Production & Marketing Reports

Estimated Costs of Producing, Harvesting, and Marketing Blackberries in the Southeastern United States

Charles D. Safley[1], Otilia Boldea[2], and Gina E. Fernandez[3]

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Summary. **This study identified the costs associated with growing, harvesting, and marketing blackberries (*Rubus* subgenus *Rubus*) and estimated the revenues and breakeven yields for various combinations of pick-your-own (PYO) and wholesale blackberry prices. The total cost of producing, harvesting, and marketing the blackberries was estimated to be $15,514/acre if the marketable yield was 10,000 lb/acre in the second year of production, and $19,561/acre if the yield was 12,500 lb/acre. Labor was the greatest expense category after the planting started producing fruit, totaling $13,739/acre, or 70% of the total costs, when full production was reached in the third year. Net revenues for varying combinations of PYO and wholesale market prices and yields were estimated, assuming that half of the marketable fruit would be sold at a PYO operation and the remaining half sold to wholesale markets. This analysis showed that if growers received $1.25 and $2.50/lb for PYO and wholesale fruit, respectively, they would have to sell a minimum of 10,066 lb/acre to cover the estimated costs for the third through the ninth years. A return to land and management of $3876/acre would be realized if growers received $1.25/lb for PYO and $2.50/lb wholesale with yields of 12,500 lb/acre. Profitability analysis reveals that blackberry production using recommended practices can be a profitable venture. The annual net cash flow is positive after the planting is established and enough revenues are projected to be generated to cover start-up expenses in the fifth year.**

Blackberry production is on the rise in the southeastern United States due to the consumer-driven demand for this high-value crop and to the recent release of cultivars with superior fruit quality. Although the total number of acres of this high-value crop in North Carolina (NC) is small relative to other horticultural crops, there was a 60% increase in total acreage between 1997 and 2002 (78 acres in 1997 and 125 acres in 2002) and a 27% increase in the number of farms growing blackberries (102 farms in 1997 and 130 farms in 2002) (C. Hayes, personal communication). Other states in the region have experienced significant growth as well. This is corroborated by the University of Arkansas blackberry breeding program, the origin of most of the cultivars currently grown in the region. The royalty income from sales of their cultivars increased 320% from 1990 to 2000 (J.R. Clark, personal communication). Furthermore, based on conversations and visits with new growers, the total acreage is likely to increase within the next few years. Current and potential blackberry growers not only need production information but also financial information to make informed decisions about entering, leaving, or expanding existing farming operations. Like all businesses, the primary objective of growing blackberries should be to make a profit.

Budgets for producing blackberries are available (Ernst et al., 2001; Perry et al., 2002; Pritts and Handley, 1989). However, these budgets were developed for different climates, cultivars, and production systems. In addition, our budget includes a breakeven analysis, which allows growers to determine price and yield necessary to recoup their costs, while the budget by Ernst et al. (2001) does not. Therefore, the purpose of this publication is to provide information about the costs and returns of growing, harvesting, and marketing blackberries for the southeastern U.S. The data are intended to serve as guides to assist individuals entering the blackberry industry and help those who are currently growing blackberries to make more informed management decisions.

The specific objectives of this study were to: 1) estimate the typical costs associated with growing, harvesting, and marketing blackberries, 2) evaluate the effect of varying price and productivity (yield), and 3) evaluate the profitability of establishing a blackberry planting.

[1]Professor, Department of Agricultural and Resource Economics, North Carolina State University, Raleigh, NC 27695-8109.

[2]Graduate Research Assistant, Department of Agricultural and Resource Economics, North Carolina State University, Raleigh, NC 27695-8109.

[3]Associate Professor, Department of Horticultural Science, North Carolina State University, Raleigh NC 27695-7609.

Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.4047	acre(s)	ha	2.4711
0.3048	ft	m	3.2808
0.7457	horsepower	$kJ \cdot s^{-1}$	1.3410
0.4536	lb	kg	2.2046
1.1209	lb/acre	$kg \cdot ha^{-1}$	0.8922
0.9072	ton(s)	t	1.1023

Materials and methods

PROCEDURE AND ASSUMPTIONS. A complete cost model was developed for a 1-acre blackberry planting, using Microsoft Excel (Microsoft Corp., Redmond, Wash.), to address the objectives of this study. Production practices were based on typical management procedures recommended by production specialists and farmers who are currently operating commercial blackberry operations. The monthly production sequence; the equipment, material, and labor input requirements needed to complete each operation; and the estimated costs per acre were developed for a representative farm in the southeastern U.S.

