry: Average Price and Yield Trend: 1992 - 2002



Source: Georgia Agricultural Statistics Service website:
www.nass.usda.gov/ga/cropests/blueberry.txt.

Georgia Fresh blueberries continue to attract better prices. ASB/USDA report (2003) shows that 2002 price was $1.57 per pound compared with $1.25 in 2001. Processed price for the 2002 was only $0.54 compared with $0.55 for 2001 and $0.75 in 2000 (Fig. 10).

Fig. 10: Georgia: Fresh, Processed and All Blueberries Price Trend 2000-2002



Source: Non-citrus Fruits and Nuts 2002 Summary (2003) ASB, NASS, USDA, July.

The estimated costs of producing southern highbush blueberries in soil in Georgia assumes year four to be the full production year. According to Krewer et al. (2003) this depends on how well the crop was taken care of during the establishment years, and since it is a perennial crop. Three types of blueberries are produced in Georgia, northern highbush, southern highbush, and rabbiteye. These varieties have similar and dissimilar characteristics. The northern highbush varieties perform better in cool climates and are rarely grown in Ga. Southern highbush are adapted to South Georgia, but grow best in lighter sandy-to-sandy loam soils with good drainage. They ripen early and enjoy a good market window. The correct site selection can drastically reduce *Phytophthora root rot* and *Botryosphaeria* stem blight, which are major variable cost component to the farmer (Smith, 2003; Fonsah et al., 2003). A number of insect pests also attack southern highbush and require treatment (Payne et al., 1993 and Steck, et al., 1993).

There are three types of cultivation techniques utilized for southern highbush blueberries in Georgia: (1) culture in special, high-organic matter soils without amendments (spodic soils), (2) culture in well-drained soils with amendments and (3) pine bark bed culture. This budget addresses culture in soil and soil with amendments. Other conditions necessary for optimum production include the following considerations: (a) pH between 4.0 and 5.2, (b) high organic matter (min. of 3-4%) and (c) installation of a permanent irrigation system (Krewer et. al., 2003).

FIRST YEAR ESTIMATED ESTABLISHMENT AND MAINTENANCE COST:

The first year of producing southern highbush blueberries is very crucial in terms of workload and cost. This enterprise budget includes all costs and returns associated with producing southern high bush blue berries in Georgia. In this budget a planting distance of 4’ x 10’ is utilized, thus equivalent to 1089 plants per acre costing $2123.55.

Other expensive cost components in land preparation operation are: stumping, pushing stumps and large limbs, and burning which costs $750 per acre depending on the number of stumps, chopping which costs $120 and milled pine bark which costs $2254 for 322 cubic yards. Fertility and both pre and post emergence weed control cost are $232.84 while pest and disease control costs are $897.47. Total variable/operating costs for the first year amounted to $7510.72 while total fixed cost is $2074.83. Fixed costs include a tractor and equipment, overhead and management and irrigation. Total establishment costs for year one, i.e. total variable and fixed costs respectively is $9,585.55 (Table 1).

Table 1: First Year Estimated Establishment and Maintenance Cost/Acre for Georgia Southern Highbush Blueberry in Soil.

