PLANT COST ESTIMATION: THE SOUTH FLORIDA FOLIAGE CASE

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How many of you know your individual plants costs? Few nurserymen know their cost for producing plants of a given cultivar, species or size. Most, however, make decisions where such information would be of great value. Why should nurserymen be concerned with individual plants costs?

1. Knowledge of individual plant costs will allow managers to insure that production costs are absorbed and a profit is earned when the price lists are developed.

2. This knowledge also allows managers to produce plants that return higher profits.

3. Plant cost can also serve as the basis for inventory valuation. The plant inventory is of particular importance when the nurseryman is concerned with a financial analysis since "growing plants" are usually the largest single investment item. Therefore, an accurate assessment of the nurseryman's net worth depends on accurate valuation of the plant inventory.

ACCOUNTING SYSTEMS

A general accounting system is in use at most commercial nurseries. The system is designed for reporting aggregate costs and profit. If a single crop was finished in one accounting period, the individual plant cost could be calculated directly from the general accounting records by dividing the total cost for the accounting period by the number of plants produced. Most nurseries produce several species requiring varying production times. Nurserymen must find another way to determine plant costs. Cost accounting can be used.

Cost accounting is an extension of the general accounting system. The record keeping system allows the input costs to be identified with specific plants. The costs that cannot be allocated directly to each plant are counted as overhead expenses and apportioned to individual plants on some common basis. A major drawback of cost accounting is that records beyond those for tax purposes are required.

Since record keeping is expensive, few nurserymen keep records beyond those required by law. Nevertheless, a cost accounting system would seem a must for at least the more complex nurseries. The nature of the nursery, the existing accounting system, and the degree of plant cost accuracy desired de-

termine the sophistication of the cost accounting system needed. Therefore, a cost accounting system needs to be tailored for each individual nursery.

For those nurserymen that do not want a unit accounting system, there are numerous ways of approximating individual plant costs from existing nursery records. Let's examine one method and see how it works for one nurseryman.

PLANT COST ESTIMATION FROM EXISTING NURSERY RECORDS

If a nurseryman is asked how much it costs him to produce a given plant, he usually begins to allocate the various inputs and their costs. Typically, the nurseryman enumerates the container and cutting costs and sometimes the cost of the growing medium. The other costs associated with production of a plant are more difficult to allocate directly to specific plants. The plant cost is the sum of the allocated costs plus some portion of the remaining costs. One way to apportion the remaining costs to individual plants is on the "rent" basis. Simply stated, the necessary growing space is rented to the plants. The plant cost is the sum of any allocated costs plus the "rent". The "rent" charged to each plant is determined by the amount of growing space required, the length of growing period, and the rental rate. A commonly used rental unit is a square foot, and a convenient way to state the growing time is in terms of weeks. The rental rate can then be stated as the cost per square foot per week.

USING THE WORK SHEET

To provide some assistance in applying the "rent" method of estimating plant costs, this technique has been generalized into a work sheet. The work sheet allows the user to allocate any portion of the annual nursery costs to individual plants and provides guidance and space for apportioning the remaining costs to the specific plants. Space is provided for calculating the cost of 10 plants (see Figure 1).

Estimating the plant costs for a South Florida foliage nursery illustrates the application of the work sheet.

SOUTH FLORIDA FOLIAGE NURSERY CASE

The nursery has 43,200 square feet in propagating and finishing space. Table 1 provides information on the plants for which a production cost estimate is desired. The allocated cost includes the cost of container, cutting, soil, and fertilizer. Table 2 shows the expense for 1977. Table 3 shows an investment of $159,345 on which a 10% return was desired. Let's find the cost

to produce each plant.

Table 1. South Florida foliage nursery production, 1977.

Plant	Size	Allocated cost	Weeks to grow	Sq. ft. required	Percent loss
D. marginata	6 in.	$0.65[a]	8	1	2
D. marginata	10 in.	2.12[b]	16	2.5	0
T. marginata	10 in.	3.02[c]	20	2.5	2

[a] container - $.075, soil - $.05, 1 cutting for $.40, and fertilizer - $.125.
[b] container - $.37, soil - $.25, 3 cuttings for $1.35, and fertilizer - $.15.
[c] container - $.37, soil - $.25, 3 cuttings for $2.25, and fertilizer - $.15.