The estimated hours of labor required for each of the operations that involves machinery and equipment were increased by a factor of 1.2 to account for the time needed for setup, adjustment, and to move the equipment to the blackberry field (Edwards, 2001). Hired employees were paid $8.25/h while the owner/operator was compensated at a rate of $16.39/h and are meant to be representative of the "true" costs of labor and not just the base wage rate. These labor rates include a base wage rate of $7.75/h and $13.00/h for the hired employees and owner/operator, respectively, plus the required payroll expenses (e.g., workers' compensation, unemployment, and FICA taxes, and other overhead expenses). The average wage rate for farm labor hired to perform field work in the southeastern U.S. was $7.75/h from Jan. to Oct. 2003 (North Carolina Department of Agriculture and Consumer Services, 2003) and it was assumed that the owner/operator could earn at least $13.00/h at his/her "next best" employment opportunity.

For purposes of this study, it was assumed that all the machinery and equipment were purchased new at 2003 purchase prices. The machinery and equipment used in this budget reflect machinery components that can be used for other farming enterprises in addition to growing blackberries on a typical diversified farm. Therefore, the hours of annual use and the resulting costs per hour reflect the equipment costs for a total farm business and not just for blackberry production. The exceptions to this are the fumigation and irrigation equipment, which was used solely for blackberry production and the refrigeration equipment, which is needed to maintain fruit quality during storage and transportation to the wholesale market.

The prices of the materials used to produce blackberries were obtained from local dealers who regularly supply North Carolina blackberry growers. Prices for the blackberry plants were obtained from a nursery in the southeastern U.S. that has certified virus-indexed plant material. It was also assumed that two cultivars were planted to extend the harvest season to 6 to 8 weeks. Materials for insect, disease, and weed control were based on recommendations in the 2005 North Carolina Agricultural Chemicals Manual (North Carolina State University, 2005), although specific chemicals are not listed in this budget by name. Fumigation and black plastic were an integral part of the weed control program, so it was assumed that their use minimized the weed population. However, a herbicide program was also developed to help control the weed population. Fertilization followed recommended rates; however, the fertilizer was delivered via a drip irrigation system from March through May. A detailed list of supplies for the trellis used in this budget (Stiles shift trellis) can be found elsewhere (Stiles, 1999).

Since every commodity should contribute to the financial success of a farm, a fee was charged to the blackberry enterprise for the overall farm overhead expenses and operating capital. Because land values vary throughout the region a land charge was not included in this budget. However, growers should include a land charge that is representative of current land values in their region. Owners should also charge a management fee to the enterprise to account for their managerial ability in supervising the overall operation.

The harvest season was assumed to last 6 weeks during May and June and ended in July with clean-up operations. It is important to understand that the marketing process bears a cost and that this marketing cost will vary considerably depending on the marketing system that producers decide to use. For growers who market their fruit through direct market operations, the out-of-pocket cost might be relatively little compared to the costs incurred when selling blackberries through conventional wholesale market channels. In this study it was assumed that half of the fruit would be sold at the farm through a PYO operation and half would be sold through wholesale marketing channels. It was also assumed that the owner/operator supervised the overall harvest operations. Supervisory tasks included helping PYO customers, monitoring the PYO checkout operations, overseeing the hired pickers, directing the postharvest handling of the fruit destined for the wholesale market as well as the general management of the blackberry operation. If the individual who must be available to accomplish these tasks has an alternative use for his or her labor, the foregone income from this alternative is a valid cost and the labor costs for supervision should be adjusted accordingly.

Results and discussion

Capital investment for the machinery and equipment for the establishment and operation of the blackberry planting were estimated to be $63,650, $18,956, and $10,225 for the preparatory, first, and second years, respectively (Table 1). Purchase of most of the equipment for land preparation and planting occur in the preparation year and the first year of production. The fruit scales and the refrigeration equipment needed to store and transport the berries can be delayed until the first harvest in the second year of production. The portable forced-air cooling unit (FACU) was assumed to be constructed in accordance with the cooling unit designed at North Carolina State University (Boyette, 1995). The FACU was designed to fit in a standard-size pickup truck and is used to keep the berries cool as the fruit is being transported to the wholesale market.

The expected yield pattern over the 10-year life of the blackberry planting assumed no adverse weather, production setbacks, or marketing difficulties starting in year 0 (preparation year) as illustrated in Table 2. The initial yield in the second year was 10,000 lb/acre, with production peaking at 12,500 lb/acre in the third through ninth years and dropping to 10,000 lb/acre in the last year of harvest.

The costs of preparing the land for planting, establishing the blackberry planting, and growing, harvesting and marketing blackberries are listed

Table 1. Estimated purchase prices and annual hours of use for the machinery and equipment needed to establish and maintain a blackberry planting over the life of the planting on a farm in the southeastern U.S. with a 50% pick-your-own (PYO) and 50% wholesale marketing operation.