ITEM	No. APPL.	UNIT	QUANTITY	PRICE	AMOUNT
Land prep 1/					
Preplant Weed Control		gal	2.50	36.00	90.00
Stumping, pushing, burning 2/		acre	1.00	750.00	750.00
Chopping		acre	3.00	40.00	120.00
Triple Super Phosphate		Lbs	150.00	0.13	19.50
Harrowing		acre	3.00	30.00	90.00
Bedding		acre	1.00	45.00	45.00
Breaking aisles		acre	1.00	30.00	30.00
Ditching and drainage		acre	1.00	80.00	80.00
Milled Pine Bark		Cu. yd	322.00	7.00	2254.00
Planting					
Plants (4' x 10')		acre	1089.00	1.95	2123.55
Planting labor		acre	3.00	7.00	21.00
Trans-planter rental		acre	1.00	11.25	11.25
Fertilizers					
FERT (10-10-10)	8/yr	Lbs	545.00	0.12	65.40
Labor	8/yr	hrs	8.00	7.00	56.00
Weed Control					0.00
Pre-emergence	1/yr	qts	1.20	23.94	28.73
Pre-emergence	1/yr	qts	1.20	19.94	23.93
Post-emergence	1/yr	gal	0.03	176.00	5.28
Roundup	4/yr	pt	0.50	90.00	45.00
Labor	1/yr	acre	1.00	7.00	7.00
Pest & Disease Control					0.00
Insecticide	3/yr	Lbs	5.25	7.19	37.75
Leaf Spots	3/yr	ozs.	46.20	1.80	83.16
Phytophthora root rot	2/yr	pts.	8.80	87.45	769.56
Labor (air-blast)	4/yr	acre	1.00	7.00	7.00
Pruning		hrs	3.00	7.00	21.00
Irrigation		acre	1.00	284.81	284.81
Interest on Operating Costs		$	7068.91	0.0625	441.81
TOTAL OPERATING COSTS					**7510.72**
FIXED COSTS					
TRACT & EQUIP		acre	1.00	287.55	290.41
Overhead & Management		$	7510.72	0.15	1126.61
IRRIGATION		acre	1.00	758.69	657.81
LAND 3/		$	1.00	0.00	0.00
OTHER			0.00	0.00	0.00
TOTAL FIXED COSTS					**2074.83**
TOTAL ESTABLISHMENT COSTS 4/					**9585.55**

1/. Customized service

2/. Range from $300 - $1200 depending on the number and size of stumps.

3/. A typical price per acre varies significantly. Leasing price often ranges from $60-$100 per acre year.

4/. Totals may not add up because of rounding errors.

SECOND YEAR ESTIMATED ESTABLISHMENT AND MAINTENANCE COST:

In year two, sprays for Phytophthora root rot, mummy berry, leaf spot and other pest and disease control contributed heavily to the variable cost. Weed control and irrigation had a major impact on the total variable cost. The total variable/operating cost was $1481.31, which is five times lower than year one. It was assumed that 500 pounds would be harvested in year two, equivalent to 145 flats (3.3 pounds containing 12 -125 g clamshells) with a 95% pack out rate.

Total harvesting and marketing costs is $1040.25. This includes harvesting, custom packing, cooling, handling and brokerage fees respectively. Fixed costs include tractor and equipment, overhead and management and irrigation, which altogether cost $1170.42. Total establishment cost for year two is $3,691.99. Assuming a return from receipts of 475 pounds with a 95 percent pack out rate and a selling price of $5.00 per pound, gross receipts would be $2375. This reduces the total establishment cost in year two to $1316.99 (Table 2).

Table 2: Second Year Estimated Establishment and Maintenance Cost per Acre for Georgia Southern Highbush Blueberry in Soil.

