

Technical and Economic Feasibility of  
**Rabbiteye Blueberry**  
**Production**  
in East Texas



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# Technical and Economic Feasibility of Rabbiteye Blueberry Production East Texas

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Successful rabbiteye blueberry production in Texas depends on the soil, site and temperature. The grower must know, in addition to these requirements, the characteristics of the local labor supply and of a pick-your-own direct market consumer before choosing an orchard location. Modification presents an economic evaluation including the establishment, development, production and marketing costs of raising blueberries in Texas. The financial analysis considers the recapture of establishment and development costs, capital expenditures, breakeven quantity and potential net returns for a pick-your-own and a fresh market operation.

The rabbiteye blueberry, *Vaccinium ashei*, is native to the south and southeastern United States, especially the river valleys of Georgia and Florida. The bushes are very vigorous, sometimes growing 10 feet tall, and tolerate heat and drouth. The establishment and development costs for growing blueberries in Texas are significant, but the potential net returns are also high. Rabbiteye blueberry bushes begin producing the fourth or fifth year after planting and, at maturity, produce 12,000 to 18,000 pints per acre. This adaptability, vigor and heavy production indicate the potential for profitable blueberry production in Texas.

The prospective blueberry grower must carefully choose the orchard site to meet the soil and temperature requirements for optimum rabbiteye blueberry production. Also consider the available supply of labor for harvest if the berries are to be sold in the fresh market, and the maximum distance customers will travel if the berries are to be sold in a pick-your-own operation.

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## Soil and Site Selection

Blueberry plants require a light, well drained, acid soil with a pH of 4.0 to 5.0. Sands and sandy loams are good blueberry soils if the pH is correct. Optimum pH is between 4.3 and 4.8. Figure 1 shows the area of Texas potentially suitable for growing blueberries. Ideally, the soil should have a layer of clay 1 to 4 feet below the surface to help conserve moisture. The clay layer should be 30 inches below the surface. The clay layer, or pan, is necessary to conserve moisture because the blueberry plant has a shallow, fine fibrous root system and the roots lack root hairs. The lack of root hairs greatly decreases the total surface area of the roots and makes water uptake more difficult. The clay pan slows the flow of water into the soil, keeping it moist and allowing the blueberry to more easily absorb water.

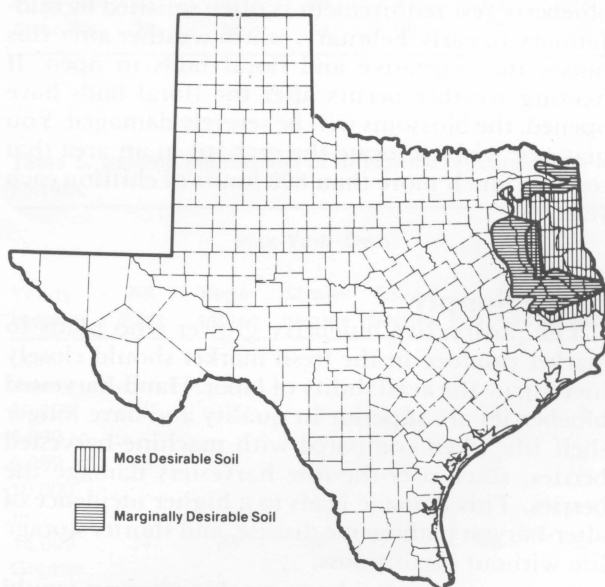


Figure 1. Location of soils suitable for rabbiteye blueberry production in Texas.



The orchard site should be flat with a slope of no more than 2 to 3 percent. Good air flow out of the orchard will prevent cold air accumulation and consequent damage to the bushes from late spring frosts. A site on top of a hill that slopes slightly to the north would allow cold air flow out of the orchard. Planting the orchard on a north slope will delay early bloom, decreasing the danger of frost damage.