Production year in which the item was purchased	Equipment or machinery item purchased	Estimated annual usage (h)	Estimated purchase price ($)
Preparation year	Tractor, 60 horsepower[z]	500	25,300
	Pickup truck, 1/2 ton[y]	650	25,000
	Boom sprayer	100	750
	Chisel plow, 7 ft[x]	125	3,000
	Disk, 9 ft, two row	125	5,000
	Rotary mower, 7 ft	150	2,600
	Irrigation well	150	2,000
	Total preparation year	---	**$63,650**
1	Plastic layer/fumigator	10	7,000
	Soil auger	6	425
	Drip irrigation system and pump	40	6,031
	Fertilizer injector	40	400
	Utility trailer	100	2,000
	PTO[w] blast sprayer	125	3,100
	Total first year	---	**$18,956**
2	Fruit scale for PYO operation	2	225
	Utility refrigerators (2)	3,672	5,000
	Portable FACUs[v] (2)	3,672	5,000
	Total second year	---	**$10,225**

[z]1 horsepower = 0.7457 kJ·s^{-1}.
[y]1 ton = 0.9072 t.
[x]1 ft = 0.3048 m.
[w]PTO = power take-off.
[v]FACU = forced-air cooling unit.

Table 2. Projected annual blackberry yields for an 11-year production period on a farm in the southeastern U.S.

Production year	Projected annual yield (lb/acre[z])
0[y]	0
1	0
2	10,000
3	12,500
4	12,500
5	12,500
6	12,500
7	12,500
8	12,500
9	12,500
10	10,000

[z]1.0 lb/acre = 1.1209 kg·ha^{-1}.
[y]Year 0 = preparation year.

Table 3. Estimated costs per acre needed to produce, harvest and market blackberries for a 50% pick-your-own (PYO) and 50% wholesale marketing operation on a farm in the southeastern U.S.

Operation	Equipment costs	Material costs	Labor costs	Total costs
	($/acre)[z]			
Year 0 (preparation year)				
Attend grower meetings	0.00	150.00	198.00	348.00
Internet service	0.00	45.00	0.00	45.00
Collect soil sample	6.17	0.00	4.13	10.30
Nematode assay	0.00	2.00	4.13	6.13
Remove noxious weeds from field perimeter	0.00	0.00	198.00	198.00
Apply herbicide to field	5.57	12.00	4.13	21.70
Plow field	18.12	0.00	10.89	29.01
Disk field	9.71	0.00	5.45	15.16
Order materials and plant cover crop	3.86	14.00	3.47	21.33
Apply nutrients (including lime)	5.18	48.50	3.47	57.15
Mow row alleys	7.60	0.00	4.95	12.55
Mow cover crop	19.00	0.00	12.38	31.38
Order plants (1090 plants)	0.00	3,815.00	4.10	3,819.10
Order and store trellis supplies	0.00	5,022.25	163.90	5,186.15
Pickup truck (miscellaneous use)	29.21	0.00	19.80	49.01
Land charge	0.00	0.00	0.00	0.00
Management charge	0.00	0.00	0.00	0.00
Contribution to farm overhead	0.00	15.00	0.00	15.00
Contribution to farm operating capital	0.00	85.56	0.00	85.56
Miscellaneous	0.00	20.00	0.00	20.00
Total costs for preparation year	$104.42	$9,229.31	$636.80	$9,970.53
Year 1 (establishment year)				
Attend grower meetings	0.00	150.00	198.00	348.00
Internet service	0.00	60.00	0.00	60.00
Mark row with flags	0.00	10.20	41.25	51.45

Table 3 continued on next page.

Table 3. Continued from previous page.

