



### 3.1 ORCHARD BUSINESS RECORDS

**Jennie S. Popp**

*Dept. of Agricultural Economics & Agribusiness  
University of Arkansas  
Fayetteville, AR 72701*

**Claude L. Dorminey, Retired**

*Dept. of Agricultural & Applied Economics  
University of Georgia  
Tifton, GA 31793*

**B**usiness records are essential tools to facilitate informed decision making. There is no substitute for an orchard business accounting system designed to meet your management needs by answering questions about the business with the least effort.

To structure the accounting system, think about the questions to be answered. Some might be:

- (1) What was the net income from the orchard operation in the current year? How does it compare with previous years?
- (2) What is the orchard's debt-to-asset ratio and how has it changed from year to year?
- (3) What is the orchard's net worth?
- (4) What costs increased the most?
- (5) How did different varieties and blocks rank in profits or losses?
- (6) What were the itemized costs per unit of production by variety and block?
- (7) How did different varieties and blocks rank in yield, quality, and marketability?

These are examples of questions that a good record system can answer. Records to answer questions five, six, and seven are too often incomplete, undefined, or lacking. Definite answers to these key questions are critical to a successful orchard business. Production and financial

records should provide a detailed, block-to-block history of costs and returns.

Production records should help describe the size and scope of an operation. Parameters include acreage, yield, varieties, costs of fertilizer, insect, disease, and weed programs, irrigation usage, labor hours, and other key physical production practices. All of these criteria are important in combination with financial records for analysis, decision-making, and management.

Financial records provide a record of all cash receipts and expenses, capital transactions, inventory, depreciation, credit transactions, and labor costs.

Labor is a very important expense in any orchard operation and the accounting requirement is complex; therefore, keep labor records separate from other records.

Keep pre-productive orchard or non-bearing expenses separate from bearing orchard expenses. The Tax Reform Act of 1986 requires all orchard development expenses for orchards having a non-bearing (pre-productive) period of more than two years to be capitalized. Depreciation of capitalized expenses may begin in the year the orchard reaches an income-producing stage.





Growers had the option on schedule F of their 1987 tax return not to capitalize pre-productive expenses. The election applied to 1987 and all future years and is irrevocable. Farmers who elected not to capitalize pre-productive expenses may deduct expenses in the year in which they occur. Farmers who entered the business after 1986 can elect out of pre-productive capitalization on the return of the first year they are in the business. However, it is important to note that electing out requires producers' use of longer-life alternative depreciation for all farm assets. Further information may be obtained from your tax consultant.

The uses of orchard records can be classified into three categories: (1) indicators of the business' economic health, (2) information for enterprise cost-return analysis, and (3) information for service purposes.

### INDICATOR FOR ECONOMIC HEALTH

When the records are summarized, the net farm income reveals the degree of success or failure of the total business. Compare this figure with comparable figures from earlier years to determine the general direction of the business.

### ENTERPRISE COST-RETURN ANALYSIS

The primary use of orchard records is to determine the level of profitability of each enterprise. Enterprise may refer to any specific unit in the overall orchard operation such as a given farm,

block, or variety as defined by the record keeper. Managers should closely examine the net returns per dollar of capital expended, especially if capital is a limiting factor in the operation.

### INFORMATION FOR SERVICE PURPOSES

Managers experience considerable demand for information for filing and substantiating tax returns, for acquiring credit, for planning, and for day-to-day management. Information obtained from records helps to meet these needs.

Record keeping may involve a simple ledgerbook or a complex computer program. No matter which record keeping method is chosen, it is important to keep good useful records that will enable a complete, concise analysis of the business.

Record-keeping assistance may be obtained from extension personnel in your state. The following guidelines were obtained for producers in six southern states:

**Alabama:** Contact your county Cooperative Extension Service agent for recommendations suitable to your orchard or visit <http://www.aces.edu/> for more information.

**Arkansas:** Cooperative Extension Service offers a "Farm Record Book" for manual record keeping and workshops to demonstrate the use of Quicken. Contact your county extension agent or visit <http://www.aragriculture.org/farmplanning/links.asp> for more information.



**Florida:** Contact your county Cooperative Extension Service agent for recommendations suitable to your orchard or visit <http://nfrec.ifas.ufl.edu/> for more information.

