Economics of Organic Blueberry Establishment in Georgia

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Blueberries are among the most commonly grown small fruits in the United States (Kuepper and Diver 2004). Rabbiteye blueberries (*Vaccinium virgatum*), which are native to the southeastern United States, are currently being researched for organic production in Georgia. This species is heat- and drought-tolerant, and unlike other blueberry species can grow in many soil types while maintaining satisfactory yields with low pest damage (Austin 1994). Blueberries have a preference for acidic soils with a pH ranging from 4.0–5.3.

As increasing numbers of producers and acreage of farmland make the transition into blueberry cultivation, blueberries are becoming more economically important each year, prompting a need for intensified research on production methods. Production of blueberries in Georgia has increased almost exponentially since the mid-1970s (Scherm and Krewer 2003) to reach a statewide farm-gate value of $75 million from 10,278 bearing acres in 2006 (Boatright and McKissick 2007). Georgia now ranks fourth among blueberry-producing states in the nation based on the value of utilized production. Bacon County, in southeast Georgia, is the largest producer in the state, generating over $22 million in farm-gate value (Figure 1).

Organic blueberry production is an emerging economic market where price premiums can exceed prices for conventional blueberries by 100 percent. Organic farming follows an ecological soil-management program and does not employ synthetic chemicals during the production process (Krewer and Walker 2006). Land has to have had no prohibited substances applied at least three years prior to harvest of organic produce. Organic food must be processed, stored, and shipped separately from conventional produce in containers void of any synthetic chemical treatments (Dimitri and Greene 2002)

Organic food products are perceived to have higher nutritional value, increased food safety from lack of synthetic pesticide residue, and the absence of bioengineered traits (FMI 2007). Environmental concerns contribute to the increase in organic food demand because organic farming methods implement resource recycling, lack petroleum-based fertilizers, promote biodiversity, and maintain environmental integrity through sustainability. Regulation of organic standards is overseen by the National Organic Program, a division of the United States Department of Agriculture (Klonsky and Tourte 1998).

Less than one percent of total agricultural production was certified organic as of 1998 (Klonsky and Tourte 1998). Adoption of organic farming remains less than 0.1 percent yearly due to risk and uncertainty in transitioning, high management costs, limited awareness about organics, and lack of strong marketing and infrastructure (USDA-ERS 2007). The same concerns apply to producers in Georgia, where organic blueberries are not in widespread production (Krewer and Walker 2006). A lack of market realization by many of the producers has created a disparity between supply and demand.

Joint research currently being conducted by the University of Florida and the University of Georgia will determine the optimal conditions for economically viable organic rabbiteye blueberry production in the Southeast. The study includes weed-control trials, assessment of plant productivity in response to organic fertilizers, and evaluation of organic weed- and pest-control compounds. Yields collected in the upcoming year will be used to determine production revenue compared to that from conventional

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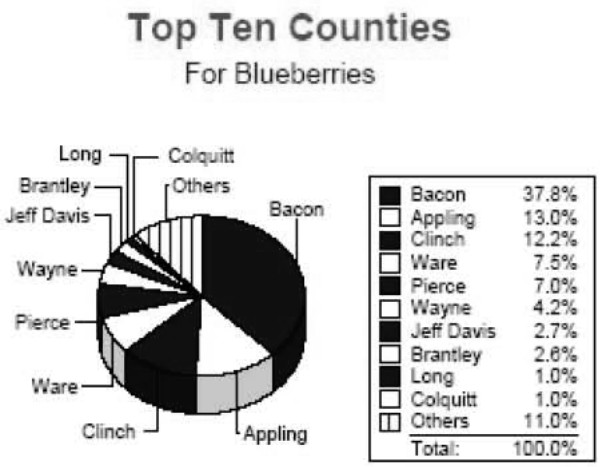


Top Ten Counties

Blueberries

County	Acres	Farm Gate Value
Bacon	2,650	$22,456,262
Appling	2,000	$7,705,000
Clinch	479	$7,257,500
Ware	620	$4,427,500
Pierce	925	$4,144,625
Wayne	602	$2,476,900
Jeff Davis	196	$1,612,492
Brantley	260	$1,555,375
Long	100	$620,056
Colquitt	65	$585,292

Figure 1.

