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5. Author(s)

1. DAVID G. HIMELRICK

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3.

6. Contributing Organization(s)

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PROEXAG

NON-TRADITIONAL AGRICULTURAL EXPORT SUPPORT PROJECT

BLUEBERRY PRODUCTION AND EXPORT
POTENTIAL IN CENTRAL AMERICA AND PANAMA

Assignment Number: ST/87-31
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SUBMITTED TO:

Regional Office for Central America and Panama (ROCAP)
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SUBMITTED BY:

David G. Himelrick
through

Chemonics International Consulting Division
2000 M Street, Northwest
Suite 200
Washington, D.C. 20036

August 1987

BLUEBERRY PRODUCTION AND EXPORT
POTENTIAL IN CENTRAL AMERICA AND PANAMA

PROEXAG
Non-Traditional Agricultural Export Support Project

Submitted by:

David G. Himelrick

BLUEBERRIES

Production Costs

The costs of blueberry production have been estimated for Washington state in 1981. Variable preharvest costs totaled \$1293., harvest costs \$1872. and fixed costs \$1764. The total costs per acre were calculated at \$4929.00. With a total production of 8000 pounds of fruit per acre the break even price was \$.62 per pound. The enterprise budget assumed a return to the grower of \$.61 per pound. These costs assume a mature fully productive blueberry planting which is not achieved until eight years after planting. No fruit is normally harvested until the third year after planting. The cumulative balance of costs versus returns does not become positive for 5 to 8 years after planting. This can present a serious cash flow problem for many producers. Production cost estimates from Washington state are included in Appendix 1.

Market Prices

Market prices in 1986 ranged from \$10.00 to \$13.00 per 12-pint flat at the wholesale market. This translates into \$1.11 to \$1.44 per pound which includes the cost of master boxes, pint tins and shipping and handling costs incurred up to the terminal market. U.S. producers received \$.75 to \$.90 per pound for fruit in 1986. The early season market begins with Florida and Georgia around the first week of May. The domestic market sales begin in force with North Carolina which comes into production the last week of May. This production concentration continues northward and finishes with Maine around the second week of October. The only major off-season imports come from New Zealand during January and February. The most concentrated domestic supply is found on the market during July, August and September. Off-season air freighted blueberries will occasionally command prices of \$25.00 to \$50.00 a flat.

Retail prices for canned blueberries are in the \$1.69/15 oz. or \$1.180/lb. range. I.Q.F. frozen packages are in the \$2.39/16 oz. or \$2.39/lb. range. Other frozen packages of blueberries are selling in the \$1.49/12 oz. or \$1.99/ lb. Bulk 30 lb. containers of frozen product are currently selling for \$.85/ lb. F.O.B. New Jersey or Michigan.

Production

Domestic blueberry production extends from early season production of the rabbiteye types in the southern U.S. up the eastern coast to North Carolina, New Jersey and Michigan with the highbush varieties. The season finishes in Maine with the lowbush types. Additional production can also be found in Washington and Oregon.

Table 1. 1986 North American blueberry crop production statistics.

(000 lbs.)

CULTIVATED:	
North Carolina.....	5.5
Michigan.....	57.0
New Jersey.....	40.0
Oregon.....	4.8
Washington.....	2.8
British Columbia.....	7.0
AR,LA,MS,TN.....	.9
Georgia.....	2.3
Florida.....	.8
Total cultivated.....	121.1
WILD:	
Maine... ..	41.0
Nova Scotia.....	16.2
Quebec.....	1.0
New Brunswick.....	6.0
Newfoundland.....	1.7
P.E.I.....	.5
Total Wild.....	66.5
1986 Total North American Blueberry Production.....	
	187.6

Table 2. The major countries which currently export blueberries to the U.S. 1986.

<u>Country</u>	<u>Metric Tons</u>	<u>1000 Dollars</u>
Canada	4,288	3,709
New Zealand	530	1,901
Australia	11	25
Chile	2	5
Mexico	6	2

Total blueberry imports for 1986 were valued at \$5,642,000 and totaled 4,837 metric tons.

Variety Recommendations

Since little or no data on the performance of blueberry cultivars (varieties) in Central America currently exists, I would recommend that trial plantings of both rabbiteye and highbush types be established. The rabbiteye types should perform better under most of the climatic conditions encountered in Central America. The rabbiteye types are generally more heat and drought tolerant. The following summarizes the current southern cultivars:

In addition to the rabbiteye types a trial planting of southern highbush blueberries should be considered. The following is a list of southern highbush blueberry cultivars with some information on what is currently known about them. The cultivars are placed in probable ripening order for a climate like that of south Georgia.

