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Cover Page Footnote

The authors are indebted to Renee Holland, Blueberry Extension Agent, Bacon County, and Renae Woods, Administrative Assistance in the Department of Agricultural Economics, Tifton Campus, for their multiple contributions that made this research successful.

Economic Analysis of Southern Highbush Blueberry Production Using Drip Irrigation and Frost Protection in Georgia, USA

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Abstract. A partial enterprise budget offers a simple way to evaluate the costs and returns profile of the agricultural firm. However, the simplicity of the partial enterprise budget consequentially lacks accuracy, as it uses fixed single estimates and ignores potential variation in the components of the agricultural production processes. We studied risk-rated returns from southern highbush blueberry productions that use drip irrigation systems and calculated five scenarios for blueberry prices and yields. The risk-rated return analysis gauges the returns over total costs under different specified situations and addresses possible uncertainty. We show the chance of profit from southern highbush blueberry in Georgia is 69% in any full production year and calculate expected returns over costs to be \$952 per acre. This approach is helpful for minimizing risk at the farmer's production level and policy formation level.

INTRODUCTION

Blueberry (*Vaccinium* spp.) is a perennial plant sharing the Ericaceae family with other plants such as rhododendron, crowberry, and cranberry. There are four major types of blueberries, namely: lowbush, southern highbush, northern highbush, and rabbiteye, all of which are native to North America (Fonsah et al., 2013; Scherm et al., 2001). Southern highbush (*V. corym-bosum* hybrids) is a hybrid between northern highbush (*V. corymbosum*) and the native southern species, *V. darrowii*, and it is best adapted to South Georgia. The market window for southern highbush produced in Georgia, unfortunately, coincides and competes with both the Florida market window from April to May and huge import supplies from Mexico in April, thus driving down the prices obtained by growers in both Georgia and Florida in particular as well as the southeast region in general (Fonsah, 2021).

Southern highbush is site-specific, making it difficult to grow anywhere, similar to rabbiteye blueberry. The irrigation system in blueberry cultivation is related to the adopted method of cultivation. Growing in pine bark requires overhead irrigation (Fonsah et al., 2007), while drip irrigation is used when water saving and fertigation are the primary foci. Blueberry in Georgia is susceptible to frost events occurring from January to April and can have significant damage depending on the stage of floral growth (Conlan et al. 2018).

This study considered the use of drip irrigation and frost protection.

In Georgia, a total of 54.5 million pounds were produced from 13,300 acres, out of which only 53.3 million pounds were utilized in 2018 (NASS, 2019). The total production increased by 27% from 43 million pounds in 2009 to 54.5 million pounds in 2018 (NASS, 2010; NASS, 2019). Blueberry yield and price received by growers in Georgia have fluctuated over the last decade. The yield was highest in 2014 (5,540 pounds per acre, making Georgia the top blueberry producer in the U.S.) and lowest in 2017 (3,730 pounds per acre) (NASS, 2015; NASS, 2019). In Georgia, the highest price (\$2.80 per pound) received for fresh blueberries was in 2013, while the lowest (\$1.59 per pound) was in 2016 (NASS, 2015; NASS, 2019). Prices for fresh fruit represent the average price producers receive at the point of first sale. Since we observed variability in blueberry yield and price received for blueberries in Georgia, we categorized yield and price into different scenarios to examine the potential risks of yield and price variation. We then used these scenarios to calculate total returns over total costs. Thus, the overall objective of this study is to analyze risk-rated economic returns of southern highbush blueberry production in Georgia. Less than a decade ago, blueberry became Georgia's top fruits and tree nut commodity in terms of farm gate value, a position which the pecan industry dominated for decades. Blueberries con-

tributed 48.87% of the total fruits and tree nuts value and 2.18% of the total Georgia agricultural farm gate value in 2018 (Wolfe & Stubbs, 2019). Hence, this study is critical in determining the productivity, profitability, and sustainability of the industry.

A general budget is a farm management tool that assists researchers, extensionists, agricultural managers, financial institutions, and farmers in making informed production, financial, and marketing management decisions (Brumfield and Pavlis, 2019; Doye, 2016). It is generally developed to estimate profitability and expenses associated with a specific enterprise (Brumfield and Pavlis, 2019; Hanson et al., 2002). In addition, it helps in deciding among various choices that prevail in the farm enterprise (Lien, 2003). On the other hand, a risk-rated budget, like sensitivity analysis in financial management, is an extension of a partial enterprise budget, as it answers ‘what if’ questions about the variation of some volatile variables in the agricultural process. Unlike a partial enterprise budget, it incorporates risk to some degree by evaluating returns under different scenarios. The more the variation in the variables, the more scenarios are required for the precise evaluation of returns.