Source: 2005 Georgia Farm Gate Value Report. AR 06-01.

yields in the same season. This knowledge is crucial for farmers who must minimize uncertainty and risk when transitioning to organic production.

Plant Productivity

In November 2006, the 80-by-300-foot site was prepped and planted with three-quart nursery-sized containers of organic 'Brightwell' rabbiteye blueberries in six rows. Organic bone meal (1-13-0) was applied in a two-foot band down the center of the raised beds prior to planting at a rate of 200 pounds of phosphorus per acre. Plant spacing was approximately 5.5 ft between each plant and 13 ft between rows (Figure 2). All blueberry plants were pruned to a height of 12 inches after planting to compare growth between plots. Growth will be measured for the first time in November 2007 and expressed using the following growth index:

(1) *Growth Index = plant height × width in row × width across row.*

Essential plant-nutrient levels will be measured in July of each year in each plot.

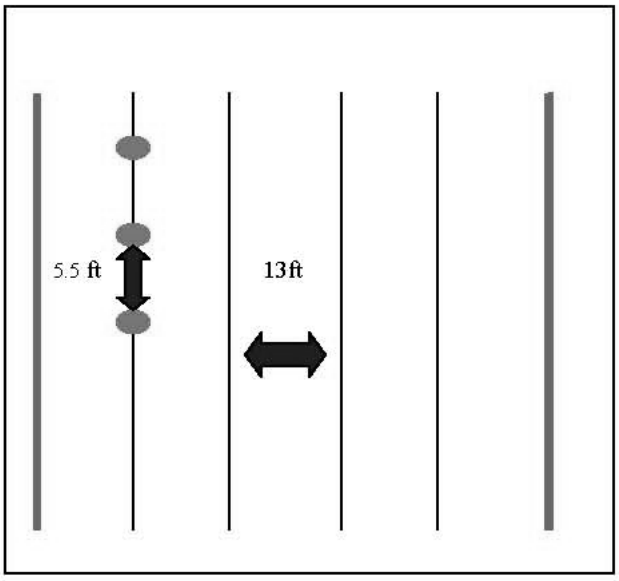
Mulch Trials

The most difficult challenge in organic production is weed control (Klonsky and Tourte 1998). To improve weed management, mulch was placed on the raised blueberry beds in early December 2006. Weed-control efficiency will be determined through extrapolated time-series data collected during mulch placement and hand-weeding time on each mulch type.

The experimental design is a randomized placement of seven mulches and a control. Each row is divided into eight 37.5-foot plots that contain seven plants. The five plants in the center of each mulch replication will be used for data collection.

Mulches were selected based on local availability. The mulches include pine bark, pine straw, peanut hulls, wheat straw, white-on-black polyethylene, landscape fabric, and black polyethylene film.

The control is bare soil that will be hand-weeded, mechanically cut, and sprayed with Matran (clove oil), a non-selective organic post-emergence herbicide for annual grasses and broadleaf weeds. To date, Matran has been applied once and was ineffective on the worst of the weeds.



Bacon County Plot Diagram

Bold lines on left and right represent organic phosphorus fertilizer trial.

The four lines in the center represent the organic blueberry mulching trial.

Figure 2.

Pine bark mulch was laid down about six inches deep in November 2006. A converted cattle feeder was used to spread the pine bark on both sides of the raised beds. The pine bark is coarse and ranges in size from 0.1 to 4 in. This mulch is preferred due to a low decomposition rate and preferred pH range of 4.2–5.0. Pine bark is a readily available, albeit somewhat expensive, resource in Georgia and Florida.