ITEM	Appl.	UNIT	QUANTITY	PRICE	AMOUNT
OPERATING COSTS					
Fertilizers					
FERT (10-10-10)	7/yr	Lbs	225.00	0.12	27.00
Labor	7/yr	hrs	7.00	7.00	49.00
Weed Control					0.00
Pre-emergence	1/yr	qts	1.20	23.94	28.73
Pre-emergence	1/yr	qts	1.20	19.94	23.93
Post-emergence	1/yr	gal	0.03	176.00	5.28
Roundup	6/yr	pt	0.75	90.00	67.50
Labor	1/yr	acre	1.00	7.00	7.00
Pest & Disease Control					0.00
Insecticide	3/yr	Lbs	5.25	7.19	37.75
Mummy Berry	3/yr	Lbs	15.00	5.15	77.25
Fungicide	3/yr	fl.ozs.	6.00	6.50	39.00
Phytophthora root rot	1/yr	pt	4.40	87.45	384.78
Leaf Spots	3/yr	Lbs	15.00	9.90	148.50
Botrytis	3/yr	Lbs	4.50	15.00	67.50
Rots	3/yr	fl.ozs.	46.20	1.80	83.16
Labor (air-blast)	6/yr	acre	6.00	7.00	42.00
Pruning	1/yr	hrs	3.00	7.00	21.00
Irrigation		acre	1.00	284.81	284.81
Interest on Operating Costs		$	1394.18	0.0625	87.14
TOTAL OPERATING COSTS					**1481.31**
Harvesting & Marketing Costs					
Harvesting 1/		Lbs	500.00	0.50	250.00
Custom Packing 2/		flat	145.00	2.75	398.75
Cooling, Handling & Brokerage (15%)		$	145.00	18.00	391.50
Total Harvesting & Marketing Costs					**1040.25**
Total Operating, Harvesting & Marketing costs					**2521.56**

FIXED COSTS				
TRACT & EQUIP	acre	1.00	287.55	290.41
Overhead & Management	$	1481.31	0.15	222.20
IRRIGATION	acre	1.00	758.69	657.81
LAND 3/	$	1.00	0.00	0.00
OTHER		0.00	0.00	0.00
TOTAL FIXED COSTS				**1170.4256**
TOTAL ESTABLISHMENT COSTS				**3691.99**
Less Return From Receipts	$	475.00	5.00	2375.00
TOTAL ESTABLISHMENT COST PER ACRE 3/				**1316.99**

1/. We assumed 95% pack out rate.
2/. A flat = 3.3 pounds clamshell containing.
3/. Total may not add up because of rounding errors.

THIRD YEAR ESTABLISHMENT AND MAINTENANCE COST:

In year three, *Phytophthora* root rot control was the largest variable cost component, $384.78 equivalent to 22.3% of total variable/operating cost. However, chemical for pest and disease control contributed to over 48.6% of total variable cost, equivalent to $837.94. Pruning cost is $175, representing approximately 10.2% of total variable cost. Chemical for weed control cost $125.40 or 7.3% of total variable cost. Fertilizer cost was $108 while irrigation use was $284.81.

Total harvesting and marketing costs was $4137.88. This included harvesting, custom packing, cooling, handling, and brokerage fees. Fixed costs include tractor and equipment, overhead and management and irrigation, which altogether cost $1206.76. Total cost for year three is $7,068.20. Assuming a return from receipts of 1,900 pounds with a 95% pack out rate and a selling price of $5.00 per pound, gross receipts was $9,500. This minus the actual total cost per acre of $7,068.20 equal a net gain of $2,431.80 in year three (Table 3).

Table 3: Third Year Estimated Establishment and Maintenance Cost per Acre for Georgia Southern Highbush Blueberry in Soil.