Risk-rated analysis or ‘what if’ analysis, is very popular and has become an almost integral part of budgeting. The University of Georgia (UGA) Cooperative Extension Services has developed several traditional budgets for southern highbush blueberry and other fruits and tree nut crops in Georgia such as pecans, muscadines, and blackberries (Awondo et al., 2017; Fonsah et al., 2007; Fonsah et al., 2008; Fonsah et al., 2013; Fonsah et al., 2013 and Fonsah et al., 2019). Our study adopted different price and yield scenarios to incorporate risks in the budget. We believe this model allows stakeholders, growers, financial institutions, and extension professionals to more easily interpret and understand the profitability level of the enterprise.

MATERIALS AND METHOD

We considered costs and returns based on an acre of producing southern highbush blueberries in the state of Georgia for a fresh market. The budget was developed for a production system that uses drip irrigation and frost control systems with a density of 1,210 plants per acre spaced 12 feet apart in a row and with 3 feet between rows.

Price and yield data were obtained directly from the growers and county agents through multiple meetings, focus group discussions, and Qualtrics surveys. There were 15 responses in the Qualtrics survey, but only 5 were usable. As a result of the poor participation in the Qualtrics survey, we organized a blueberry grower meeting and focus group discussions with the help of UGA Blueberry Extension Agents in Bacon County, the largest blueberry-producing area in

Georgia. There were about 150 farmers and county agents in the growers meeting and 18 farmers in the focus group meetings. Our analysis estimated costs and returns based on a 15-year long full production lifespan. Nevertheless, with good management practices (GMP) and recommendations from research and extension scientists, this time could be extended to 20 years or more. The first three years were considered as orchard establishment even though a small percentage of fruits can be harvested in the second and third years, while the fourth and subsequent years were considered fully productive (Fonsah et al., 2011; Fonsah et al., 2013; Pritts & Hancock, 1992). For the calculation of the returns over costs, we considered total costs from the full productive year.

Input prices were the average prices collected from farmers, agricultural vendors, and county extension professionals. There were many variations in input prices caused by factors such as discount rates based on quantity purchased, the relationship of the vendor to the growers, and whether the payment was cash or credit. Averaging the input price is the standard approach practiced and recommended by extension economists from the University of Georgia. Secondary data was also obtained from the UGA Agricultural Economics website and USDA/NASS reports (NASS, 2015; 2019).

The total cost of production was captured by estimating the fixed and the variable (pre-harvest, harvest, and marketing) costs. Fixed costs included machinery, irrigation, overhead, and management. Due to high divergence in the cost of land in southern Georgia, the land cost was purposely left out (Fonsah et al., 2007; Kunwar et al., 2019). To estimate costs associated with machinery and other equipment, we used standardized practices recommended by the Agricultural and Applied Economics Association (AAEA) Task Force on Commodity Costs and Returns (AAEA, 2000). Machinery and equipment costs for 2020 prices and calculations were based on 10 acres, then divided by 10 to obtain the cost per acre (Fonsah et al., 2007). Sprayers, rotary mowers, wagons, tractors, hedgers, trucks, spreaders, mulchers, harrows, and V blades were included in the fixed machinery cost. The fixed cost calculations also included parameters such as percentage used for the crop, purchase price, salvage value, lifespan, depreciation, interest, taxes, and insurance. For instance, we utilized 20%, 6.5%, and 1.5% for salvage value, interest rate, tax, and insurance respectively, since all equipment was assumed new (Brumfield and Pavlis, 2019).

The expected Georgia growers’ price in 2020 was assumed to be \$2.65 per pound. The expected yields for the second and third years were assumed to be 1,700 and 4,000 pounds per acre respectively, while the yields for full productive years, starting from the fourth year, was 7,000 pounds per acre. All these assumptions were based on information gathered from farmers and county agents. Furthermore, we

Economic Analysis of Southern Highbush Blueberry Production in Georgia, USA

also assumed a 5% loss during harvesting and packaging. As a result, the yields used for estimating revenue for the second, third and fourth to fifteenth years were 1,615, 3,800, and 6,650 pounds per acre respectively.