Table 2. South Florida foliage nursery production costs, 1977

Item	Dollars
Cash costs	
Containers[a]	$ 5,235
Soil[a]	2,787
Cuttings[a]	26,627
Fertilizer[a]	1,081
Unallocated cash cost	92,913
Total cash costs	128,643
Non-cash costs	
Depreciation — bldgs. & improvements	3,365
Depreciation — machinery & equipment	1,803
Total non-cash costs	5,168

[a] an allocated cost

Table 3. South Florida foliage nursery investment, 1977.

Item	Dollars
Growing plants	50,661
Building & improvements	23,951
Machinery & equipment	4,733
Land	80,000
Total	159,345

Work Sheet Instructions and Explanation. The completed work sheet for the South Florida Foliage Nursery is shown as Figure 1.

Column 1. Names of the plants produced, listed in Table 1, are entered in column 1 of the work sheet.

Column 2. The unallocated cost per square foot per week is calculated in the space provided on the work sheet. The steps are:

1. Enter unallocated annual costs of $98,091 from Table 2, on line A.

2. Enter the investment of $159,345 from Table 3, on line B.

3. The desired rate of return on the investment (10%) is en-

tered on line C.

4. Multiply the investment by the desired rate of return ($159,345 × 10%) to get the annual investment cost of $15,935. Enter the annual investment cost on line D.

5. Add the annual investment cost and the unallocated annual cost (15,935 + $98,081). Enter total of annual unallocated costs plus annual investment cost ($114,016) on line E.

6. Enter the square feet in production (43,200) on line F.

7. Divide the annual costs on line E ($114,016) by the square feet in production (43,200) and enter $2.64 on line G.

8. Enter 52 on line H if the nursery was in operation for a full year.

9. Divide the annual unallocated cost/sq. ft. ($2.64 on line G) by 52, and enter the unallocated cost/sq. ft./week, $.051, on line 1 and in column 2.

Column 3. The number of weeks required to grow each plant to salable size, as provided in Table 1, is entered in Column 3. For example, the 10-inch *Dracaena marginata* requires 16 weeks to grow. The growing time used should include time that the bench is open for cleaning or repairs before a new crop is placed for growing. The growing time does not include the time that the plant occupies the bed space waiting to be sold.

Column 4. The square feet required to grow the plant should be entered in Column 4. The square feet should be in decimal terms rather than fractions. For example, if ½ square foot is required, then enter ".5".

Column 5. The unallocated cost per plant is calculated by multiplying the amounts in Columns 2, 3, and 4 for each individual plant. The product should be entered in Column 5.

Column 6. The allocated cost for each plant from Table 1 should be entered in Column 6. In the South Florida Foliage Nursery case, the allocated costs per plant are the cuttings, soil, fertilizer, and containers.

Column 7. The total cost per plant is the sum of the allocated (Column 6) and unallocated (Column 5) costs. The total cost per plant are:

6 inch *D. marginata*, $1.06
10 inch *D. marginata*, $4.16, and
10 inch *T. marginata*, $5.57.

Column 8. Not all plants reach a salable size because of damage in handling, among other things. Thus, the cost per plant needs to be adjusted for these losses. To do this, the percentage of the crop expected to reach a salable size should be entered in Column 8.

WORK SHEET FOR CALCULATING FOLIAGE NURSERY PLANT COST

Column 1 Plant	Column 2 Unallocated cost/sq.ft./week	Column 3 Weeks to grow plants	Column 4 Space per plant	Column 5 Unallocated cost per plant	Column 6 Allocated cost per plant	Column 7 Total cost per plant	Column 8 Percent salable plants	Column 9 Adjusted plant cost
1. 6" D. marg.	.051	8	1	.41	.65	1.06	.98	1.08
2. 10" D. marg.	.051	16	2.5	2.04	2.12	4.16	1.00	4.16
3. 10" T. marg.	.051	20	2.5	2.55	3.02	5.57	.98	5.68
4.								
5.								
6.								
7.								
8.								
9.								
10.								

Instructions:

Column 1. Enter the individual plant names for which a cost will be estimated.