### Temperature Requirements

You must also consider the number of chilling hours (hours below 45 degrees F.) needed to satisfy the rest requirements of the blueberry plant.

The rest requirement is a physiological mechanism induced by short day length and cold temperatures in the fall, and prevents plant growth during adverse weather. The rest period of the blueberry is that period of dormancy when the aboveground portion will not grow, even though temperature, moisture and other environmental conditions are favorable. If the rest period is not completely satisfied by the proper number of chilling hours, poor and delayed opening of the buds results, with a consequent poor crop of fruit.

The rabbiteye blueberry is native to the regions of the southeastern United States that receive 400 to 700 hours of cold temperatures below 45 degrees F. Most new rabbiteye blueberry varieties require 400 to 500 hours of chilling. Locate the orchard in an area of Texas that receives at least 400 hours of chilling each year. Figure 2 shows the number of chilling hours received by areas in Texas. However, a problem confronted by a fruit producer in the southern United States is the susceptibility of plants with low chilling requirements to late winter and early spring cold damage to the blossom. Since the rabbiteye blueberry rest requirement is often satisfied by mid-January to early February, warm weather after this causes the vegetative and floral buds to open. If freezing weather occurs after the floral buds have opened, the blossoms will be severely damaged. You may not wish to locate the orchard in an area that receives much more than 800 hours of chilling each year.

### Labor Supply

The prospective blueberry grower who plans to market produce in the fresh market should closely investigate the availability of labor. Hand-harvested blueberries are superior in quality and have longer shelf life when compared with machine-harvested berries, since over-the-row harvesters damage the berries. This damage leads to a higher incidence of after-harvest pathogenic disease, and shorter storage life without quality loss.

A grower who decides to machine harvest would also need large and expensive packing house equipment to grade and pack the harvested berries.

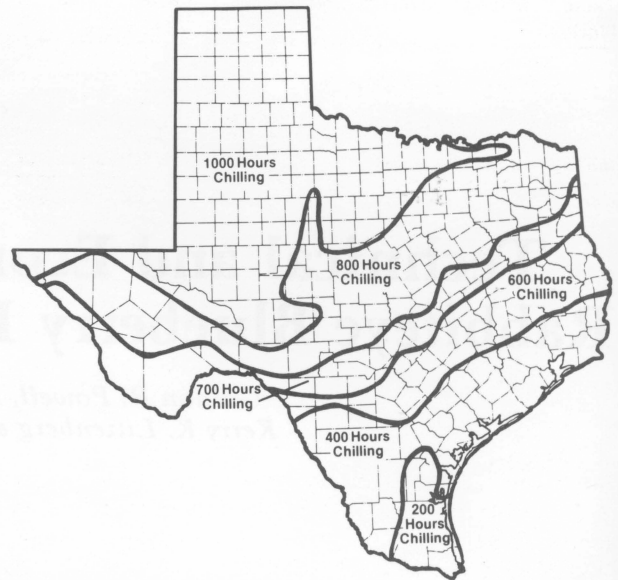


Figure 2. Number of chilling hours below 45 degrees F. in each area of Texas.

The grower should harvest directly into market flats containing a dozen 1-pint containers. Four to six people per acre will be necessary to harvest during the 4- to 6-week harvest season.

### Consumer Characteristics for Pick-Your-Own Operations

The grower expecting to market blueberries with a pick-your-own operation should consider these consumer characteristics when choosing a location:

- The distance customers will travel
- The frequency of shopping trips to direct market outlets
- The dollar purchases per shopping trip
- Demographic characteristics of the surrounding population such as age, income distribution and family size

In 1970, G. B. Wall, F. W. Stegelin and T. E. Crocker of the Florida Cooperative Extension Service studied these factors which are also believed to apply to Texas consumers.