Risk-rated returns were calculated adopting a financial management sensitivity analysis approach that created five different scenarios of yield and price. To address variation in yields and prices, we assigned the five different scenarios as: 'best,' 'optimistic,' 'most likely,' 'pessimistic,' and 'worst.' The scenario 'most likely' indicates the base price or yield, which was obtained from growers and county agents during meetings and focus group discussions. The other scenarios were created using the base price and the base yield plus and minus 10% and 20% from the base price and the base yield (Fonsah and Chidebelu, 2012). The 'pessimistic' and 'worst' cases were assumed at 10% and 20% decreases from the 'most likely' case, while the 'optimistic' and 'best' were assumed at 10% and 20% increases from the 'most likely' case.

We adopted five out of the potential 25 price-yield scenarios. This simplifies the analysis of risk-rated returns over total costs; however, the simplification comes with the cost that it ignores cases for growers with a greater yield than the base yield and lower price than the base price and vice-versa. For calculating the chances of net returns in different scenarios and overall profits from blueberry production in Georgia, we assumed net returns follow a normal distribution. Therefore, the area under the normal distribution curve for net returns greater than zero gives the chance of profit from blueberry production. The derivation of the normal distribution of net returns follows from the step of calculation of mean and standard deviation using variations in the yields and prices (best, optimistic, pessimistic, and worst) from the base yield and the base price, respectively. This allows us to calculate a Z-score and, finally, the probability for net returns. Even though prices and yields are generally skewed, Tew et al. (1988) showed normal distribution of the net returns is valid.

Although this study used risk-rated return analysis to address variation in blueberry yields and prices over a period of time, it did not account for variation in costs, which is a limitation of the study. However, this study is crucially important to industry stakeholders, growers, financial institutions, and extension clientele, as it provides different levels of profitability even when the 'most likely' base price fluctuates.

RESULTS AND DISCUSSIONS

ESTIMATED FIRST-YEAR ESTABLISHMENT AND MAINTENANCE COST

The total variable cost and the total fixed cost per acre were \$6,947 and \$2,849, respectively. The total first-year establishment and maintenance cost was \$9,797 per acre (Table 1).

The reason for the higher year-one pre-variable cost compared to year two is due to the huge cost of land preparation, which includes pre-plant weed control, stumping, pushing and burning, chopping, fertilization, farming layout, and so forth. The labor cost for planting, based on a plant density of 1,210 plants per acre times \$2.30 per plant, was \$2,783. Pest control is one of the key cultural operations in southern highbush production. Compromising pest and disease control—which was \$607 per acre, equivalent to 9% of total variable costs—may have a serious negative impact on total yield (Table 1).

ESTIMATED SECOND-YEAR ESTABLISHMENT AND MAINTENANCE COST

The total variable cost and the total fixed cost in the second year of production were \$4,834 and \$2,026 per acre, respectively (Table 2). Comparing the first and second years, there is a small variation in the total fixed cost. The second year variable cost was lower by \$2,113 per acre simply because there was no land preparation cost. However, unlike year-one production, new input, harvesting, and marketing costs contributed to the total variable costs in year two since a percentage of the crop was harvested and sold. The harvesting and marketing costs were estimated at \$3,375 per acre, which is approximately 70% of the total variable cost and nearly 50% of the total cost. All harvesting, custom packing, cooling, handling, and brokerage costs were estimated based on an expected yield of 1,615 pounds per acre after deducting 5% for field losses (Table 2).

ESTIMATED THIRD-YEAR MAINTENANCE COST

The estimated total variable costs in the third year, which was \$9,379 per acre, surpassed both the first year and the second year total variable costs. There was no change in the fixed costs compared to the first and second years. The increase in the total variable costs was almost 35% and 94% from the first and the second year total variable costs, respectively. Principally, the observed increase in the estimated total costs was due to an increase in the harvesting and marketing costs. Similar to the second year, the harvesting and marketing costs involved harvesting, custom packing, cooling, handling, and brokerage fees, all of which were based on an expected yield of 3,800 pounds per acre after considering 5% loss. The costs of harvesting and marketing were estimated at \$7,942 per acre, which is approximately 85% and 70% of the total variable costs and the total costs, respectively.