Highbush Cultivars

'Sharpblue' - Approximate ripening date in lower South Georgia: early May, low to moderate vigor, semi-upright, moderately productive, fruit medium in size, light blue, fairly firm but with a wet scar, and good flavor. Resistant to stem canker but leaf diseases can be a problem. Recommended for trial in zone 9A only (Gulf Coast area). 300 chilling hours. 1976 release by Drs. Sharpe and Sherman.

'O'Neal' (NC1688) - Approximate ripening date in South Georgia: early May; southeast North Carolina: June 1, vigorous, semi-upright, productive, fruit very large, medium blue, excellent firmness, picking scar and flavor. Blooms over an extended period in southeastern North Carolina. Tolerant to some races of stem canker. Recommended for trial in the coastal plain and piedmont in the southeast. 400-500 chilling hours. 1987 release by Drs. Ballington and Draper.

'Avonblue' - Approximate ripening date in low South Georgia: early to mid May, low vigor, semi-upright, moderately productive, fruit medium large in size, light blue, good firmness, dry stem scar and good flavor. Recommended for trial in zone 9A (Gulf Coast area). 400 chilling hours. 1977 release by Drs. Sherman and Sharpe.

'Georgiagem' (T285) - Approximate ripening date in South Georgia: mid may; North Georgia and southeast North Carolina: early June, vigorous, upright, medium productivity, fruit medium in size with a good color, firmness, picking scar and flavor. Probably susceptible to stem blight and canker. Recommended for well-drained sites in the coastal plain and also in the piedmont if frost protection can be provided. 350 chilling hours. 1986 release by Drs. Austin and Draper.

'Gulf Coast' (MS90) - Approximate ripening date in South

'Climax' - Upright, open plants. Berries are medium in size, medium dark blue in color, have a small scar and good flavor. Early season, ripening 3 to 5 days before 'Woodard'. Concentrated ripening, excellent for machine-harvest. Georgia 1976.

'Briteblue' - Moderately vigorous, grows upright and open. Mid-season, generally before 'Tifblue'. Berry firmness, heavy bloom, and small dry scar combine to make this a good shipper. Fruit with good flavor when fully ripe. Georgia 1969.

'Bluebelle' - Good pick-your-own cultivar. Berries large, round, light blue with excellent flavor that size well throughout the season. Mid-season. Plants moderately vigorous with upright growth. Scar tends to tear, not recommended for shipping. Georgia 1976.

'Delite' - Upright bush, moderately vigorous. Season slightly later than 'Tifblue'. Berries are light blue, often with reddish undercoat; large, firm with excellent flavor. Berries are not tart before reaching maturity. Georgia 1969.

'Southland' - Moderately vigorous, dense upright plant. Berries are light blue, medium large with good flavor. Tend to lose size as season progresses. Same season as 'Tifblue'. Scar is small and dry. Georgia 1969.

'Brightwell' - Early, same season as 'Woodard'. Berries are medium in size and in blue color, with small dry scars and good flavor. Plant growth is vigorous, upright and produces enough new canes to renew the plant. Georgia 1981.

'Premier' - Earlier (2-3 weeks) than 'Tifblue'. Large fruit with good flavor. Vigorous, disease resistant, productive. North Carolina 1978.

'Powderblue' - Vigorous, disease resistant, productive. Same season as 'Tifblue' with better fruit color and more foliage disease resistance. North Carolina 1978.

'Centurion' - Later than 'Tifblue'. Adds one or more weeks to the rabbiteye ripening season in North Carolina. Good flavor, not as firm and darker than 'Tifblue'. North Carolina 1978.

'Beckyblue' - Early ripening. Low chilling requirement (less than 400 hours). Extends the cultural range of rabbiteye blueberries into South-Central Florida. Should be interplanted with 'Aliceblue'. Not recommended north of North Florida. Florida 1978.

'Aliceblue' - Early ripening with low chilling requirement. Similar to and should be interplanted with Beckyblue. Florida 1978.

'Baldwin' - Productive, late-ripening cultivar with good flavor and firm, dark-blue fruit. Has lengthy ripening period; adapted to pick-your-own and backyard plantings. Georgia 1985.

The following cultivars are low-chilling tetraploid (Southern highbush) plants and are included since their climatic adaptability is within the range of rabbiteye blueberries:

'Avonblue' - Adapted to North Central Florida. Ripens after 'Sharpeblue' but before any rabbiteye cultivars. Fruit quality high. Florida 1977.