The distances traveled by consumers to a direct market in Florida are listed in Table 1. The table indicates that 76 percent of the consumers surveyed would travel 30 miles or less to pick blueberries. There is no reason to believe Texas consumers would travel farther to a direct market outlet. Data are also presented for strawberries, peaches, grapes and vegetables as a comparison with blueberries.

**Table 1. Mileage traveled by consumers to various markets in Florida.**

Mileage	Pick-Your-Own					
	All PYO	Vege- tables	Straw- berries	Blue- berries	Peaches	Grapes
0 to 5	16	26	20	13	3	16
6 to 15	25	28	22	33	17	26
16 to 30	31	25	31	30	36	34
31 to 50	11	13	13	8	22	5
51 to 70	6	3	9	2	13	2
70	10	2	3	14	9	16

The frequency of shopping trips to direct market outlets for Florida consumers is presented in Table 2. The table indicates that 9 percent of the consumers made weekly trips to the orchard, 13 percent made biweekly trips and 13 percent visited once per month. However, 54 percent of the consumers visited the orchard less than once every 2 months. Again, blueberry consumers in Texas are assumed to behave the same way. Blueberries are harvested over a 4- to 6-week period, and since 54 percent of the consumers in the study indicated they would visit the orchard less than one time in 2 months, more than one-half the potential customers will visit the orchard only once or not at all.

**Table 2. Frequency of shopping trips to direct-market outlets by Florida consumers.**

Number of Trips	Pick-Your Own					
	All PYO	Vege- tables	Straw- berries	Blue- berries	Peaches	Grapes
Daily	0	0	0	0	1	0
Weekly	11	20	16	9	5	7
Bi-weekly	14	21	19	13	5	10
Monthly	26	27	31	23	27	23
Less than 1 every 2 months	49	32	34	54	63	60

The dollar purchases per shopping trip by Florida consumers are shown in Table 3. This table shows that approximately 90 percent of the customers of a pick-your-own blueberry orchard will spend less than \$10.00 per shopping trip. However, gasoline prices have risen since the study was completed in the late 1970's, probably decreasing the number of trips customers are willing to make.

The demographic characteristics of a potential customer for a pick-your-own operation in Florida are shown in Tables 4, 5 and 6. Table 4 indicates 41 percent of the potential customers are 40 to 59 years old. Table 5 indicates that approximately 75 percent

of the potential customers in an area have incomes greater than \$10,000 per year. Table 6 indicates that 43 percent of the customers come from a two-person family. These demographic variables are also *potentially applicable in Texas.*

**Table 3. Dollar purchases per shopping trip by Florida consumers.**

Dollars	Pick-Your-Own					
	All PYO	Vege- tables	Straw- berries	Blue- berries	Peaches	Grapes
Less than 5.00	33	26	19	39	16	51
5.00 to 9.99	52	54	59	50	53	45
10.00 to 14.99	11	15	15	8	23	1
15.00 to 20.00	3	3	5	2	6	1
Greater than 20.00	1	2	2	1	2	1

**Table 4. Age distribution of direct-market consumers in Florida.**

Age	Pick-Your-Own					
	All PYO	Vege- tables	Straw- berries	Blue- berries	Peaches	Grapes
Less than 20	1	0	0	2	0	2
20 to 39	29	34	34	28	19	28
40 to 59	46	48	46	41	53	45
Over 60	24	18	19	28	27	25

**Table 5. Income distribution of direct-market consumers in Florida.**

Yearly Income	Pick-Your-Own					
	All PYO	Vege- tables	Straw- berries	Blue- berries	Peaches	Grapes
Less than \$5,000	6	7	8	5	4	3
5,000 to 9,999	15	17	7	18	22	17
10,000 to 14,999	34	33	34	36	46	35
Greater than 15,000	44	43	51	41	28	46

**Table 6. Family size of direct-market consumers in Florida.**

Number of Persons	Pick-Your-Own					
	All PYO	Vegetables	Strawberries	Blueberries	Peaches	Grapes
1	7	2	3	11	8	9
2	38	39	36	43	34	35
3	16	15	17	16	18	17
4	19	24	24	16	17	18
5	10	10	11	10	13	9
6	5	7	6	2	5	6
7	2	2	3	2.06	3	3
8	1	1	1	0	2	3

The production costs of rabbiteye blueberries include the one-time cost of establishing the orchard, developing the orchard to full production over a 3-year period and the cost of maintaining the blueberries at full production. There may be significant marketing costs also.