Operation	Equipment costs	Material costs	Labor costs	Total costs
	---------- ($/acre)[z] ----------			
Fumigate strips (4356 ft linear)[y]	316.90	0.00	19.80	336.70
Fumigant	33.10	125.00	29.70	187.80
Plastic film	0.00	144.00	0.00	144.00
Drip tape	0.00	125.00	0.00	125.00
Mark post locations	0.00	0.00	41.25	41.25
Auger post holes	129.22	0.00	49.50	178.72
Build trellis	0.00	0.00	825.00	825.00
Plant blackberry plants	0.00	0.00	264.00	264.00
Set up irrigation system	25.71	0.00	82.50	108.21
Irrigate and fertilize	68.28	5.58	34.65	108.51
Order and replant 100 plants	0.00	350.00	57.75	407.75
Order pruning equipment	0.00	0.00	32.78	32.78
Prune and train canes	9.04	0.00	74.25	83.29
Mow row alleys	96.28	0.00	62.70	158.98
Hand hoe	0.00	33.00	0.00	33.00
Root rot spray	5.57	14.00	4.13	23.70
Apply herbicide	5.57	7.04	4.13	16.74
Pickup truck (miscellaneous use)	73.02	0.00	49.50	122.52
Land fee charge	0.00	0.00	0.00	0.00
Management charge	0.00	0.00	0.00	0.00
Contribution to farm overhead	0.00	22.50	0.00	22.50
Contribution to farm operating capital	0.00	89.31	0.00	89.31
Interest on investment	0.00	165.64	0.00	165.64
Miscellaneous	0.00	30.00	0.00	30.00
Total costs for year 1	$762.69	$1,331.27	$1,870.89	$3,964.85
	Year 2 [first harvest (10,000 lb/acre)[w]]			
Attend grower meetings	0.00	150.00	198.00	348.00
Internet service	0.00	60.00	0.00	60.00
Order harvest supplies	0.00	0.00	32.78	32.78
Order fruit scale	0.00	0.00	4.10	4.10
Dormant spray (lime sulfur)	6.77	26.00	4.13	36.90
Root rot spray	11.14	141.50	37.13	189.77
Set up irrigation system	0.67	0.00	165.00	165.67
Irrigate and fertilize	67.65	5.91	162.53	236.09
Apply herbicide	11.14	14.08	8.25	33.47
Prebloom spray	6.77	21.62	4.13	32.52
Position trellis (2X)	0.00	0.00	49.50	49.50
Beehive rental (two hives for 3 months)	0.00	210.00	0.00	210.00
Bloom/postbloom sprays	6.77	34.11	4.13	45.01
Bird deterrent management	0.00	0.00	12.38	12.38
Harvest preparation	0.00	0.00	14.35	14.35
PYO harvest	0.00	625.00	629.01	1,254.01
Wholesale blackberries				
1. Harvest costs	35.55	1,254.17	6,841.63	8,131.35
2. Refrigeration costs	639.35	0.00	0.00	639.35
3. Transportation costs	642.57	0.00	1,081.74	1,724.31
Harvest cleanup	0.00	0.00	71.74	71.74
Mow alleys	253.36	0.00	165.00	418.36
Prune and train canes	38.42	0.00	346.50	384.92
Harvest/postharvest sprays	33.84	31.28	20.63	85.75
Leaf-tissue analysis	0.00	4.00	0.00	4.00
Remove canes	9.04	0.00	66.00	75.04
Repair trellis	0.00	0.00	165.00	165.00
Pickup truck,	73.03	0.00	49.50	122.52
Land charge	0.00	0.00	0.00	0.00
Management charge	0.00	0.00	0.00	0.00
Contribution to farm overhead	0.00	30.00	0.00	30.00

Table 3 continued on next page.

Table 3. Continued from previous page.

Operation	Equipment costs	Material costs	Labor costs	Total costs
	---------- ($/acre)[z] ----------			
Contribution to farm operating capital	0.00	61.29	0.00	61.29
Interest on investment	0.00	836.04	0.00	836.04
Miscellaneous	0.00	40.00	0.00	40.00
Total costs for year 2	$1,836.07	$3,545.00	$10,133.16	$15,514.23
	Year 3 [full production (12,500 lb/acre)[w]]			
Attend grower meetings	0.00	150.00	198.00	348.00
Internet service	0.00	60.00	0.00	60.00
Order harvest supplies	0.00	0.00	32.78	32.78
Dormant spray	6.77	26.00	4.13	36.90
Root rot spray	11.14	141.50	37.13	189.77
Set up irrigation system	0.67	0.00	165.00	165.67
Irrigate and apply fertilizer	58.79	8.52	158.81	226.13
Apply herbicide	11.14	14.07	8.25	33.46
Prebloom spray	6.77	21.62	4.13	32.52
Position trellis (2X)	0.00	0.00	49.50	49.50
Beehive rental (two hives for 3 months)	0.00	140.00	0.00	140.00
Bloom/postbloom spray	6.77	35.97	4.13	46.87
Bird deterrent management	0.00	0.00	12.38	12.38
Harvest preparation	0.00	0.00	16.50	16.50
PYO harvest	0.00	781.25	738.21	1,519.46
Wholesale blackberries				
1. Harvest costs	35.55	1,567.71	10,244.52	11,847.78
2. Refrigeration costs	639.35	0.00	0.00	639.35
3. Transportation costs	700.98	0.00	1,180.08	1,881.06
Harvest cleanup	0.00	0.00	82.50	82.50
Mow alleys	253.36	0.00	165.00	418.36
Prune and train canes	38.42	0.00	346.50	384.92
Harvest/postharvest sprays	33.84	31.28	20.63	85.75
Leaf-tissue analysis	0.00	4.00	0.00	4.00
Remove canes	9.04	0.00	66.00	75.04
Repair trellis	0.00	0.00	165.00	165.00
Pickup truck (miscellaneous use)	58.42	0.00	39.60	98.02
Land charge	0.00	0.00	0.00	0.00
Management charge	0.00	0.00	0.00	0.00
Contribution to farm overhead	0.00	30.00	0.00	30.00
Contribution to farm operating capital	0.00	63.29	0.00	63.29
Interest on investment	0.00	836.04	0.00	836.04
Miscellaneous	0.00	40.00	0.00	40.00
Total costs year 3	$1,871.01	$3,951.25	$13,738.78	$19,561.04
	Year 4			
Total costs year 4	$1,871.01	$3,951.25	$13,738.78	$19,561.04
	Year 5			
Total costs year 5	$1,871.01	$3,951.25	$13,738.78	$19,561.04
	Year 6			
Total costs year 6	$1,871.01	$3,951.25	$13,738.78	$19,561.04
	Year 7			
Total costs year 7	$1,871.01	$3,951.25	$13,738.78	$19,561.04
	Year 8			
Total costs year 8	$1,871.01	$3,951.25	$13,738.78	$19,561.04
	Year 9			
Total costs year 9	$1,871.01	$3,951.25	$13,738.78	$19,561.04
	Year 10			
Total costs year 10	$1,836.07	$3,544.99	$10,133.16	$15,514.23
Total estimated costs	$17,636.32	$45,309.32	$118,945.47	$181,891.11