ITEM	Appl	UNIT	QUANTITY	PRICE	AMOUNT
OPERATING COSTS					
Fertilizers					
FERT (10-10-10, banded)	5/yr	Lbs	900.00	0.12	108.00
Labor	5/yr	hrs	5.00	7.00	35.00
Weed Control					0.00
Pre-emergence	1/yr	qts	1.20	23.94	28.73
Pre-emergence	1/yr	qts	1.20	19.94	23.93
Post-emergence	1/yr	gal	0.03	176.00	5.28
Roundup	6/yr	pt	0.75	90.00	67.50
Labor	1/yr	acre	1.00	7.00	7.00
Pest & Disease Control					0.00
Insecticide treatment	3/yr	Lbs	5.25	7.19	37.75
Mummy Berry treatment	3/yr	Lbs	15.00	5.15	77.25
Fungicide control	3/yr	ozs	6.00	6.50	39.00
Phytophthora root rot treatment	1/yr	pt	4.40	87.45	384.78
Leaf Spots treatment	3/yr	Lbs	15.00	9.90	148.50
Botrytis treatment	3/yr	Lbs	4.50	15.00	67.50
Rots treatment	3/yr	fl.oz.	46.20	1.80	83.16
Labor (air-blast) sprayer	7/yr	acre	7.00	7.00	49.00
Pruning	1/yr	hrs	25.00	7.00	175.00
Irrigation		acre	1.00	284.81	284.81
Interest on Operating Costs		$	1622.18	0.0625	101.39
TOTAL OPERATING COSTS					**1723.56**
Harvesting & Marketing Costs					
Harvesting 1/		Lbs	2000.00	0.50	1000.00
Custom Packing 2/		flat	575.76	2.75	1583.33
Cooling, Handling & Brokerage (15%)		$	575.76	18.00	1554.55
Total Harvesting & Marketing Costs					**4137.88**
Total Variable, Harvesting and Marketing Costs					**5861.44**
FIXED COSTS					
TRACT & EQUIP		acre	1.00	507.33	290.41
Overhead & Management		$	1768.17	0.15	258.53
IRRIGATION		acre	1.00	758.69	657.81
TOTAL FIXED COSTS					**1206.76**
TOTAL COST PER ACRE					**7068.20**
TOTAL RETURNS PER ACRE			1900	5.00	**9500.00**
TOTAL NET RETURNS PER ACRE 3/					**2431.80**

1/. We assumed 95% pack out rate.
2/. A flat = 3.3 pounds containing.
3/. Totals may not add up because of rounding error.

FOURTH YEAR – FULL PRODUCTION COST:

In the fourth year, the blueberry field is assumed to be in full production. The chemicals used for *Phytophthora* root rot control was still the largest variable cost component, \$384.78 equivalent to 18.4% of total variable cost. Chemicals for pest and disease control contributed to 39.1% of total variable cost, equivalent to \$817.09. Annual pruning cost was estimated at \$217, representing approximately 10.4% of total variable cost. Chemicals for weed control costs for both pre-emergence and post-emergence herbicides cost \$226.24 or 10.8% of total variable cost. Fertilizer cost was \$127 while operating cost of irrigation use was \$284.81. Total harvesting and marketing costs was \$8,016.67. This included harvesting, custom packing, cooling, handling, and brokerage fees respectively. Fixed costs include tractor and equipment, overhead and management and irrigation, which altogether cost \$3,438.48. Total cost per acre during this first full production year was \$13,547.35. Assuming a return from receipts of 4,000 pounds with a 95% pack out rate and a selling price of \$5.00 per pound, gross receipts would be \$19,000. This minus the actual total cost per acre of \$13,547.35 equal a net gain of \$5,452.65 in year four (Table 4).

Table 4: Risk-Rated Southern Highbush Blueberry in Soil in Georgia

	Best	Optimistic	Median	Pessimistic	Worst
***Yield (lbs)**	6000	5000	**4000**	3000	1000
***Price per lb.**	7.00	6.00	**5.00**	4.00	3.00