### Establishment Costs

The first year establishment costs per acre are presented in Table 7. The land charge of \$50 is a typical rent, and can be considered an opportunity cost since the potential rental income from the land is lost when the landowner decides to grow blueberries. Opportunity cost is the value of the product not produced because an input was used for another purpose.

**Table 7. Estimated establishment costs per acre for rabbiteye blueberries in Texas.**

Item	Unit Cost	Quantity	Amount
Land Charge	\$ 50.00/acre	1.0	\$ 50.00
Leveling		1.0	75.00
Trickle Irrigation with Labor	500.00/acre	1.0	500.00
Rabbiteye Blueberry Plants	1.25 each	605.0	756.25
Peat Moss	13.00/bale	76.0	988.00
Mulch	3.00/bale	400.0	1200.00
Machinery Costs*			
Plow	14.26/hour	.5	7.13
Harrow	7.02/hour	.6	4.21
Mark Rows	7.00/hour	.5	3.50
Open Furrows	7.00/hour	.5	3.50
Apply Peat Moss	7.00/hour	2.5	17.50
Set plants	7.00/hour	6.0	42.00
Mulch Beds	23.15/hour	1.5	34.73
Subtotal		12.1	112.57
Labor**	4.00/hour	16.6 hours	66.40
Irrigation	3.00/application	26	78.00
<b>Total Establishment Cost</b>			<b>3826.22</b>

\* All machinery costs are for implement plus tractor costs.

\*\*Labor hours equal machine hours except for mulching beds which requires four workers per machine hour or 6 hours for mulching beds and a total of 16.6 hours.

Plant 605 blueberry plants per acre 6 feet apart in rows 12 feet apart. Add 1/8 bale of peat moss to the soil when each plant is placed in the ground. A permanent mulch over the entire orchard floor controls weeds and helps maintain soil moisture. The mulch should be 6 to 8 inches deep and will require 400 bales of hay per acre. Irrigate the blueberry bushes with a trickle irrigation system installed above the mulch. This can also be used to apply soluble fertilizers to the plants.

The land to be used for blueberry production requires careful preparation. Grow cover crops, such as millet and rye grass, for 1 to 2 years before planting blueberries. Fertilize these crops at the highest suggested rate to produce maximum green plant material. This addition of green plant material to the soil will increase the organic matter content and improve soil structure.

Thoroughly harrow the ground before planting. Mark the rows, then open them with a plow. At this time place peat moss at each plant location and cover the peat moss to absorb moisture from the soil. After the peat moss is moist, open the rows again from two directions so the peat moss and soil are thoroughly mixed before setting the plants.

### Development Costs

The development costs for years 1 through 3 are listed in Table 8. The main cost during the developmental years is associated with maintaining the mulch which requires four workers. The mulch

will be maintained with the addition of 75 bales of hay per acre. The hay used for this mulch should be grown under contract so you can specify that it be cut before producing seed, avoiding future weed problems.

**Table 8. Estimated development costs per acre for rabbiteye blueberries in Texas (years average).**

Item	Unit Cost	Quantity	Amount
Fertilizer (8-8-8)	\$ 6.00/cwt.	1.7	\$10.20
Irrigation	3.00/irrigation	26.0	78.00
Mulching			
Mulch	3.00/bale	75.0	225.00
Machine	23.15/hour	.75	17.36
Labor			
Mulching	4.00/hour	3.0	
Hand Hoe	4.00/hour	8.0	
Pruning	4.00/hour	10.0	84.00
<b>Total Development Costs</b>			<b>\$414.56</b>

Prune the bushes sparingly to remove the flower buds so only vegetative growth occurs the first 2 years.

