

## ANALYZING THE EQUIPMENT PURCHASE DECISION FOR PECAN PRODUCERS<sup>1</sup>

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**Abstract.** As Florida pecan producers expand their acreage or improve production on existing acreage, the need for harvesting and spraying equipment becomes very important. Because of timeliness and poor performance by some custom operators, producers continuously attempt to justify the purchase of the needed equipment. Since these capital investments are relatively expensive, the purchase decision must be closely evaluated.

A partial budgeting technique may be used to determine the relative profitability of purchasing the desired equipment or hiring custom operators to perform the needed services. To assist in the decision making process, examples were developed to determine if producers should purchase a sprayer, pecan shaker, pecan sweeper, and pecan harvester instead of hiring custom operators to perform these services.

By using the partial budgeting technique, producers are able to determine if their acreage is sufficient to justify the anticipated capital purchases. This analysis will assist producers in forward production planning, business financing, and management control of their pecan operation.

Making efficient management decisions is one of the major tasks of all agricultural producers. Pecan producers have to make many decisions that are complicated by changing production practices, weather, costs, and prices. Profitable decisions are often facilitated by the use of partial budgeting techniques. Partial budgeting uses the information developed from enterprise budgets. As a decision making "tool" partial budgeting is attractive because it is effective, simple to use, and can be used on a variety of decision-making problems.

One example of a problem commonly solved by using a partial budgeting technique is: Should a producer buy equipment or hire a custom operator to perform certain operations? Pecan operations require expensive equipment, hence producers have a difficult time justifying the large capital outlay required to purchase this equipment and often have certain orchard practices done on a custom basis.

The advantages of custom work are:

- Costs of ownership are eliminated.
- Capital required to own equipment can be used in other ways.
- Some or all labor is furnished, thereby releasing the farm operator to perform other jobs.
- The farm operator needs less power and equipment.
- Producers may benefit from newer machinery, techniques, and skilled operation.
- Repairs, maintenance and obtaining materials are the custom operator's responsibility.
- Farm operators with small jobs can gain benefits of large machines.

The disadvantages of custom work are:

- Service may not be available when job is ready.
- Irresponsible custom operators may do poor work and lose quantity and quality of products.
- Risk of carrying weeds and diseases from farm to farm.
- For large jobs, total cost may be higher than owning equipment.
- Custom operators may refuse or postpone small jobs for larger jobs.

Examples are shown attempting to justify the purchase of a pecan shaker, sprayer, sweeper, and harvester in lieu of hiring custom operators. The nature of this question makes it difficult to determine what numbers to use in this analysis. Most producers feel they can do a better job than the custom operator. Also it is difficult to quantify the timeliness of performing the spraying, shaking, sweeping, or harvesting operation. However, a method can be shown with conservative estimates so each individual producer can analyze his own situation.

The steps to follow in this analysis were developed by Westberry [3] and are: first to determine the cost of owning and operating the machinery that the producer is considering purchasing. In the examples annual fixed cost is assumed to be 17% of the purchase price. This figure is a "rule of thumb" number often used for simplicity purposes. Fixed costs normally include charges for depreciation which spreads the purchase price of the equipment over the productive life, interest (opportunity cost of capital invested in equipment), repairs such as major overhauls performed during the off-season, taxes such as ad valorem taxes which must be paid regardless of use, and insurance on the equipment whether covered by an actual policy or borne by the owner. The next step would be to determine the custom rates. The numbers can then be put into the following formula to determine if the operator can justify the purchase of the equipment.

$$\text{Break-even acres for self-propelled equipment} = \frac{\text{Total annual fixed costs}}{\text{Custom rate} - \text{variable costs/acre}}$$

In the situation where a previously owned tractor is required, the following formula is used:

$$\text{Break-even acres for tractor pull-type equipment} = \frac{\text{Total annual fixed costs for the new machinery}}{\text{Custom rate} - \text{variable costs/acre for new machinery} + \text{total per acre costs for tractor}}$$

### Purchasing A Pecan Shaker

Two examples will be shown, one assuming the purchase of a small tractor mounted shaker and another example assuming the purchase of a large self-propelled shaker.