'Flordablue' and 'Sharpblue' - adapted to Central and South-Central Florida, considerably south of the best range for present rabbiteye cultivars. Suitable for pick-your-own and local markets. Interplant both cultivars for cross-pollination. Florida 1976.

'Blue Ridge' - Early-midseason cultivar with medium-large, firm, high acid flavored fruit. Recommended for local sales and pick-your-own in Piedmont and lower mountains of Southeastern U.S. Chilling requirement - 500 to 600 hrs. North Carolina, 1987.

'Cape Fear' - Mid-early cultivar similar in season to Croatan in North Carolina. Productive with very large fruit of good color, scar, and firmness and average quality. Recommended for hand harvest and commercial shipment and average quality. Recommended for hand harvest and commercial shipment or FYO plantings. 500 - 600 hrs. chilling requirement. North Carolina, 1987.

'O'Neal' - Very early ripening cultivar with large very high quality fruit. Adapted for FYO or hand harvest for commercial shipment. Chilling requirement - 400 hrs. North Carolina, 1987.

'Cooper' and 'Gulfcoast' - Moderately vigorous, upright, productive cultivars with high quality medium size fruit. Fruit size of 'Cooper' is larger and 'Gulfcoast' is more productive. Flower later than 'Climax' and ripen 2 - 3 weeks earlier than 'Climax' or 'Premier'. Mississippi, 1987.

'Georgiagem' - Moderately vigorous, upright, productive with medium size fruit that has good color, small scar, and is firm. Blooms later than 'Climax' but earlier than 'Sharpblue' and 'Avonblue' and ripens 2 weeks before 'Climax'. Georgia, 1987.

Recommendations

Site Selection

The first critical factor in site selection for blueberries is soil pH. Blueberries require an acid soil below a pH of 5.2. This crop also responds very favorably to high levels of organic matter in the soil. Well decomposed organic matter should be added to the planting hole and the plant should be mulched annually with sawdust or other materials. Many soils in Central America are much too alkaline for good blueberry growth and will undoubtedly produce an iron chlorosis (deficiency) in the plant. Soil pH can be reduced through the addition of sulfur. The practical limitations of this procedure is limited by the natural pH of the soil and its tendency (buffering capacity) to return to this native pH.

In the case of acid-loving crops such as blueberries the soil pH may need to be lowered. In this situation the use of agricultural grade sulfur is recommended as a soil amendment. One year is required for bacteria to oxidize sulfur and lower the soil pH. No more than 400 pounds of sulfur should be used on established blueberry plantings in one year. Table 3 gives the approximate quantities required to change the soil pH of various soil types and initial acidity levels.

Table 3. Preplant sulfur recommendations to lower soil pH to 4.5. Pounds of sulfur needed per acre. Aluminum sulfate can be substituted at six times the suggested rates.

Current pH	Soil type		
	Sand	Loam	Clay
4.5	0	0	0
5.0	175	530	800
5.5	350	1050	1600
6.0	530	1540	2310
6.5	660	2020	3030
7.0	840	2555	3830
7.5	1000	3040	4560

The second critical factor is a chilling requirement for proper flowering. All rabbiteye and southern highbush cultivars require at least 250 hours of air temperatures below 7°C (45°F) to meet this physiological requirement. Temperatures below 10°C (50°F) may be of benefit in meeting this need. Temperatures above 15°C (59°F) may reverse the chilling process. Adequate chilling will probably only be obtained at elevations above 2000 meters (6500 feet) in Central America. Other potential experimental treatments to chemically break dormancy include cyanamide (4%), thiourea (1%), oil + DNOC (5%), KNO₃ (5%)--see article attached to bramble report.

The third critical factor will be the water requirement of the plants. Blueberries have a fibrous and limited root system which is inefficient in foraging for water. The plants will need at least 2.5 cm (1 inch) per week of water during the fruiting season. This will demand the use of supplemental irrigation for successful fruit production and plant growth. In most areas irrigation will be required from November through April. In other areas irrigation will be necessary every month of the year.

Trial Plantings

Since no information exists on the growth, flowering, and fruiting of blueberries under Central American conditions we can not be certain of their performance. In this situation I would recommend the establishment of trial plantings at various locations which are representative of the typical climatic conditions in the proposed production areas. Due to the budgetary and logistical limitations I would suggest the following cultivars for evaluation:

Highbush Types

Sharpblue
Flordablue
Avonblue

Rabbiteye Types

Eeckyblue
Aliceblue
Briteblue
Woodard

Due to the long term nature of a blueberry planting no reliable data on cultivar performance will be available for 3 to 5 years from planting. Trial plantings should be started as soon as possible.