ESTIMATED FULL PRODUCTION YEARS AND MAINTENANCE COST

Blueberry orchards enter full production starting in the fourth year. Thus, the harvesting and marketing costs in the fourth year exceeded the previous years. The total costs in the full production years increased by 80%, 157%, and 54%

Kunwar and Fonsah

Table 1. First-Year Establishment Cost of Blueberry Orchard Using Drip Irrigation in Georgia, 2020

| Item | Application | Unit | Quantity | Price | Amount |
|------------------------------------|-------------|-------|--------------------|-------------|-----------------|
| Land preparation | | | | | |
| Preplant weed control | | Gal. | 2.50 | 36.00 | 90.00 |
| Stumping, pushing, burning | | Acre | 1.00 | 1,200.00 | 1,200.00 |
| Chopping | | Acre | 3.00 | 50.00 | 150.00 |
| Phosphate (DAP or MAP) | | Lb | 150.00 | 0.13 | 19.50 |
| Copper sulfate | | Lb | 4.00 | 2.00 | 8.00 |
| Harrowing | | Acre | 3.00 | 50.00 | 150.00 |
| Bedding | | Acre | 1.00 | 150.00 | 150.00 |
| Breaking aisles | | Acre | 1.00 | 75.00 | 75.00 |
| Ditching and drainage | | Acre | 1.00 | 130.00 | 130.00 |
| Milled pine bark | | Ton | 20.00 | 40.00 | 800.00 |
| Planting | | | | | |
| Plants (3' × 12') | | Acre | 1,210.00 | 2.30 | 2,783.00 |
| Planting labor | | Acre | 1,210.00 | 0.20 | 242.00 |
| Fertilizers | | | | | |
| Fertilizer (liquid) | | Gal. | 64.00 | 1.86 | 119.04 |
| Weed Control | | | | | |
| Pre-emergence | 2 per year | Acre | 2.00 | 30.00 | 60.00 |
| Post-emergence | 2 per year | Acre | 2.00 | 20.00 | 40.00 |
| Tractor and sprayer | 4 per year | Hour | 4.00 | 12.00 | 48.00 |
| Labor | 4 per year | Hour | 4.00 | 9.00 | 36.00 |
| Insect and Disease Control | | | | | |
| Fungicide | 4 per year | Acre | 4.00 | 26.43 | 105.71 |
| Insecticide | 2 per year | Acre | 2.00 | 12.00 | 24.00 |
| Tractor and sprayer | 6 per year | Acre | 6.00 | 12.00 | 72.00 |
| Labor | 6 per year | Acre | 6.00 | 9.00 | 54.00 |
| Pruning | 1 per year | Hours | 3.00 | 9.00 | 27.00 |
| Irrigation and frost control | | Acre | 1.00 | 140.00 | 140.00 |
| Interest on operating costs | | | \$ 6,523.25 | 0.07 | 424.01 |
| Total variable costs (TVC) | | | | | 6,947.26 |
| Tractor and equipment | | Acre | 1.00 | 1,521.30 | 1,521.30 |
| Overhead and management | | \$ | 6,947.26 | 0.15 | 1,042.09 |
| Irrigation | | Acre | 1.00 | 286.07 | 286.07 |
| Total fixed costs (TFC) | | | | | 2,849.46 |
| Total establishment costs | | | | | 9,796.72 |

Economic Analysis of Southern Highbush Blueberry Production in Georgia, USA

Table 2. Second-Year Establishment Cost of Blueberry Orchard Using Drip Irrigation in Georgia, 2020

| Item | Application | Unit | Quantity | Price | Amount | |
|--|-------------|------|----------|----------|-----------------|-------|
| Fertilizers | | | | | | |
| Fertilizer (liquid) | Year | Gal. | 85.00 | 1.86 | 158.10 | |
| Weed Control | | | | | | |
| Pre-emergence | 2 per year | Acre | 2.00 | 30.00 | 60.00 | |
| Post-emergence | 2 per year | Acre | 2.00 | 20.00 | 40.00 | |
| Labor | 4 per year | Acre | 4.00 | 9.00 | 36.00 | |
| Insect and Disease Control | | | | | | |
| Fungicide | 8 per year | Acre | 8.00 | 46.13 | 369.00 | |
| Insecticide | 4 per year | Acre | 4.00 | 12.00 | 48.00 | |
| Tractor and sprayer | 12 per year | Acre | 12.00 | 12.00 | 144.00 | |
| Labor | 12 per year | Acre | 12.00 | 9.00 | 108.00 | |
| Pruning | 1 per year | Acre | 1,210.00 | 0.22 | 266.20 | |
| Irrigation and frost control | Year | Acre | 1.00 | 140.00 | 140.00 | |
| Interest on operating costs | | | \$ | 1,369.30 | 0.07 | 89.00 |
| Harvesting and marketing costs | | | | | | |
| Harvesting | | Lb | 1,615.00 | 1.00 | 1,615.00 | |
| Custom packing | | Lb | 1,615.00 | 0.94 | 1,518.10 | |
| Cooling, handling, and brokerage (15%) | | Lb | 1,615.00 | 0.15 | 242.25 | |
| Total variable costs | | | \$ | | 4,833.65 | |
| Tractor and equipment | | Acre | 1.00 | 1521.30 | 1521.30 | |
| Overhead and management | | \$ | 1,458.30 | 0.15 | 218.75 | |
| Irrigation | | Acre | 1.00 | 286.07 | 286.07 | |
| Total fixed costs (TFC) | | | \$ | | 2,026.11 | |
| Total establishment costs (TC) | | | \$ | | 6,859.77 | |