#### Small Shaker

Assumptions are:

1. A 3-point hitch tractor mounted, P.T.O. drive, 42" clamp opening costs \$5,250.
2. Annual fixed cost is determined to be 17% of new cost and is \$892.50.

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3. Variable cost per acre for the shaker is \$1.08.
4. A 70 hp tractor is already owned with per acre costs of \$11.62.
5. Custom rate is \$42.50 per acre (17 trees at \$2.50 per tree).

$$\begin{aligned}
 \text{Break-even acres} &= \frac{\$892.50}{\$42.50 - (\$11.62 + \$1.08)} \\
 &= \frac{\$892.50}{\$42.50 - \$12.70} \\
 &= \frac{\$892.50}{\$29.80} \\
 &= 30 \text{ acres}
 \end{aligned}$$

If the pecan producer has 30 acres of trees or more to harvest and owns a 70 hp tractor, he can justify the purchase of a \$5,250 shaker if the custom rate is \$2.50 per tree.

#### *Large Self-Propelled Shaker*

Assumptions are:

1. A 200 hp shaker propelled by a heavy duty 6-cylinder gasoline engine with a 20' shaking height costs \$31,775.
2. Annual fixed cost (purchase price x 17%) is \$5,401.75.
3. Variable cost for self-propelled shaker is \$10.75 per acre.
4. Custom rate is \$42.50 per acre (17 trees at \$2.50 per tree).

$$\begin{aligned}
 \text{Break-even acres} &= \frac{\$5,401.75}{\$42.50 - \$10.75} \\
 &= \frac{\$5,401.75}{\$31.75} \\
 &= 170 \text{ acres}
 \end{aligned}$$

To justify the purchase of this shaker under these assumptions, the pecan producer needs to have 170 acres to shake.

#### **Sprayer Purchase**

Most producers desire to purchase an orchard sprayer but are often reluctant to do so because of the large capital investment required. Spraying is needed for insect and disease control in order for the producer to expect maximum yield. Two examples will be shown to assist the producer in this decision.

#### *PTO Driven Sprayer*

Assumptions are:

1. A PTO driven sprayer with a 500 gallon stainless steel tank, multi-stage centrifugal pump, a 24" diameter fan, and positive fluid agitation costs \$10,300.
2. Annual fixed cost (purchase price x 17%) is \$1,751.
3. Variable cost per acre for the sprayer is \$9.66 (six sprayings a year assumed).
4. Per acre costs for a 70 hp tractor are \$16.44 (six sprayings).
5. Custom rate is \$90 per acre (\$15 x 6 sprayings).

$$\begin{aligned}
 \text{Break-even acres} &= \frac{\$1,751}{\$90 - \$26.10} \\
 &= \frac{\$1,751}{\$63.90}
 \end{aligned}$$

$$= 27 \text{ acres}$$

If the pecan producer has 27 acres to spray, he can justify the purchase of a sprayer under the above mentioned assumptions.

#### *Diesel Sprayer*

Assumptions are:

1. A diesel sprayer with a 1,000 gallon stainless steel tank, Cummins V6 Diesel Engine, multi-stage centrifugal pump, and 26" diameter cast aluminum fan costs \$31,700.
2. Annual fixed cost (purchase price x 17%) is \$5,389.
3. Variable cost per acre for the sprayer is \$19.38 (six sprayings).
4. Per acre costs for a 70 hp tractor are \$14.70 (six sprayings).
5. Custom rate is \$90 per acre (\$15 x 6 sprayings).

$$\begin{aligned}
 \text{Break-even acres} &= \frac{\$5,389}{\$90 - \$34.08} \\
 &= \frac{\$5,389}{\$55.92} \\
 &= 96 \text{ acres}
 \end{aligned}$$

If the pecan producer has 96 acres or more to spray, he can justify the purchase of a large diesel sprayer.

#### **Sweeper Purchase**

Pecan producers also desire to purchase a sweeper so that the nuts can be windrowed for easier pick up. Much labor can also be saved by purchasing a sweeper. Two examples will be shown to assist the producer in this decision.