[z]$1.00/acre = $2.4711/ha.
[y]1 ft = 0.3048 m.
[w]1.0 lb/acre = 1.1209 kg·ha^{-1}.

in Table 3. Assembling the plants and supplies and preparing the land for planting during the preparation year was estimated to cost $9970/acre while establishing the planting in the first production year cost $3965/acre.

The total cost of producing, harvesting, and marketing the blackberries was estimated to be $15,514/acre if the marketable yield was 10,000 lb/acre and $19,561/acre if the yield was 12,500 lb/acre. Not surprisingly, the cost of the materials accounted for the largest percentage of the total costs during the preparation year, comprising 92% of the total costs. However, labor was the most expensive cost category in the establishment year and after the planting started producing fruit. Labor expenses totaled $1870/acre, or 47% of the total costs in the establishment year; $10,133/acre, or 65% of the total costs, when the marketable yield was 10,000 lb/acre; and $13,739/acre, or 70% of the total costs, when the marketable yield was 12,500 lb/acre. Overall the cost of owning and operating the machinery and equipment accounted for 9.7% of the total costs during the 10-year life of the blackberry planting, while the materials expense represented 24.9% of the total and labor expenses made up 65.4% of the total costs.

MONTHLY EXPENSES. The estimated monthly expenses for the major cost categories were included to give growers an idea of the potential annual cash flow obligations (Table 4). Growers should estimate these monthly cash flow requirements before planting blackberries to ensure that they know how much money must be available to meet their financial obligations. In addition, a lending agency may require the grower to provide information to determine the appropriate repayment schedule if the grower has to secure a financial loan.

Over 88% of the total estimated cost in the preparation year was spent in December to purchase the blackberry plants and the trellis supplies. Constructing the trellis and planting the blackberry plants in March and April accounted for 30.0% and 38.7%, respectively, of the total cost per acre in the first year. The costs associated with harvesting and marketing blackberries were the most expensive cost categories when the planting started producing fruit. When the marketable yield was projected to be 10,000 lb/acre in the second year and last year of production, the costs were estimated to be $5459 in May and $5290 in June, which was 35.2% and 34.1%, respectively, of the total annual costs. In the third through the ninth years, the projected expense in May was $7205, or 36.8% of the total annual costs, and $7132 in June, or 36.5% of the total. In addition, labor expenditures accounted for over 82% of the monthly harvesting and marketing costs when the blackberry planting yielded 10,000 lb/acre of berries and over 87% of the total expenses when 12,500 lb of marketable fruit was harvested per acre.

MONTHLY LABOR ESTIMATES. Since blackberries are a labor-intensive enterprise, the annual labor estimates are presented in Table 5 to give potential growers an idea of the amount of labor that will be required each month to maintain, harvest and market this crop. It is not surprising that the required person-hours of labor increase each year until the blackberry planting reaches full production in the third year and then decreases as the marketable yield declines. May is the most labor-intensive month during the preparation year as the field is prepared for planting. During the establishment year, or first year of production, March and April require the vast majority of the labor when the trellis is being constructed and the blackberry plants are being planted. May and June are the most labor-intensive months when the blackberries are being harvested and marketed. A total of 981.6 person-hours, or 87.6% of the total annual labor, are estimated to be needed in these months during the second year; and 1265.2 person-hours, or 90.2% of the annual total, are required during the third through ninth years of production. However, if the assumption of selling half the crop to wholesale markets is changed, the amount of labor that is needed will depend on the percentage of fruit that is sold to the direct and wholesale markets.