**Georgia:** Georgia Cooperative Extension Service offers the "Georgia Farm Record Book," a manual system, and the Georgia Extension Farm Business Management Advisory Program, which includes business enterprise analysis and record-keeping guidance. Contact your county extension agent or visit

<http://www.ces.uga.edu/Agriculture/agecon/alt.htm> for more information.

**Oklahoma:** Cooperative Extension Service offers manual record books entitled "Farm/Ranch Account Book" and "The Oklahoma Farm Family Account Book" and instructions for adapting Quicken. Contact your county extension agent or visit <http://osuextra.okstate.edu/index.shtml> for more information.

**South Carolina:** Contact your county Cooperative Extension Service agent for recommendations suitable to your orchard or visit <http://cherokee.agecon.clemson.edu/extindex.htm> for more farm management information.

## REFERENCES

Doye, D., C. Green, and J. Williams. 1992. Farm/ranch account book. Cooperative Extension Service Circular E-908. Oklahoma State University, Stillwater, OK.

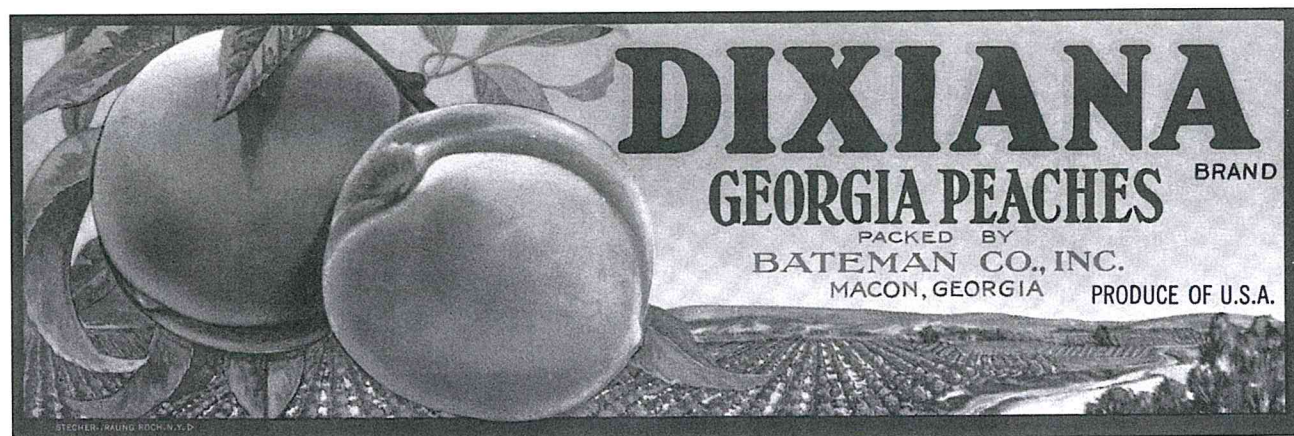
Georgia Farm Record Book, Cooperative Extension Service, The University of Georgia College of Agriculture, Bulletin 722, Revised August 1983.

Hardin, M. 1999. The Oklahoma Farm Family Account Book. Cooperative Extension Service Circular E-823. Oklahoma State University, Stillwater, OK.

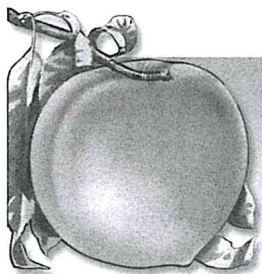
Heady, O. and J. A. Hopkins. 1975. Farm records and accounting, Fifth Edition, Iowa State University Press, Ames, IA.

Miller, B. R., R. E. Thomas, Jr., and J. R. Mackert. 1986. User Guide to the Georgia farm accounting system (GFAS), Special Publication 34. The Georgia Agricultural Experiment Stations, College of Agriculture, The University of Georgia, Athens, GA.

Windham, T. 1993. Farm record book. MP 116. Arkansas Cooperative Extension Service, Little Rock, AR.