#### *Tractor Mounted Sweeper*

Assumptions are:

1. A 11' front-end mounted sweeper with a heavy duty frame and bearings costs \$6,450.
2. Annual fixed costs (purchase price x 17%) are \$1,096.50.
3. Per acre variable costs are \$.76.
4. Per acre costs for a 70 hp tractor are \$4.98.
5. Custom rate is \$25 per acre.

$$\begin{aligned}
 \text{Break-even acres} &= \frac{\$1,096.50}{\$25 - \$5.74} \\
 &= \frac{\$1,096.50}{\$19.26} \\
 &= 57 \text{ acres}
 \end{aligned}$$

If the pecan producer has 57 acres or more to sweep, he can justify the purchase of a tractor mounted sweeper.

#### *Self-Propelled Sweeper*

Assumptions are:

1. A 40 hp self-propelled sweeper with a 10' sweeper costs \$12,500.
2. Annual fixed costs (purchase price x 17%) are \$2,125.
3. Variable cost for self-propelled sweeper is \$2.62 per acre.
4. Custom rate is \$25 per acre.

$$\begin{aligned}
 \text{Break-even acres} &= \frac{\$2,125}{\$25 - \$2.62} = \frac{\$6,885}{\$34.54} \\
 &= \frac{\$2,125}{\$22.38} = 199 \text{ acres} \\
 &= 95 \text{ acres}
 \end{aligned}$$

To justify the purchase of a self-propelled sweeper, the producer needs to sweep 95 acres or more.

### Harvester Purchase

One of the most desired pieces of equipment for the pecan producer is a nut harvester. Much labor can also be eliminated by using a harvester. Two examples are shown to assist the producer in this purchasing decision.

#### Tractor Pulled Harvester

Assumptions are:

1. A PTO driven harvester with a 48" pick-up reel, 24" elevator chain and 24" discharge costs \$10,945.
2. Annual fixed cost (purchase price x 17%) is \$1,860.65.
3. Per acre variable cost is \$2.32.
4. Per acre costs for a 70 hp tractor are \$4.98.
5. Custom rate is \$42.50 per acre.

$$\begin{aligned}
 \text{Break-even acres} &= \frac{\$1,860.65}{\$42.50 - \$7.30} \\
 &= \frac{\$1,860.65}{\$35.20} \\
 &= 53 \text{ acres}
 \end{aligned}$$

If the producer has 53 acres to harvest, he can justify the purchase of a tractor pulled harvester.

#### Self-Propelled Harvester

Assumptions are:

1. A front wheel driven harvester powered by a 300 cu. in. water cooled engine with a 48" pick-up reel costs \$40,500.
2. Annual fixed costs (purchase price x 17%) are \$6,885.
3. Variable costs for the self-propelled harvester are \$7.96 per acre.
4. Custom rate is \$42.50 per acre.

$$\text{Break-even acres} = \frac{\$6,885}{\$42.50 - \$7.96}$$

To justify the purchase of a self-propelled harvester, the producer needs to have 199 acres to harvest.

Pecan producers should be able to use this partial budgeting technique to assist them in analyzing the equipment purchase decision. Each pecan producer needs to substitute figures obtained from his records and from equipment dealers into the examples to assist him in his decision concerning purchasing equipment versus custom hiring. Remember that other considerations must also be analyzed. The pecan producers cash flow position and the tax implications must be considered. A relatively small producer may not be able to generate a sufficient cash flow for such a purchase. Interest expenses and depreciation are tax deductible for the owner, but custom rates are also tax deductible. In the year of the purchase, investment credit and additional first year depreciation may be positive tax implications.

Under the assumptions made in the analyses presented here, a small producer interested in buying equipment for all four operations would need pecan acreage of at least 57 acres. If he had less than 57 acres, he should have the work done by a custom operator. For a large producer interested in self-propelled shakers, sweepers, and harvesters and a large sprayer; 199 acres of pecans would be needed to justify purchasing the equipment over hiring custom operators. Each producer needs to evaluate the situation differently. Some may not be interested in buying all the equipment mentioned. Also the availability and job performance of custom operators is important. In many areas custom operators are not available.

Remember, this partial budgeting technique is simply another tool for the producer as he makes daily production practice decisions that directly affect income. In these days of steadily increasing costs and fluctuating prices, increased precision in decision making is necessary to maintain viable operations [1].

The material presented is best used as a guide for evaluating a pecan producers' or potential producers' own operation. Sound management dictates careful economic planning and subsequent activity by the efficient pecan producer.

### Literature Cited

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