Pine straw mulch was spread onto blueberry beds manually. The straw was fluffed and placed to a depth of six inches. Decomposition will decrease the pine straw volume but will maintain low soil pH. Pine straw does not immobilize nitrogen, allowing plant-available nitrogen levels to remain stable and accessible. Seasonal mulch replenishment may be required. Pine straw prices are relatively high due to demand for landscape use.

Peanut hulls are spread mechanically utilizing a converted cattle feeder. This mulch was laid to a depth of four inches and required the tractor to run on either side of the bed to evenly spread the mulch. Hulls are readily available in south Georgia, Florida, and Alabama, but have a high pH of around seven. The effect on soil pH is yet to be determined.

Wheat straw was fluffed and spread by hand onto the blueberry beds. This mulch could be dispersed using a converted cattle feeder to reduce labor costs. The straw was laid to a depth of about six inches. Once decomposition begins the depth decreases while providing nutrients and weed control. This mulch will last about two years before it needs to be replenished.

White-on-black polyethylene about four feet wide was held above the plants, while circular holes eight to 12 inches in diameter were cut in the plastic. The plastic was lowered onto the bed and staked into the ground with U-shaped pins to prevent movement. The holes were sealed with coarse pine bark mulch which water and nutrients can infiltrate. The temperatures under the plastic are similar to those of bare soil. The polyethylene has an expected lifespan of over two years. Use of this ground cover is preferred during the blueberry establishment stage.

Woven landscape fabric is a heavier material that was laid down by cutting an "X" 12–18 inches long for each plant; the fabric was held flush against the bed with U-shaped stakes, and the holes were sealed with coarse pine bark mulch at the base of the blueberry plant. Water and nutrients are able to pass through the landscape fabric to the soil below

but organic fertilization application will occur close the plant base. The expected lifespan is around three years before the fabric must be removed and disposed of.

Black polyethylene with a width of about four feet was laid down on the beds by cutting holes eight to 12 inches in diameter in the plastic and pulling the plants through. This plastic was then staked down to the bed with U-shaped stakes. Temperatures can reach over 122°F under the plastic during the summer. Expected lifespan is around two years.

The organic mulches will be re-applied as needed to maintain a layer about four inches thick. Weeds that occur between the beds will be controlled by regular mowing. The cost of weed control will be determined based on fuel and time consumed by labor through time-series extrapolation. Weed coverage and species composition for each plot will be estimated five times during the growing season.

Organic Inputs

Organic fertilizers, herbicides, and pesticides will be applied throughout the experiment. Costs are dependent on the amount of organic compounds used throughout the establishment phase of blueberry growth. The amounts will be extrapolated for an average-size blueberry operation.

To date, we have applied Matran organic herbicide once and were unsatisfied with the results on the toughest weeds.

Organic fertilizer has been applied four times so far. We used Nature Safe (8-5-5), a mix of feather, meat, bone, blood, and fish meals; langbeinite; yeast; sugars; carbohydrates; and humus (Nature Safe Products n.d.). This is considered an ideal starter fertilizer that contains primary and secondary plant nutrients.

Organic Yields

Fruit yields will be collected when plants reach fruit-bearing age 18 and 30 months after planting. 'Brightwell' rabbiteye blueberries should begin fruiting around June 10th until late July. Yield per plant and berry weight will be compared with conventional blueberry yields in the same region. Fruit amount and time to harvest will determine the amount of revenue and profits generated. Fruit sold earlier in the blueberry season will result in higher prices, since most other berry-growing regions in North America produce fruit that ripen later in the year.

Conclusion

The organic market is one of the fastest-growing sectors of United States agriculture, with organic land acreage having doubled between 1992 and 1997. Fresh produce is the top seller within the organic foods market (Dimitri and Greene 2002). The ever-growing demand for organic fruit is providing a niche market for blueberry producers in the Southeast. The ability to harvest early-fruiting plants creates a high price premium that is exclusive to Georgia and Florida. In Georgia, the main limiting factors for organic blueberry production is weed management and pest control (Krewer and Walker 2006). The goal of this research is to overcome the limiting factors of production in an economically viable manner that can be adopted successfully throughout the region.

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