Fertilize rabbiteye blueberries with a complete ratio fertilizer such as 8-8-8 or 12-12-12 analysis applied at a rate of 50 to 60 pounds of actual nitrogen per acre. Rabbiteye blueberries respond best when ammonium sulfate or ammonium nitrate is used as

the nitrogen source. Fertilize the young bushes with 3- to 6-ounces of fertilizer the year of planting, and gradually increase the amount of fertilizer until at maturity each plant is receiving 1 pound.

## Production Costs

The production expenses for rabbiteye blueberries are given in Table 9. As previously stated, fresh market berries will be hand-harvested directly into market flats that contain twelve, 1-pint cups. The harvesting operation will require four to six workers per acre over the 4- to 6-week harvest season. These workers should be paid based on the number of pints harvested by each worker daily.

The production costs for a pick-your-own operation are shown in Table 9. The costs for contract piecework, market preparation and shipping, and market flats have been deleted because they do not apply to a pick-your-own operation. The pick-your-own operator will have greater expenses for advertising the promotion than the fresh-market grower. The pick-your-own operator will also need scales if selling the berries by weight rather than by volume. The power and labor requirements during the productive years are the same for both the fresh market and pick-your-own operations.

**Table 9. Estimated production costs per acre after establishment and development for rabbiteye blueberries in Texas.**

Item	Unit Cost	Quantity	Fresh Market	Pick-Your-Own
Fertilizer (8-8-8)	\$ 6.00/cwt.	6.05	36.30	36.30
Mulching				
Mulch	3.00/bale	75.00	225.00	225.00
Machine	23.15/hour	.75	17.36	17.36
Labor				
Hand Hoe	4.00/hour	8.00		
Pruning	4.00/hour	20.00		
Mulching	4.00/hour	3.00	124.00	124.00
Irrigation	3.00/irrigation	26.00	78.00	78.00
Contract Piecework*	.20/pint	15,000	3,000.00	
Market Preparation and Shipping*	.20/pint	15,000	3,000.00	
Market Flats*	1.25/each	1,250	1,562.50	
Marketing				
Advertising, and so forth				450.00
Miscellaneous*			200.00	200.00
Interest on Operating Capital		.16	6.60 <sup>1</sup>	90.00 <sup>1</sup>
<b>Total Production Costs</b>			<b>8,903.16</b>	<b>1,220.66</b>

\* These production costs are required for fresh market production only.

\*\*These costs are for beehives, telephone, transportation, and so forth.

<sup>1</sup>Interest on operating capital of \$8,243.16 for fresh market and \$1,130.66 for pick-your-own marketing for 6 months at 16 percent interest.



## Recapturing Establishment and Development Costs

The decision to invest money in a blueberry orchard and defer a positive cash flow until the fifth year should be considered a cost. You have the option of investing the money elsewhere and receiving income over the entire 4-year establishment and development period. The lost income over a 5-year period should be recaptured after the orchard reaches full production the fifth year. Table 10 shows the total production costs during 5 years for a fresh-market and pick-your-own operation. This table also shows the establishment and development costs to be recaptured each year. These costs are then compounded into the future at 16 percent. Normally the grower will have to wait 5 years to begin recapturing these costs because the fruit buds on the bushes should be removed to encourage only vegetative growth the first 2 years after establishment. Production will be limited the third and fourth years after planting.

Table 10 also includes the cost of the establishment and development expenditures in terms of the fifth year. These values assume that the expenditure is made in year one and the grower will begin to recover principal plus interest in year five.

For break-even analysis purposes, the loan is assumed to be financed for 5 years (beginning in year 5) at 16 percent interest. This repayment schedule would require a \$5,580 annual payment for fresh market and \$3,234 annual payment for pick-your-own marketing.