## 3.2 CONDUCTING A COST ANALYSIS

### **Jennie S. Popp**

*Dept. of Agricultural Economics & Agribusiness  
University of Arkansas  
Fayetteville, AR 72701*

### **George Westberry, Retired**

*Dept. of Agricultural & Applied Economics  
University of Georgia  
Athens, GA 30602*

In the late 1990s, average annual utilized peach production for Alabama, Arkansas, Georgia, Oklahoma, and South Carolina averaged 260 million pounds. Average value of production in these states was over \$79 million. Peach production can be a profitable enterprise. However, as with any enterprise, potential profits should be analyzed before investments are made. Such an analysis can be made using an enterprise budget. The materials that follow are guidelines to develop a relevant budget. Differences in varieties, size of operation, production practices (particularly irrigation) and associated production costs, and prices received for fruit will affect orchard budgets.

### **COMPONENTS OF A BUDGET**

Three areas of information are generally included in the peach production budget: estimated crop yield, market price for the crop, and production (or input) costs. Returns to management are generally calculated over the expected life span or production period of an orchard. This time varies, but on average it would range from pre-planting to the first year of meaningful production and continue through the last year of full production (from 8 to 18 years). Returns to management would be calculated again starting with the next planting cycle.

### **EXPLANATION OF COSTS**

Production costs fall into two categories: fixed and variable. Fixed costs are those that accrue

independently of the size of production. They include land, machinery, management, and overhead expenses. Land is generally assumed to be owned; however, an opportunity cost (what the money that has been put into land could earn if it had been invested elsewhere) may be charged for land. Ownership costs for equipment, including depreciation, interest, taxes, and insurance, are charged as fixed costs. Management may or may not include cash costs. For owner operators, it is not a cash expense; however, a hired manager would be included as a cash expense. Finally, general overhead includes items that are not specific to peaches, such as tools, farm shop, and other farm equipment. Variable costs are costs that are directly associated with production. These costs are further separated into costs associated with pre-harvest, harvest, packing, and marketing. Key variable cost categories include fertilizers, pesticides, labor, machinery fuel and maintenance, and interest on operating capital.

### **ESTABLISHMENT COSTS AND AMORTIZATION**

Orchard establishment generally takes place over a three-year period. In each of those years there are a number of fixed and variable costs that need to be considered. Tables 3-2-1 through 3-2-3 list the types of costs generally incurred in the early years of orchard life. The costs during the non-bearing (pre-productive) years are compounded at a fixed interest rate until amortization begins during the fourth year.

**PRODUCTION BUDGET**

Table 3-2-4 presents an example of an annual production budget for years four through each remaining year of production. In this example, harvest and marketing costs are the largest cost

items in the budget. These costs are estimated to be \$3.04 per 1/2 bushel. (Pick-your-own operations would have much lower harvest and marketing costs.) The fixed cost section includes recapture of establishment costs of \$165 per acre. This is the largest component of fixed costs. The last

**TABLE 3-2-1. Types of establishment and maintenance costs considered in the first year of the operation. Adapted from Pardue et al. (1996) and Westberry and Collier (1998).**

ITEM	\$/UNIT
<b>Variable Costs:</b>	
Fertilizer	
<i>Nitrogen</i>	pound
<i>Phosphate (P<sub>2</sub>O<sub>5</sub>)</i>	pound
<i>Potash (K<sub>2</sub>O)</i>	pound
Lime	ton
Land Leveling & Terracing	hour
Seeds for Cover Crop	pound
Trees	each
Pesticides	
<i>Herbicides</i>	acre
<i>Fungicides</i>	acre
<i>Insecticides</i>	acre
Labor	hour
Machinery	
<i>Fuel</i>	gallon
<i>Repair &amp; Maintenance</i>	acre or hour
Irrigation	acre inch
Interest	dollar (@__%)
Misc	
<b>Fixed Costs:</b>	
Tractor	hour
Other Equipment	hour
Irrigation	acre inch
Land	dollar
Overhead	dollar
Misc	

**TABLE 3-2-2. Types of establishment and maintenance costs considered in the second year of the operation. Adapted from Pardue et al. (1996) and Westberry and Collier (1998).**

ITEM	\$/UNIT
<b>Variable Costs:</b>	
Fertilizer	
<i>Nitrogen</i>	pound
<i>Phosphate (P<sub>2</sub>O<sub>5</sub>)</i>	pound
<i>Potash (K<sub>2</sub>O)</i>	pound
Lime	ton
Trees (Replacements)	each
Pesticides	
<i>Herbicides</i>	acre
<i>Fungicides</i>	acre
<i>Insecticides</i>	acre
Labor	
<i>Machinery and Others</i>	hour
<i>Dormant Pruning</i>	hour
<i>Summer Pruning</i>	hour
<i>Remove Fruit</i>	hour
Machinery	
<i>Fuel</i>	gallon
<i>Repair &amp; Maintenance</i>	hour
Irrigation	acre inch
Interest	dollar
Misc	
<b>Fixed Costs:</b>	
Tractor	hour
Other Equipment	hour
Irrigation	acre inch
Land	dollar
Overhead	dollar
Misc	