RETURNS TO LAND AND MANAGEMENT. The net returns to land and management will depend on the marketable yield and the price growers receive for their blackberries. As in most farming operations, growers do have a tremendous influence on their crop yields. The more they know about their crop and the better job they do in caring for the crop, the more likely they will have higher yields of high- quality fruit. However, local markets will determine the maximum price for which growers can sell their berries. Since prices and yields can vary significantly from one location to another, the projected net returns shown in Table 6 were calculated for various combinations of prices and marketable yields.

Gross revenues were calculated assuming that farmers will try to sell as much fruit as possible. The blackberry prices and projected yields were obtained from the blackberry growers who reviewed this enterprise budget. PYO prices ranged from a low of $1.15/lb to a high of $1.35/lb while the lowest wholesale price was $2.00/lb and the highest price was $3.00/lb. Yield estimates ranged from a low of 8500 lb/acre to a high of 16,500 lb/acre during the planting's peak production period in the third through the 10th years. Total expenses per acre were adjusted to account for varying the yields.

If the marketable yield was 8500 lb/acre, growers would not receive a positive return unless the PYO price was $1.35/lb and the wholesale price was $3.00/lb. Similarly, if the yield was 10,500 lb/acre, the PYO price had to be at least $1.25/lb and the wholesale price had to be $2.50/lb to achieve a positive return. Positive returns to land and management were projected for all other combinations of prices and yields used in this study.

This analysis also revealed that growers would not achieve a positive net return if they received a price combination of $1.15/lb for their PYO berries and $2.00/lb for the wholesale berries unless the marketable yield was almost 12,500 lb/acre (Table 6). In fact, the breakeven yield for this price combination was 12,402 lb/acre (Table 7). If the PYO price was $1.25/lb and the wholesale price was $2.50/lb, the breakeven yield was 10,066 lb/acre, while the price combination of $1.35/lb at the PYO operation and $3.00/lb at the wholesale market resulted in a breakeven yield of 8470.5 lb/acre.

BLACKBERRY PROFITABILITY. When judging the profitability of an enterprise, it is important to see not only how many dollars the enterprise yields, but also when the dollars come in and the returns are available for other enterprises. There are two principles to consider. First, the sooner a dollar of revenue comes in, the sooner it can be used to earn more revenue.

Table 4. Estimated monthly and annual equipment, material, labor, and total cost of producing, harvesting, and marketing blackberries for a 50% pick-your-own and 50% wholesale marketing operation on a farm in the southeastern U.S.[z]

Year and month the costs are incurred	Estimated equipment costs	Estimated material costs	Estimated labor costs	Estimated total costs	Monthly percentage of total costs
	($/acre)[y]				(%)
			Preparation year		
January	0.00	0.00	0.00	0.00	0.00
February	0.00	150.00	198.00	348.00	3.49
March	0.00	0.00	0.00	0.00	0.00
April	6.17	7.00	8.26	21.43	0.21
May	50.04	79.50	230.38	359.92	3.61
June	4.75	5.00	3.09	12.84	0.13
July	4.75	5.00	3.09	12.84	0.13
August	4.75	5.00	3.09	12.84	0.13
September	4.75	5.00	3.09	12.84	0.13
October	0.00	5.00	0.00	5.00	0.05
November	0.00	5.00	0.00	5.00	0.05
December	0.00	8,842.25	168.00	9,010.25	90.37
Annual charges	29.21	120.56	19.80	169.57	1.70
Total preparation year	$104.42	$9,229.31	$636.80	$9,970.53	
			Year 1		
January	0.00	5.00	0.00	5.00	0.13
February	0.00	165.20	239.25	404.45	10.20
March	386.03	400.97	403.84	1,190.84	30.03
April	151.28	356.97	1,027.32	1,535.56	38.73
May	67.39	39.64	57.34	164.37	4.15
June	19.54	5.00	25.16	49.70	1.25
July	27.14	5.00	30.11	62.25	1.57
August	19.55	5.00	25.17	49.72	1.25
September	18.74	26.04	13.20	57.98	1.46
October	0.00	5.00	0.00	5.00	0.13
November	0.00	5.00	0.00	5.00	0.13
December	0.00	5.00	0.00	5.00	0.13
Annual charges	73.02	307.45	49.50	429.97	10.84
Total year 1	$762.69	$1,331.27	$1,870.89	$3,964.85	
			Year 2		
January	5.65	1,884.17	78.13	1,967.94	12.68
February	5.65	155.00	239.25	399.90	2.58
March	27.88	54.01	105.60	187.49	1.21
April	16.74	98.59	136.45	251.78	1.62
May	761.21	111.08	4,587.34	5,459.63	35.19
June	795.98	106.28	4,387.48	5,289.73	34.10
July	69.40	9.00	244.57	322.97	2.08
August	64.88	5.00	69.71	139.59	0.90
September	10.09	132.50	66.00	208.59	1.34
October	5.57	12.04	4.13	21.74	0.14
November	0.00	5.00	165.00	170.00	1.10
December	0.00	5.00	0.00	5.00	0.03
Annual charges	73.02	967.33	49.50	1,089.85	7.02
Total year 2	$1,836.07	$3,545.00	$10,133.16	$15,514.23	
			Years 3–9		
January	5.65	2,353.96	74.03	2,433.64	12.44
February	5.65	155.00	239.25	399.90	2.04
March	27.88	54.87	105.60	188.35	0.96
April	16.74	99.46	138.60	254.81	1.30
May	751.53	113.81	6,339.66	7,205.00	36.83
June	854.37	36.28	6,241.87	7,132.52	36.46
July	69.40	9.00	255.33	333.73	1.71
August	65.71	5.00	69.71	140.42	0.72
September	10.09	132.50	66.00	208.59	1.07
October	5.57	12.04	4.13	21.73	.011
November	0.00	5.00	165.00	170.00	0.87
December	0.00	5.00	0.00	5.00	0.03
Annual charges	58.42	969.33	39.60	1,067.35	5.46
Total years 3–9	$1,871.01	$3,951.25	$13,738.78	$19,561.04	