from the first year, second year, and third years' costs, respectively. The total harvesting and marketing costs were \$13,899 per acre, which consisted of approximately 89% of the total variable costs and 79% of the total costs. Once the orchard entered full production (years four to 15 in this study), we further assumed that costs would not vary in subsequent years since cultural practices would be more or less similar. The expected yield of 6,650 pounds per acre was assumed to be constant for the rest of the life of the orchard.

RISK-RATED RETURNS OVER TOTAL COSTS

Table 5 provides the risk-rated returns over the total costs of producing southern highbush blueberries in Georgia. The first row in Table 5 provides the net return on five different possible scenarios, as described in the material and method section above. For instance, in the best-case scenario, the chance of gaining \$3,820 or more per acre in a full production year is 7%, whereas, in the worst-case scenario, there is a 7% chance of losing \$1,917 or less per acre. In the 'optimis-

tic' case scenario, the table shows that there is a 31% chance of obtaining a net revenue of \$1,908 or more per acre and a 31% chance of losing \$5 or less per acre in the 'pessimistic' case scenario. Finally, we observed a 69% chance of positive returns in any full production year from southern highbush blueberry production in Georgia.

CONCLUSIONS

The dynamic Georgia blueberry industry ranks top amongst the fruits and tree nuts commodity category in terms of farm gate value, thus showing potential for further growth. This is especially the case since blueberries are popular in both the fresh and processed markets. This study investigated the different costs associated with the southern highbush blueberry production using drip irrigation and frost protection in Georgia. We used a risk-rated return analysis over costs by analyzing five possible scenarios: 'best,' 'optimistic,' 'most likely,' 'pessimistic,' and 'worst.'

Table 3. Third-Year Establishment Cost of Blueberry Orchard Using Drip Irrigation in Georgia, 2020

| Item | Application | Unit | Quantity | Price | Amount | |
|---------------------------------------|-------------|------|----------|----------|----------|------------------|
| Fertilizer | | | | | | |
| Fertilizer (liquid) | Year | Gal. | 85.00 | 1.86 | 158.10 | |
| Weed control | | | | | | |
| Pre-emergence | 2 per year | Acre | 2.00 | 30.00 | 60.00 | |
| Post-emergence | 2 per year | Acre | 2.00 | 20.00 | 40.00 | |
| Labor | 4 per year | Acre | 4.00 | 9.00 | 36.00 | |
| Insect and disease control | | | | | | |
| Fungicide | 8 per year | Acre | 8.00 | 46.13 | 369.00 | |
| Insecticide | 4 per year | Acre | 4.00 | 7.00 | 28.00 | |
| Tractor and sprayer | 12 per year | Acre | 12.00 | 12.00 | 144.00 | |
| Labor | 12 per year | Acre | 12.00 | 9.00 | 108.00 | |
| Pruning | 1 per year | Acre | 1,210.00 | 0.22 | 266.20 | |
| Irrigation and frost control | | Acre | 1.00 | 140.00 | 140.00 | |
| Interest on operating costs | | | \$ | 1,349.30 | 0.07 | 87.70 |
| Harvesting and marketing costs | | | | | | |
| Harvesting | | Lb | 3,800.00 | 1.00 | 3,800.00 | |
| Custom packing | | Lb | 3,800.00 | 0.94 | 3,572.00 | |
| Cooling, handling, and brokerage | | Lb | 3,800.00 | 0.15 | 570.00 | |
| Total variable costs | | | \$ | | | 9,379.00 |
| Tractor and equipment | | Acre | 1.00 | 1,521.30 | 1,521.30 | |
| Overhead and management | | \$ | 1,437.00 | 0.15 | 215.55 | |
| Irrigation | | Acre | 1.00 | 286.07 | 286.07 | |
| Total fixed costs (TFC) | | | \$ | | | 2,022.92 |
| Total establishment costs (TC) | | | \$ | | | 11,401.92 |