**TABLE 3-2-3. Types of establishment and maintenance costs considered in the third year of the operation. Adapted from Pardue et al. (1996) and Westberry and Collier (1998).**

ITEM	\$/UNIT
<b>Variable Costs:</b>	
Fertilizer	
<i>Nitrogen</i>	pound
<i>Phosphate (P<sub>2</sub>O<sub>5</sub>)</i>	pound
<i>Potash (K<sub>2</sub>O)</i>	pound
Lime	ton
Trees (Replacements)	each
Pesticides	
<i>Herbicides</i>	acre
<i>Fungicides</i>	acre
<i>Insecticides</i>	acre
Labor	
<i>Machinery and Others</i>	hour
<i>Dormant Pruning</i>	hour
<i>Summer Pruning</i>	hour
<i>Remove Fruit</i>	hour
Machinery	
<i>Fuel</i>	gallon
<i>Repair and Maintenance</i>	hour
Irrigation	acre inch
Interest	dollar
Misc	
Harvesting and Marketing	bushel
<b>Fixed Costs:</b>	
Tractor	hour
Other Equipment	hour
Irrigation	acre inch
Land	dollar
Overhead	dollar
Misc	

section in Table 3-2-4 gives the cost per 1/2 bushel breakdown by cost groups. The total budgeted cost per 1/2 bushel of \$4.61 indicates that a price of \$4.61 per 1/2 bushel is needed to break even.

Table 3-2-5 shows potential net income variation given the anticipated variation of prices and yields. The expected prices, yields, and net income are anticipated averages for the marketing and cultural practices that are included. Optimistic levels are those levels that would be expected to be obtained one-year-in-six. The pessimistic levels also are for one-year-in-six. When these prices and yields are included with the budgeted costs, net income probabilities can be estimated.

For the data presented as an example, there was a 74 percent probability of covering all budgeted costs. The net income level of \$581 per acre should be exceeded half the time and not be reached about half the time. About one-year-in-six returns over \$1,438 would be anticipated; in one-year-in-six more than \$394 would be lost (an income of -\$394).

## IRRIGATION

Irrigation is not charged off in the budget, but a line is included for irrigation. In most cases, irrigation increases yields by increasing fruit size, thus fewer bushels are needed to pay for the added costs, because large fruits normally receive higher prices. See your Cooperative Extension Service specialist for more information on irrigation costs and returns to irrigation.

## BREAK-EVEN PRICES

Table 3-2-6 shows the break-even prices for various yield levels. The pre-harvest variable costs and fixed costs decline fairly rapidly with increases in yield. At 200 bushels, the pre-harvest cost per bushel is \$3.36, while at 600 bushels it declines to \$1.12. Fixed cost per bushel is \$2.13 at 200 bushels, but only \$0.71 at 600 bushels. The break-even prices (for all costs) show a similar pattern. At 200 bushels yield, the break-even price is \$8.53 per 1/2 bushel. At 600 bushels yield, the break-even price declines to \$4.87 per 1/2 bushel.

TABLE 3-2-4. Example of a mid-season peach budget. (Westberry and Collier 1998)