[z]Some values may not total due to rounding error.
[y]$1.00/acre = $2.4711/ha.

Table 5. Estimated monthly and annual labor required to grow, harvest, and market blackberries for a 50% pick-your-own and 50% wholesale marketing operation on a farm in the southeastern U.S.

Production year	Month	Estimated labor required (person-hours)
Preparation year	January	0.00
	February	24.00
	March	0.00
	April	1.00
	May	27.92
	June	0.38
	July	0.38
	August	0.38
	September	0.38
	October	0.00
	November	0.00
	December	10.25
	General activities	2.40
Total estimated annual labor for the preparation year		67.09
Year 1	January	0.00
	February	29.00
	March	48.95
	April	122.55
	May	6.95
	June	3.05
	July	3.65
	August	3.05
	September	1.60
	October	0.00
	November	0.00
	December	0.00
	General activities	6.00
Total estimated annual labor for year 1		224.80
Year 2	January	7.25
	February	29.00
	March	12.80
	April	16.54
	May	499.93
	June	481.62
	July	29.65
	August	8.45
	September	8.00
	October	0.50
	November	20.00
	December	0.00
	General activities	6.00
Total estimated annual labor for year 2		1,119.74
Years 3–9	January	7.00
	February	29.00
	March	12.80
	April	16.80
	May	638.80
	June	626.45
	July	30.95
	August	8.45
	September	8.00
	October	0.50
	November	20.00
	December	0.00
	General activities	4.80
Total estimated annual labor for years 3–9		1,403.55

Table 6. Estimated returns to land and management for varying pick-your-own and wholesale prices and marketable yields received by farmers from growing, harvesting, and marketing blackberries for a 50% pick-your-own and 50% wholesale marketing operation on a farm in the southeastern U.S.

Pick-your-own price ($/lb)[y]	Wholesale price ($/lb)	Marketable yields (lb/acre)[z]				
		8,500	10,500	12,500	14,500	16,500
		----Returns for the marketable yields ($/acre)[x]----				
1.15	2.00	–5,044	–2,459	126	2,712	5,297
1.20	2.25	–3,769	–884	2,001	4,887	7,772
1.25	2.50	–2,494	691	3,876	7,062	10,247
1.30	2.75	–1,219	2,266	5,751	9,237	12,722
1.35	3.00	56	3,841	7,626	11,412	15,197

[z]1 lb/acre = 1.1209 kg·ha^{-1}.
[y]$1.00/lb = $2.2046/kg.
[x]$1.00/acre = $2.4711/ha.

Table 7. The estimated breakeven yields per acre[z] that must be sold to cover production, harvesting and marketing costs for 1 acre (0.4 ha) of blackberries for various price combinations assuming a 50% pick-your-own and 50% wholesale marketing operation on a farm in the southeastern U.S.

Pick-your-own price ($/lb)[y]	Wholesale price ($/lb)	Breakeven yield for the respective price combination (lb/acre)[x]
1.15	2.00	12,402
1.20	2.25	11,112
1.25	2.50	10,066
1.30	2.75	9,199
1.35	3.00	8,470

[z]The breakeven yield was calculated by setting net returns equal to zero. Therefore the returns above the breakeven yield are the revenues available to cover the land and management fees as well as profit.
[y]$1.00/lb = $2.2046/kg.
[x]1.0 lb/acre = 1.1209 kg·ha^{-1}.

Secondly, for any two enterprises of equal risk, the one yielding the higher rate of return is usually preferable. We will look at the flow of funds in the blackberry business to show both profitability and cash position (solvency).