Item	**Application**	**Unit**	**Quantity**	**Price**	**$Amt/ac**
Variable Costs					
Fertilizers					
FERT (10-10-10, banded)	4/yr	Lbs	1000	0.12	120.00
Post Harvest Fertilizer (18-46-0)	1/yr	Lbs	50	0.14	7.00
Tractor & spreader	5/yr	Hrs	5	9.00	45.00
Labor	5/yr	Hrs	5	7.00	35.00
Weed Control (4' Band)					0.00
Pre-emergence	1/yr	Lbs	1.2	17.75	21.30
Pre-emergence	1/yr	Qts	1.2	23.94	28.73
Pre-emergence	1/yr	Qts	1.2	19.94	23.93
Post-emergence	1/yr	Gal	0.03	176.00	5.28
Tractor & sprayer	3/yr	Hrs	3	9.00	27.00
Roundup	4/yr	Gal	0.6	98.00	58.80
Roundup row middles (6' band)	3/yr	Gal	0.9	98.00	88.20
Labor	6/yr	Hrs	6	7.00	42.00
Pest & Disease Control					0.00
Insecticide	3/yr	Lbs	5.25	7.19	37.75
Mummy Berry	3/yr	Lbs	15.00	3.76	56.40
Fungicide	3/yr	Ozs	6.00	6.50	39.00
Phytophthora root rot	1/yr	pt	4.4	87.45	384.78
	3/yr	Lbs	15	9.9	148.50
Leaf Spots					
Botrytis	3/yr	Lbs	4.5	15	67.50
Rots	3/yr	fl.oz.	46.2	1.8	83.16
Tractor & sprayer	9/yr	Hrs	9	9.00	81.00
Labor (airblast) sprayer	9/yr	Acre	7	7.00	49.00
Pruning					
Pruning (manual)	1/yr	Hrs	25	7.00	175.00
Chop pruning	2/yr	Hrs	2	7.00	14.00
Mechanical topping	2/yr	Hrs	4	7.00	28.00
Equipment (Tractor & Mower)		Hrs	2	9.00	18.00
Irrigation		Acre	1	284.81	284.81
Interest on Operating Costs		$	1969.13	0.0625	123.07
TOTAL VARIABLE COSTS					**2092.20**
Harvesting & Marketing Costs					
Harvesting 1/		Lbs	4000	0.50	2000.00
Custom Packing 2/		Flat	1151.52	2.75	3166.67
Cooling, Handling & Brokerage		$	19000.00	0.15	2850.00
Total Harvesting & Marketing Costs					**8016.67**
Total Variable, Harvesting & Marketing Costs					**10108.87**

FIXED COSTS

TRACT & EQUIP	Acre	1	287.55	290.41
Overhead & Management	$	2092.20	0.15	313.83
IRRIGATION	Acre	1	758.69	657.81
Recaptured Establishment Costs	Acre	1	2103.73	2176.43
TOTAL FIXED COSTS				**3438.48**
Total budgeted cost per acre				**13547.35**
Total Gross Return per acre	Acre	3800	5.00	**19000**
Total Net Return per acre 3/				**5452.65**

1/. We assumed 95% pack out rate.
2/. A flat = 3.3 pounds containing.
3/. Totals may not add up because of rounding error.

FARM INPUT PRICES

There were several factors that can influence prices of inputs, total cost of production and profit margin. Many farmers in Georgia need not invest in overhead irrigation materials or dig a new well since they already have them available. If so, that would significantly increase profitability. Also motor sizes (HP) were different depending on acreage. Quantity discounts for items such as packing supplies were factors that affected prices of inputs. The cost estimate in this budget reflects a combination of the current agricultural practices in Georgia and recommendations from UGA specialists. The prices were actual prices from vendors around the counties involved in blueberry production and they excluded quantity discounts.

ESTIMATED ANNUAL TOTAL FIXED MACHINERY COSTS:

Fixed machinery cost includes sprayers, rotary mower, wagons, tractor, hedger, truck, spreader, mulcher, harrow, and V blade (Table 5). These costs were calculated using the University of Georgia Agriculture Engineering calculations which included percentage of use for southern highbush blueberry, purchased price, salvage value, life-span of equipment, depreciation, interest, tax and insurance respectively. The calculation was based on 50 acres and 7 % fixed interest rate. Based on this study, the estimated fixed machinery cost per acre was $290.4.