ITEM	UNIT	QUANTITY	PRICE	AMT/AC \$	TOTAL \$
<b>Variable Costs:</b>					
Trees (replants)	Each	3.00	1.75	5.25	5
Lime, applied	Ton	0.50	24.00	12.00	12
Fertilizer	Cwt	4.00	7.80	31.20	31
Nitrogen	Lbs.	85.00	0.31	26.35	26
Chemicals	Appl.	35.00		197.74	198
Machinery					
<i>Fuel</i>	Acre	14.86	0.75	11.14	11
<i>Repairs</i>	Acre	1.00	5.49	5.49	5
Labor	Hr.	63.49	5.17	328.40	328
Land rent	Acre	1.00	0.00	0.00	0
Irrigation	Acre Inch	2.00	5.92	11.85	12
Other	Acre	1.00	0.00	0.00	0
Interest on operating capital	\$	629.42	10.0%	41.98	42
<b>Pre-Harvest Variable Costs:</b>				<b>671.41</b>	<b>671</b>
<b>Harvest and Marketing Costs:</b>					
Picking and hauling	1/2 Bushel	700.00	0.93	647.50	648
Grading and packing	1/2 Bushel	700.00	0.83	577.50	578
Containers	Each	700.00	0.85	595.00	595
Marketing @ 7.50%	1/2 Bushel	700.00	0.44	307.13	307
<b>Total Harvest and Marketing</b>			<b>3.04</b>	<b>2,127.13</b>	<b>2,127</b>
<b>Total Variable Costs:</b>				<b>2,798.53</b>	<b>2,799</b>
<b>Fixed Costs:</b>					
Machinery	Acre	1.00	85.86	85.86	86
Irrigation	Acre	1.00	81.54	81.54	82
Recapture establishment costs	Acre	1.00	164.60	164.60	165
Land	Acre	1.00	60.00	60.00	60
Overhead and management	\$	671.00	0.05	33.57	34
<b>Total Fixed Costs</b>				<b>425.57</b>	<b>426</b>
<b>Total budgeted cost per acre:</b>				<b>3,224.10</b>	<b>3,224</b>
Costs Per 1/2 Bushel					
Pre-harvest variable cost per 1/2 Bushel					0.96
Harvest & marketing cost per 1/2 Bushel					3.04
Fixed costs per 1/2 Bushel					0.61
Total Budgeted Cost per 1/2 Bushel					4.61



**TABLE 3-2-5. Peach prices, yields, and risk rated net returns.**

	OPTIMISTIC		EXPECTED		PESSIMISTIC	
Yield (1/2 bushels)	900		700		350	
Price per 1/2 bushels	6.60		5.85		5.10	
Net Returns (\$)	1,866	1,438	1,010	581	94	(-394) (-882)
Chances of obtaining the return listed above or more	6%	16%	33%	52%		
Chances of obtaining the return listed above or less				48%	29%	16% 7%
Overall chance of profit at expected yield and price				74%		

### INCOME OVER VARIABLE COSTS

Table 3-2-7 shows the income over variable costs (pre-harvest, harvest, and marketing costs). At a price of \$6.00 per 1/2 bushel, it takes a yield of nearly 250 bushels just to cover the variable costs. At \$8.00 per 1/2 bushel, a yield of about 150 bushels covers variable costs.

### DEVELOPING BUDGETS FOR YOUR OPERATION

Many of the southeastern states have developed enterprise budgets for peach production in their area. However, as mentioned earlier, differences in varieties, operation size, management practices, input prices, and peach prices will affect the budget for any given orchard. Please check with Cooperative Extension personnel in your state for peach enterprise and irrigation budget information.

**Alabama:** Contact your Cooperative Extension Service agent for recommendations suitable to your orchard or visit <http://www.aces.edu/> for more information.

**Arkansas:** The Arkansas Agricultural Experiment Station offers a special report entitled, "Economic Analysis of Commercial Fresh Market, Irrigated Peach Production in Arkansas." Contact a Cooperative Extension Service agent for recommendations suitable to your orchard or visit <http://www.uaex.edu> for more information.

**Florida:** The most recent peach enterprise budgets for Florida can be downloaded from the internet at <http://nfrec.ifas.ufl.edu/Hewitt/budgets.htm> or contact your Cooperative Extension Service agent for recommendations suitable to your orchard or visit <http://www.fred.ifas.ufl.edu/> for more information.

**Georgia:** The Georgia Cooperative Extension Service offers budgets for establishment and mid-season peach production. Contact The University of Georgia Department of Agricultural and Applied Economics in Tifton or visit <http://www.griffin.peachnet.edu/caes/gapeach/> for more information.

**Oklahoma:** The University of Oklahoma offers budgets for preplant year, establishment year, year 2, year 3, and years 4-15. You can download these budgets from <http://www.agecon.okstate.edu/archives/budgets/statecrp.htm#Fruits%20&%20Vegetables>.