After subtracting expenses from revenues in each year, the flow-of-funds, or net cash flow, pattern emerges as it appears in Table 8. Farmers establishing new blackberry plantings will experience net outflows of cash during the first 2 years. The income stream becomes positive during the second year of production when fruit is harvested and increases slightly in the third year when the yield increases.

The net accumulated cash flow is also shown in Table 8. The fifth year is the year of payback, that is, the year in which growers finally get their investment back in terms of cash flow. The payback year or breakeven year is an important consideration in arranging financing because farmers must secure loans that cover the period in which the enterprise operates in a deficit cash position. Only during the breakeven year will enough revenues have been generated to cover start-up expenses.

The next step is to compare the net revenue stream with other opportunities. There are two ways to do this. The first way is to assume that farmers could invest their money elsewhere at a given interest rate, such as 6%, and compare the blackberry enterprise with this other investment. The interest rate selected for this analysis should represent the "best" low risk alternative, such as a long-term certificate of deposit, available for off-farm investments. For a single enterprise, the essence of the net present value (NPV) approach is that the project should be accepted if its NPV is greater than zero. This procedure uses

Table 8. Estimated annual yields, gross revenues, costs, net and accumulated cash flows for 1 acre (0.4 ha) of blackberries over an 11-year production period, starting with the establishment year and ending after nine seasons of fruit production, for a representative farm in the southeastern U.S. with a 50% pick-your-own and 50% wholesale marketing operation.[z]

Production year	Estimated annual yield	Estimated gross revenue	Estimated costs[x]	Net cash flow	Accumulated Net cash
	----------($/acre)[y]----------				
0[w]	0	0.00	9,970.53	–9,970.53	–9,970.53
1	0	0.00	3,964.85	–3,964.85	–13,935.38
2	10,000	18,750.00	15,514.23	3,235.77	–10,699.61
3	12,500	23,437.50	19,561.04	3,876.46	–6,823.15
4	12,500	23,437.50	19,561.04	3,876.46	–2,946.69
5	12,500	23,437.50	19,561.04	3,876.46	929.77
6	12,500	23,437.50	19,561.04	3,876.46	4,806.23
7	12,500	23,437.50	19,561.04	3,876.46	8,682.69
8	12,500	23,437.50	19,561.04	3,876.46	12,559.15
9	12,500	23,437.50	19,561.04	3,876.46	16,435.61
10	10,000	18,750.00	15,514.23	3,235.77	19,671.38

[z]The prices used to calculate the gross revenues were $1.25/lb ($2.7557/kg) for the pick-your-own blackberries and $2.50/lb ($5.5115/kg) for the berries sold at the wholesale market.
[y]$1.00/acre = $2.4711/ha.
[x]Estimated costs do not include a land charge or management fee.
[w]Year 0 = preparation year.

the discounting procedure to compare the value of a dollar at the time of the planting decision with a dollar received for blueberries at some future time. Discounting is based on the concept that a dollar received in the future is worth less than a dollar received today. For example, $1000 received 10 years from now is worth $558 received today at a 6% interest rate.

Today's cash equivalent value of applying land and management to blackberries for a 6% interest rate is $10,235. The figure is interpreted in just one way, but the interpretation can be phrased in several ways. At an interest rate of 6%, for example: 1) a new, 1-acre blackberry planting is worth $10,235 today; and 2) if a farmer was just about to establish a blackberry planting, someone would have to pay him $10,235 to bribe him to forget the plans. Under these assumptions, blackberry planting is a winning proposition.

The second method for financial comparison of the blackberry enterprise with other opportunities is to calculate the internal rate of return (IRR) on the total investment in blueberries and then compare this rate of return with the interest yields on other investments. In this analysis, blackberry production was compared to U.S. Treasury bonds, which are typically a 20-year low risk investment. The IRR to an investment in the blackberry enterprise was 18.4%. With dividends on U.S. Treasury bonds currently yielding around 4.25%, this return looks pretty good. Of course, potential growers should be cautious because revenues from blackberry production are more risky due to price fluctuations and weather conditions, but blackberry production looks profitable under the assumptions in this study.

Conclusions and recommendations

Profitability analysis revealed that blackberry production using the recommended practices can be a profitable venture. The total costs of producing, harvesting, and marketing an acre of blackberries were $19,561.04/acre when planting was in full production compared to a gross revenue of $23,437.50 (years 3–10). Therefore the estimated return to land and management for the same time period was $3,876.46/acre. Cash flow analysis demonstrated that the payback period can be achieved in the fifth year, while the NPV of the investment was estimated to be $10,235 and the IRR was 18.4%.

This budget is only a guide and is not a substitute for growers calculating their own costs and breakeven year. Costs can vary from one producer to another because of market conditions, labor supply, age and condition of the machinery and equipment, education, managerial skills, and many other factors. Since every grower's situation is different, each grower should estimate their individual production, marketing, and harvest costs based on their own production techniques, price expectations, and local market situation.

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