Table 5: Estimated Annual Total Fixed Machinery Cost for Southern Highbush Blueberry in Soil in Georgia

Acres **50**
Interest **7.0%**

Item	% Use For Crop	Purchase Price	Salvage Value	Yrs. Life	Depre-ciation.	Inte-rest	Tax& Ins	FC/Ac
Sprayer, herbicide	75%	600	120	5	72	19	4	1.89
Sprayer, air-blast	100%	8000	1600	5	1280	336	67	33.66
Rotary Mower (15')	75%	700	140	7	60	22	4	1.73
Wagon	100%	500	100	15	27	21	4	1.04
Wagons (4 used)	50%	2000	400	15	53	42	8	2.07
Tractor (30-39HP)*	50%	16600	3320	8	830	349	70	24.97
Hedger	100%	3500	700	8	350	147	29	10.53
Truck	50%	20000	4000	1	8000	420	84	170.08
Fertilizer Spreader	100%	300	60	10	24	13	3	0.78
Mulcher	100%	8500	1700	5	1360	357	71	35.77
Harrow	100%	500	100	10	40	21	4	1.30
V Blade	100%	300	60	10	24	13	3	0.78
Golf Cart	100%	1200	240	5	192	50	10	5.05
Hand-sprayer	100%	150	30	4	30	6	1	0.75
Total Investment		**$62,850**	**12570**		**12342**	**1816**	**363**	**290.4**

TOTAL FIXED COSTS **$14,521**
FIXED COSTS per ACRE **$290.4**

These prices were for new equipments except the four wagons. Used equipments could be purchased at reduced cost. Totals may not add up due to rounding error.

COMPOUNDED AND RECAPTURED ESTABLISHMENT COSTS:

The total establishment costs for years 1, 2 and 3 were $9,585.55, $3,691.99 and $7,068.20 respectively. These costs were compounded using the University of Georgia Engineering calculations. The fixed compounded interest rate obtained from Ag-Georgia Farm Credit was 7%. We used 20 years in our calculations because we believe that a well managed southern highbush blueberry farm in Georgia would last that long before it could be replanted. The annual recapture establishment cost was $2,176.43 (Table 6).

Table 6: Compounded and Recaptured Establishment Cost

	Years to Production	Compounded Rate	Est. Costs	Total
	3	1.19	9582.68	11413.13
	2	1.12	3689.12	4145.10
	1	1.06	7065.34	7489.26
COMPOUND ESTAB. COST				**23047.48**
YEARS	20			
FIXED INTEREST RATE %	0.07			
RECAPTURED ANNUAL EST. COST	**$2,176.43**			

Totals may not add up due to rounding error.

SOLID SET IRRIGATION COSTS:

The annual fixed cost of irrigation per acre was estimated at $657.81 and includes, pipe and fittings, sprinklers, well eight inch that can handle 600 gals/min, pump, motor, installation and miscellaneous. The estimate was based on the University of Georgia Engineering calculations. This cost was also considered fixed cost items. The variable/operating cost component of the solid set irrigation was $284.81 per acre. This calculation was based on four acres and sprinklers were 40 by 45 inches spacing, and a 50 HP motor size. The cost would have been extremely high if only one acre was used. For instance the total annual fixed cost per four acre was $2632, whereas the total annual fixed cost per acre was $657.81. Total irrigation operating/variable cost was $284.81 whereas total annual fixed and operating costs were $942.62. Although the solid set system is relatively more expensive in terms of initial investment per acre but is necessary for spring frost and freeze control (Table 7).

Table 7: Solid Set Irrigation for Southern Highbush Blueberry in Soil in Georgia

BASED ON			**4**	ACRES
SPRINKLER SPACING	40	by	45	
INTEREST ON INVESTMENT CAPITAL				7.00%
TAXES & INSURANCE				0.015
DEPTH OF WELL IN FEET				400