**TABLE 3-2-6. Break-even prices for various yield levels.**

<b>YIELD PER ACRE</b>	<b>PRE-HARVEST COSTS</b>	<b>FIXED COSTS</b>	<b>HARVEST AND MARKETING</b>	<b>BREAKEVEN</b>
(Bushel)	(Bushel)	(Bushel)	(1/2 Bushel)	(1/2 Bushel)
100	6.71	4.26	3.04	14.01
150	4.47	2.84	3.04	10.35
200	3.36	2.13	3.04	8.53
250	2.68	1.70	3.04	7.43
300	2.24	1.42	3.04	6.70
350	1.92	1.22	3.04	6.17
400	1.68	1.07	3.04	5.78
450	1.49	0.95	3.04	5.48
500	1.34	0.85	3.04	5.23
550	1.22	0.77	3.04	5.03
600	1.12	0.71	3.04	4.87
650	1.03	0.66	3.04	4.73
700	0.96	0.61	3.04	4.61
750	0.89	0.57	3.04	4.50
800	0.84	0.53	3.04	4.41
850	0.79	0.50	3.04	4.33
900	0.75	0.47	3.04	4.26

Contact Oklahoma State University Department of Agricultural Economics or visit <http://www.agecon.okstate.edu> for more information.

**South Carolina:** Contact your Cooperative Extension Service agent for recommendations suitable to your orchard or visit <http://cherokee.agecon.clemson.edu/extindex.htm> for more information.

## REFERENCES

- Hewitt, T. 2000a. Estimated development costs per acre for peaches, North Florida. University of Florida, Department of Food and Resource Economics, NFREC, Marianna, FL.
- Hewitt, T. 2000b. Estimated per acre annual costs for producing peaches, North Florida (pick your own). University of Florida, Department of Food and Resource Economics, NFREC, Marianna, FL.
- Hewitt, T. 2000c. Estimated production costs for peaches, North Florida (fresh market). University of Florida, Department of Food and Resource Economics, NFREC, Marianna, FL.
- Pardue, M., C. Price, J. R. Clark, C. R. Rom, P. Fenn, and C. R. Garner. 1996. Economics analysis of commercial, fresh market irrigated peach production in Arkansas. Arkansas Agricultural Experiment Station Special Report 176. University of Arkansas, Division of Agriculture, Little Rock, AR.
- Schatzer, J., M. Smith, and D. McGraw. 1997a. Peaches, preplant year. Oklahoma State University, Department of Agricultural Economics, Stillwater, OK.

**TABLE 3-2-7. Income above variable costs at various prices and yields.**

YIELD	PRICE PER 1/2 BUSHEL				
	4.00	6.00	8.00	10.00	12.00
100	-575	-375	-175	25	225
150	-527	-227	73	373	673
200	-479	-79	321	721	1,121
225	-455	-5	445	895	1,345
250	-431	69	569	1,069	1,569
300	-383	217	817	1,417	2,017
350	-335	365	1,065	1,765	2,465
400	-287	513	1,313	2,113	2,913
450	-239	661	1,561	2,461	3,361
500	-191	809	1,809	2,809	3,809
550	-143	957	2,057	3,157	4,257
600	-95	1,105	2,305	3,505	4,705
650	-47	1,253	2,553	3,853	5,153
700	1	1,401	2,801	4,201	5,601
750	49	1,549	3,049	4,549	6,049
800	97	1,697	3,297	4,897	6,497
850	145	1,845	3,545	5,245	6,945
900	193	1,993	3,793	5,593	7,393

Schatzer, J., M. Smith, and D. McGraw. 1997b. Peaches, establishment year. Oklahoma State University, Department of Agricultural Economics, Stillwater, OK.

Schatzer, J., M. Smith, and D. McGraw. 1997c. Peaches, year 2. Oklahoma State University, Department of Agricultural Economics, Stillwater, OK.

Schatzer, J., M. Smith, and D. McGraw. 1997d. Peaches, year 3. Oklahoma State University, Department of Agricultural Economics, Stillwater, OK.

Schatzer, J., M. Smith, and D. McGraw. 1997e. Peaches, year 4 to 15. Oklahoma State University, Department of Agricultural Economics, Stillwater, OK.

USDA, NASS, 2001. Noncitrus fruits and nuts, 2000 preliminary report. United States Department of Agriculture, National Agricultural Statistics Service, Washington, DC.

Westberry, G. and M. Collier. 1998. Mid season peach production budget. University of Georgia, Department of Agricultural and Applied Economics, Tifton, GA.