Column 2. Calculate unallocated cost per square foot per week as follows:

a. Unallocated annual costs (from nursery records) .... $ 98,081
b. Investment in nursery operation 159,345
c. Desired rate of return .... .10
d. Investment cost (b × c) 15,935
e. Annual costs plus investment cost (a + d) 114,016
f. Square feet of propagation and finishing 43,200
g. Annual unallocated cost/sq. ft. in propagation & finishing (e ÷ f) 2.64
h. Weeks in operation (52 if a full year) 52
i. Unallocated cost/sq.ft./wk., including a return on investment (g ÷ h) .... .051

Enter this figure in column 2 for each plant for which a cost will be estimated.

Column 3. Enter weeks to grow each plant to salable size in Colume 3. Include normanl "down time" for cleaning and placing a new crop.

Column 4. Enter the square feet required for individual containers. Enter the number in decimals. For example, if one-half (½) a square foot is required, enter .5; if one and one-half square feet are required, enter 1.5.

Column 5. The unallocated cost per plant is calculated as: Column 2 × Column 3 × Column 4. Enter the unallocated cost per plant in Column 5.

Column 6. Enter the costs that can be allocated to the individual plants. Any cost category allocated should have been excluded from the total annual costs. Common costs that can be allocated are pots and cuttings.

Column 7. Enter the sum of the unallocated cost per plant (column 5) and the allocated cost per plant (Column 6) in Column 7.

Column 8. Enter the percentage of the plants that reach a salable size and quality. Enter the number in decimals. For example, if ¾ of the plants are salable, enter .75.

Column 9. The adjusted cost per plant is calculated as Column 7 ÷ Column 8. Enter the quotient in Column 9.

Figure 1. Completed Work Sheet for South Florida Nursery

Column 9. The plant cost adjusted for plant losses is calculated by dividing the amounts in Column 7 by the respective percentages of salable plants in Column 8. The adjusted plant costs are entered in Column 9.

MANAGEMENT USES OF PLANT COST INFORMATION

The plant cost estimates are of little value unless they can be used for management decisions. Simply knowing the cost and returns per plant is useful, but growing plants with the highest returns per plant does not necessarily insure nursery profits. Since plants require differing growing times and spaces, relative profitability of plants have to be compared on a common basis. A convenient basis for comparison is on a square foot per year. This is a three step process (Table 4). First, determine the returns per plant by subtracting the plant cost from the expected selling price. Second, the return per plant is reduced to a common space basis (square foot) by dividing the return per plant by the growing space required. Thrid, the return per square foot for each crop produced is multipled by the number of crops that can be produced in a year.

Table 4. Comparison of expected cost and return for south Florida foliage nursery.

	Unit	6 inch D. marginata	10 inch D. marginata	10 inch T. marginata
Expected Selling price	$	1.75	5.75	7.25
Growing & "marketing cost"[a]	$	1.45	4.65	6.19
Return over total cost	$	.30	1.15	1.06
Square foot per plant	square foot	1	2.5	2.5
Return per square foot per crop	$	.30	.46	.42
Crops per year	$	3.5	2.6	2.2
Return per square foot per year	$	1.05	1.19	.93

[a] Marketing cost, in this case is defined to be the additional cost incurred for holding the plant in the nursery during the period after the plant has reached salable size until it is sold. The plant cost, in this case, was re-estimated using the following "growing and marketing" weeks:

6 inch D. marginata — 15,
10 inch D. marginata — 20, and
10 inch T. marginata — 24.

The return per square foot per year for the three South Florida foliage nursery plants range from $.93 for the 10 inch T. marginata to $1.19 for the 10 inch D. marginata. In this case all

three plants are yielding an acceptable return. The cost and return for other plants grown need to be estimated to gain insight into overall nursery profitability.

Returns above all costs are necessary if capital for expansion, replacement and modernization is to be accumulated. Thus, growing plants and just covering production costs may not be desirable.

ADDITIONAL COMMENTS ON USING THE WORK SHEET

1. The individual plant costs calculated by this method are only approximations of actual costs.

2. The cost per square foot is an average. Using an average implies that all square feet in the nursery are equal in value.

3. The nursery plant costs calculated from last year's records are history. When input prices are increasing, the plant costs estimates should be updated as soon as the appropriate information is available. When large increases in input prices are expected nurserymen may even project their annual costs.

4. The annual production costs should be adjusted for changes in supply inventories during the accounting period.

5. Consider factors in addition to the plant cost estimates when establishing price lists. It may be necessary to grow plants providing lower returns in order to complete a product mix. Competitors price lists might also be helpful in developing price lists.