INVESTMENT AND ANNUAL FIXED COSTS	NEW COST	YEARS LIFE	DEPRE-CIATION	INTEREST	TAX & INS.
PIPE & FITTINGS	3840	20	192	134	29
SPRINKLERS	960	10	96	34	7
WELL (8") (600 Gals/min)	10500	25	420	368	79
PUMP & MOTOR	10500	15	700	368	79
Miscellaneous	500	10	50	18	4
INSTALLATION	600	20	30	21	5
TOTAL INVESTMENT	**26900**		1488	943	203
TOTAL ANNUAL FIXED COSTS					**$2,631**
ANNUAL FIXED COSTS PER ACRE					**$657.81**
OPERATING COSTS					
MOTOR SIZE (HP)			50		
REPAIRS			301		
ANNUAL PUMPING HOURS			80		
ELECTRICITY					
Demand (standby charge) per YEAR			600		
Rate $ per KWH			0.08		
ANNUAL ENERGY COST			839		
ANNUAL ENERGY COST PER ACRE					$209.68
OPERATING COST PER ACRE PER YEAR					**$284.81**
TOTAL ANNUAL COSTS PER ACRE					**$942.62**

RISK RATED EXPECTED RETURNS:

Table 8 shows that the expected return or yield per acre for southern highbush blueberry in soil in Georgia was 4,000 pounds. If only 95% of the fruits are recovered in the field or during harvesting, and the expected price is $5 per pound, then the total return will be $19,000 per acre.

Table 8: Expected Returns from Total Acreage

ACRES	EXPECTED YIELD/AC	VOLUME MARKETED	EXPECTED PRICE	TOTAL RETURNS
1	4000	95.0%	5.00	19000

RISK RATED RETURNS OVER TOTAL COSTS:

Table 9 shows the probabilistic chances of obtaining the various calculated risk rated net return over total costs. The "Returns ($)" row of Table 9 depicts seven different net returns possibilities. According to Westberry et al (1995), "all net returns are determined from their relationship to the expected net return. They are not determined by multiplying prices and yields and subtracting total cost. Rather, they reflect the variability of prices and yields. The first "Chances" row shows the estimated frequency of obtaining the above net returns or more. The second "Chances" row shows the estimated frequency of obtaining the above net returns or less". For instance, there were only 6 % chances of obtaining $15,140 per acre of southern highbush blueberry in soil in Georgia whereas there were 7% chances of earning a negative return ($-474). Furthermore, there were 66% chances of earning the expected $5,456 per acre. The risk rated returns over total costs further depicted that the base budgeted net revenue was $6,456 with a 92% chances of making profit under Georgia conditions (Table 9).

Table 9: Risk Rated Returns over Total Costs

		Optimistic		Expected		Pessimistic	
Returns ($) 1/	15,140	12,599	10,057	**5,456**	4,853	2,189	-474
Chances 2/	6%	16%	32%	66%	0.70	0.84	1
Chances 3/	94%	84%	68%	34%	30%	16%	7%
CHANCES FOR PROFIT =	**92%**		BASE BUDGETED NET REVENUE =	**$6,456**			

1/. Net return levels (TOP ROW).
2/. The chances of obtaining this level or more (MIDDLE ROW);
3/. The chances of obtaining this level or less (BOTTOM ROW).

TOTAL BUDGETED COST PER POUND:

The pre-harvest variable cost per lb in this risk rated return analysis was $0.52. The harvesting and marketing cost per pound was estimated at $2.00 while the fixed cost per pound was $0.86. The total budgeted cost per pound amounted to $3.38 (Table 10).

Table 10: Total Budgeted Cost per Pound

Pre-harvest variable cost per lb	$0.52
Harvesting & Marketing cost per lb	$2.00
Fixed costs per lb	$0.86
Total budgeted cost per lb	**$3.38**

Total costs of growing and selling blueberries include fixed and variable costs respectively. Variable costs are broken down into pre-harvest, harvesting and marketing costs. Fixed cost components include machinery, irrigation, recaptured establishment costs, land, overhead and management. Total variable/operating costs were $7,510.72, $1,481.31, and $1,723.56 for year one, two, three and four respectively. Harvesting and marketing costs were $1,040.25, $4,137.88 and $8,016.67 for years two, three and four respectively. Please note here that year four is assumed to be in full production. Total fixed costs were $2,074.83, $1,170.42, $1,206.76 and $3,438.48 for years one, two, three and four respectively. Recaptured establishment costs of $2,176.43 were included in year four as part of fixed costs (Table 11).