## Capital Expenditures

The capital expenditures necessary for a 40-acre blueberry operation are presented in Table 11. These expenditures include a building for storage of all equipment and supplies used during production. A packager will be necessary to place a cellophane wrapper over each pint of fresh market berries before refrigeration. Refrigeration after harvest preserves berry freshness and prevents diseases. However, you will not need the refrigerator and packager until full production begins in the fifth year.

A plow and disk harrow can be rented the first year. A sprayer is not necessary because rabbiteye blueberries are resistant to insects and diseases and a regular spray program is not required.

Table 11 shows total capital expenditures for fresh market operations of \$76,590 and \$43,590 for pick-your-own marketing. However, for financial analysis, these expenditures are calculated for an annual fixed cost of \$671 per acre for fresh market production and \$465 per acre for pick-your-own operations.

## Potential Net Returns

The total cost for producing both fresh market and pick-your-own blueberries after the 5-year establishment and development cost are in Table 12. This analysis assumes that these development and establishment costs are financed beginning in year 6 for 5 years at 16 percent interest. This financing plan requires the annual payment of \$5,580 for fresh market and \$3,234 for a pick-your-own operation. This recapture of investment is added to variable production costs (see Table 9) and fixed cost from Table 11.

The potential net return per acre at varying yields and price levels for fresh market is given in Table 13. The total costs per acre are given in the left hand column and vary  $\pm$  \$545 per 1,000 units of production to account for changes in the variable costs. The variable costs that change directly with production levels are for contract piece-work, market preparation and shipping, market flats and interest on operating capital. The total cost per acre includes the recapture of establishment and development costs the first 5 years of full production and also includes the land payment. Potential returns are expected to be greater after year 10 when all establishment and development costs have been recaptured. Returns are expected to increase again after year 15 when the final land payment is made. Consider Table 13 as a worst case since no tax advantages of capital investments are included. Even with these worst case calculations, realistic

**Table 10. Total capital investment per acre for establishment and development of rabbiteye blueberries in Texas (years 1 through 5).**

Investment	Fresh Market		Pick-Your-Own	
	Actual Cost	Year 5 Cost*	Actual Cost	Year 5 Cost*
Establishment - Year 1	\$3,826.00	\$6,930.00	\$3,826.00	\$6,930.00
Development - Year 1	414.00	751.00	414.00	751.00
Development - Year 2	414.00	647.00	414.00	647.00
Development - Year 3	414.00	558.00	414.00	558.00
Development - Year 4	414.00	480.00	414.00	480.00
Production - Year 5	8,903.00	8,903.00	1,221.00	1,221.00
Total		18,269.00		10,587.00

\*This cost assumes the initial cost is financed through year 5 with no interest payments. (Factors used are 1.81, 1.56, 1.35 and 1.16).



**Table 11. Capital expenditures for rabbiteye blueberry production in Texas (40 acres).**

Wood Frame Storage Building (20' x 40')		\$ 9,600.00
Power Unit for Pump		5,000.00
Pump (600 GPM) and Set		5,000.00
Well Drilling and Casing (6" x 200')		2,000.00
40-HP Tractor with Fork Lift Attachment		12,000.00
Mulcher - 5 ton/hr. Capacity		7,990.00
Fuel Tank (1-500 gal. tank w/frame)		500.00
Refrigerator - 10 tons at \$1500/ton (includes bldg.)		15,000.00
Packager (28 packages/min.)		18,000.00
Trailer		1,000.00
Hand Tools		500.00
<b>Total Fresh Market Capital Expenditures</b>		<b>\$76,590.00</b>
<b>Total Pick-Your-Own Capital Expenditures</b>		<b>43,590.00</b>
	<b>Fresh Market</b>	<b>Pick-Your-Own</b>
Depreciation, housing, insurance, taxes on capital purchases @ approximately 17%	13,020.30	7,410.30
Interest on investment - 16% of average investment (capital expenses ÷ 2)	6,127.20	3,487.20
Land payment - \$1,500/acre amortized over 15 years at 12% interest	7,708.00	7,708.00
Total fixed costs per acre		
$\left( \frac{13,020.30 + 6,127.20 + 7,708.00}{40 \text{ acres}} \right)$	671.39	465.14