The study estimates that the total variable costs in the first three establishment and maintenance years were \$6,947, \$4,834, and \$9,379 per acre, respectively. For each of the full production years, the total variable costs were estimated at \$15,544 per acre. The higher total variable costs observed in the first year compared to the second year were because growers should expect to incur additional costs to prepare the land. Additionally, there was an increase in the total variable costs from the second year to the third and fourth years. The total variable costs increased alongside harvesting and marketing cost increases due to increased yield in the third and fourth years when the orchard entered the full production stage. The total establishment and maintenance costs for the first, second, and third years were estimated at \$9,797, \$6,860, and \$11,402 per acre, respectively. The highest total cost per acre (\$17,598) was recorded in the fourth year, which was the first full productive year. Finally, the risk-rated return analysis showed a 69% chance of obtaining profit and

a base-budgeted net revenue of \$952 per acre in the full productive year.

Although this study did not consider variation in costs incurred by growers, it evaluated net returns under different scenarios by projecting the chance of profit from southern highbush blueberry in Georgia. The results from this study could be used at the farmers' level to minimize risk or implemented in agricultural policy formation to assist growers. More specifically, with the help of extension agents, growers can use this study to identify their scenarios and assess returns over costs from blueberry production, helping them to decide on production plans. Follow-up research to this study may consider variation in costs among growers or utilize probabilistic approaches to address potential variations.

Economic Analysis of Southern Highbush Blueberry Production in Georgia, USA

Table 4. Costs of Productive Years (Fourth Year Onwards) of Blueberry Orchard Using Drip Irrigation in Georgia, 2020

| Item | Application | Unit | Quantity | Price | Amount |
|--|-------------|-----------|----------|------------------|----------|
| Fertility | | | | | |
| Fertilizer (liquid) | Year | Gal. | 85.00 | 1.86 | 158.10 |
| Weed control | | | | | |
| Pre-emergence | 2 per year | Acre | 2.00 | 50.00 | 100.00 |
| Post-emergence | 3 per year | Acre | 3.00 | 15.00 | 45.00 |
| Tractor and sprayer | 4 per year | Hour | 4.00 | 12.00 | 48.00 |
| Labor | 4 per year | Hour | 4.00 | 9.00 | 36.00 |
| Insect and disease control | | | | | |
| Insecticides | 5 per year | Acre | 5.00 | 7.00 | 35.00 |
| Fungicides | 8 per year | Acre | 8.00 | 46.13 | 369.00 |
| Tractor and sprayer | 13 per year | Hour | 13.00 | 12.00 | 156.00 |
| Labor | 13 per year | Acre | 13.00 | 9.00 | 117.00 |
| Pruning | | | | | |
| Pruning (manual) (3' x 12') | 1 per year | Plant | 1,210.00 | 0.22 | 266.20 |
| Mechanical topping | 1 per year | Acre | 1.00 | 75.00 | 75.00 |
| Irrigation | | | Acre | 1.00 | 140.00 |
| Interest on operating costs | | | \$ | 1,545.30 | 0.07 |
| Harvesting and marketing costs | | | | | |
| Harvesting | | Lb | 6,650.00 | 1.00 | 6,650.00 |
| Custom packing | | Lb | 6,650.00 | 0.94 | 6,251.00 |
| Cooling, handling, and brokerage (15%) | | Lb | 6,650.00 | 0.15 | 997.50 |
| Total variable costs (TVC) | | \$ | | 15,544.24 | |
| Tractor and equipment | | Acre | 1.00 | 1,521.30 | 1,521.30 |
| Overhead and management | | \$ | 1,645.74 | 0.15 | 246.86 |
| Irrigation | | Acre | 1.00 | 286.07 | 286.07 |
| Total fixed costs (TFC) | | \$ | | 2,054.23 | |
| Total budgeted cost per acre (TC) | | \$ | | 17,598.47 | |

Table 5. Risk-Rated Returns Over Total Costs of Producing Southern Highbush Blueberries in Georgia

| | Best | Optimistic | Most likely | Pessimistic | Worst |
|---|-------|------------|--|-------------|-------|
| Net returns level (\$) | 3,820 | 1,908 | 952 | -5 | -1917 |
| Chances of obtaining this level or more (%) | 7 | 31 | 50 | | |
| Chances of obtaining this level or less (%) | | | 50 | 31 | 7 |
| Chances for profit = 69% | | | Base budgeted net revenue = \$952 | | |

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