Table 11: Fixed Cost Component

	Unit	Quantity	Price	Total
Tractor, equipment	acre	1	290.41	290.41
Overhead & Management	$	2092.20	0.15	313.83
Irrigation	acre	1	657.81	657.81
Recaptured Establishment Costs	acre	1	2176.43	2176.43
TOTAL FIXED COSTS				**3438.48**

CONCLUSION:

In year one, the total operating/variable cost of growing southern highbush blueberry in soil in Georgia was estimated at $7,510.72 per acre. The total fixed cost was estimated at $2,074.83 and the total estimated establishment and maintenance cost for the first year was $9,585.55. In year two, the total variable cost was $1,481.31, which is five times lower than year one. The total harvesting and marketing costs was $1,040.25 and fixed cost was $1,170.42. The total establishment cost per acre for year two was $3,691.99.

In year three, chemical used for *Phytophthora* root rot control was the largest variable cost component, $384.78 equivalent to 22.3 % of total variable/operating cost. Chemical used for pest and disease control contributed to over 48.6% of total variable cost, equivalent to $837.94. Total harvesting and marketing costs was $4,137.88. Fixed costs include tractor and equipment, overhead and management and irrigation, which altogether cost $1,206.76. Total establishment cost for year three is $7,068.20. In the fourth year, the blueberry field was assumed to be in full production. Total harvesting and marketing costs were $8016.67. This included harvesting, custom packing, cooling, handling, and brokerage fees respectively. Fixed costs include tractor and equipment, overhead and management and irrigation, which altogether cost $3,438.48. Total cost per acre during this first full production year was $13,547.35.

Fixed machinery cost per acre was $290.41 and included sprayers, rotary mower, wagons, tractor, hedger, truck, spreader, mulcher, harrow, V blade and charges for land. The total costs establishment costs for years 1, 2 and 3 were $9,585.55, $3,691.99, and $7,068.20 respectively. After compounding at the fixed rate of 7 % for the expected 20 years lifespan of the farm under Georgia conditions, the annual recaptured establishment cost was $2,176.43 per acre.

The annual fixed cost per acre of solid set irrigation was estimated at $657.81 and included pipe and fittings, sprinklers, well (8”) capable of pumping 600 gals/min, pump, motor, installation, and miscellaneous. The variable/operating cost component of the solid set irrigation was $284.81 per acre while the total annual costs per acre i.e. total operating cost plus total annual fixed costs were $942.62. Although the solid set system was relatively more expensive in terms of initial investment per acre it was necessary for spring frost and freeze control.

The expected return or yield per acre for southern highbush blueberry in soil in Georgia was 4000 pounds. If only 95% of the fruits were recovered in the field or during harvesting and packaging, and the expected price was $5, then the total return was $19,000 per acre. The risk rated net returns showed that there were only 6 % chances of obtaining $15,140 per acre of southern highbush blueberry in soil in Georgia whereas there were 7% chances of earning a negative return ($-474). Furthermore, there were 66% chances of earning the expected $5,456 per acre. The risk rated returns over total costs further depicted that the base budgeted net revenue was $6,456 with a 92% chances of making profit under Georgia conditions

This study further illustrates that the pre-harvest variable cost per pound in this risk rated return analysis was $0.52. The harvesting and marketing cost per pound was at $2.00 while the fixed cost per pound was $0.86. Adding all these brings the total budgeted cost per pound to $3.38.

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AGECON 04 93 **August 2004**

Issued in furtherance of Cooperative Extension, Acts of May 8 and June 30, 1914, the University of Georgia College of Agricultural and Environmental Sciences and the U.S. Department of Agriculture Cooperating.

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