**Table 12. Total cost for producing rabbiteye blueberries for years 5 through 10.**

	<b>Fresh Market</b>	<b>Pick-Your-Own</b>
Recapture of Establishment and Development Costs, Years 1-5	5,580.00	3,234.00
Variable Production Costs	8,903.00	1,221.00
Fixed Costs	671.00	465.00
	<u>15,154.00</u>	<u>4,920.00</u>

Again potential returns are expected to be higher after year 10 when all establishment and development costs have been recaptured, and returns are expected to increase again after year 15 when the final land payment is made. In Tables 13 and 14 the greater potential for net returns per acre is with the pick-your-own operation but the grower must also consider the future for large pick-your-own operations and the trend among agricultural lenders to favor more extensive marketing proposals available to a fresh market operation when making farm loans.

**Table 13. Potential net returns per acre for fresh market rabbiteye blueberry production in Texas at various yields and price levels.**

<b>Total Cost /Acre</b>	<b>Pints /Acre</b>	<b>Price/Pint</b>			
		<b>\$.80</b>	<b>\$.90</b>	<b>\$1.00</b>	<b>\$1.10</b>
\$14,064	13,000	-3664	-2364	-1064	236
14,609	14,000	-3409	-2009	-609	791
15,154	15,000	-3154	-1654	-154	1346
15,699	16,000	-2899	-1299	301	1901
16,244	17,000	-2644	-944	756	2456
16,789	18,000	-2389	-589	1211	3011
17,334	19,000	-2134	-234	1666	3566
17,879	20,000	-1879	121	2121	4121

production level/price expectations result in positive returns.

The potential net returns at varying yields and price levels for a pick-your-own operation are in Table 14. The total costs per acre are listed in the lefthand column and do not change at varying levels of production because the grower does not incur the costs for contact piecework, market preparation for shipping, and market flats. The total cost per acre includes the recapture of establishment and development costs over the first 5 years of full production and also includes the land payment.

**Table 14. Potential net returns per acre for pick-your-own rabbiteye blueberry production at varying yields and price levels.**

Total Cost /Acre	Pints /Acre	Price/Pint			
		\$ .40	\$ .50	\$ .60	\$ .70
\$4,920	13,000	280	1580	2880	4180
4,920	14,000	680	2080	3480	4880
4,920	15,000	1080	2580	4080	5580
4,920	16,000	1480	3080	4680	6280
4,920	17,000	1880	3580	5280	6980
4,920	18,000	2280	4080	5880	7680
4,920	19,000	2680	4580	6480	8380
4,920	20,000	3080	5080	7080	9080

### **Business Organization**

The financial analysis presented earlier indicates the importance of the blueberry producer's business organization.

Businesses that require large amounts of startup capital and do not generate returns for several years can afford tremendous tax advantages depending upon the organizational structure. Consider personal liability, potential for sufficient capital formation and tax implications when selecting an organizational structure for your business. Consider cooperatives, regular corporations, subchapter S corporations, partnerships and sole ownership as potential forms of business organization. Contact a county Extension agent for more information about alternative business organizations.

Rabbiteye blueberry production appears profitable for east Texas producers. Careful attention to soil types, chilling hours and organizational structure of the blueberry business are essential. In addition, potential producers of rabbiteye blueberries must evaluate the labor supply available and alternate methods of marketing the product. The initial investment is made 5 years before realizing production and profits. Nonownership of land requires the prospective grower to negotiate long-term land rental agreements to assure recouping investment capital.

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