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# Use of Cost Analysis to Improve Nursery Profitability©

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## INTRODUCTION

It is now possible to calculate the cost of every line of nursery stock on an individual nursery. The ease and accuracy of these costs will depend on the detail and quality of data collected by the nursery. In such a short paper it is not possible to fully cover all aspects of nursery stock costs. This paper will examine the most important factors that affect profitability and highlight the effects of time, space (crop density), yield, and waste on the profitability of nursery stock. The ways and means of allocating labour costs will also be reviewed.

**Current Performance Within the Industry.** Over the last few years the U.K. nursery stock industry has come under severe financial pressure. This has a number of causes. The market has slowed down due to adverse weather during key seasons and changes in consumer buying, resulting in over-production, both in the U.K. and in countries that export to the U.K. Many crops have been offered at low prices just to clear the backlog of plants.

At the same time, costs have been rising dramatically, and aggressive pricing policies from some of the larger multiple retailers are keeping prices of finished plants uneconomically low.

Tables 1 and 2 show the results from all nurseries within the Horticultural Trades Association's (HTA) Nursery Business Improvement Scheme (NBIS) for the 12 months to 31 March in each year. The NBIS is a scheme in which member nurseries can compare costs and other business data within local discussion groups. The data represent a comprehensive cross section of the industry and shows the trends within the nursery trade. Labour costs have increased dramatically over the last few years, as have transport, marketing, and sales costs, which are included in distribution. Despite a steady increase in productivity, the surplus available for extra income and investment has fallen.

**Table 1.** All nurseries analysis of costs in £ per m².

| | Return per m² | Labour | Distribution | Plants | Pots etc | Overheads | Surplus |
|---|---|---|---|---|---|---|---|
| 2002 | £12.26 | £4.24 | £1.12 | £3.87 | £0.83 | £1.51 | £0.68 |
| 2003 | £14.94 | £5.18 | £1.40 | £4.45 | £1.45 | £1.80 | £0.65 |
| 2004 | £20.23 | £7.03 | £1.83 | £6.29 | £1.83 | £2.40 | £0.85 |
| 2005 | £19.41 | £7.14 | £1.95 | £5.41 | £1.48 | £2.88 | £0.55 |

**Table 2.** All nurseries analysis of costs as a percentage of output.

| | Return per m² | Labour | Distribution | Plants | Pots etc | Overheads | Surplus |
|---|---|---|---|---|---|---|---|
| 2002 | £12.26 | 34.6 | 9.2 | 31.6 | 6.8 | 12.4 | 5.6 |
| 2003 | £14.94 | 34.7 | 9.4 | 29.8 | 9.7 | 12.0 | 4.4 |
| 2004 | £20.23 | 34.8 | 9.1 | 31.1 | 9.0 | 11.9 | 4.2 |
| 2005 | £19.41 | 36.8 | 10.0 | 27.9 | 7.6 | 14.9 | 2.8 |

**Table 3**. Analysis of costs as a percentage of output for market sectors for the 12 months ending March 2005.

| | Return per m² | Labour | Distribution | Plants | Pots etc | Overheads | Surplus |
|---|---|---|---|---|---|---|---|
| All sectors | £19.41 | 36.8 | 10.0 | 27.9 | 7.6 | 14.9 | 2.8 |
| Amenity | £10.44 | 39.0 | 6.1 | 28.1 | 5.5 | 9.9 | 11.3 |
| Retail | £25.81 | 35.4 | 14.5 | 29.0 | 7.5 | 19.9 | -6.4 |
| Liners | £68.72 | 32.3 | 7.1 | 27.6 | 8.2 | 11.4 | 13.3 |

As the profitability of the industry is falling it is now more important to establish the accurate cost of each line that a nursery produces. This is important in production planning and price setting.

Table 3 shows how various sectors of the industry are performing. Nurseries supplying the amenity market and young plants were doing relatively well up to the end of March 2005. Since then, even these sectors are beginning to find things more difficult. Nurseries supplying the retail market are finding trade particularly difficult because of a run of poor weather at critical periods, and other market forces.

## OBTAINING ACCURATE COSTS

Within each sector there will be a range of nursery performances with some being very profitable and others not so. It is quite amazing that, in a relatively small industry supplying similar outlets, the cost structures of individual nurseries differ so much. It is therefore important when attempting to find the unit costs on your nursery that you use your own data and not an average of other nurseries.

It is possible to calculate the cost of each line on nearly all nurseries from the data they commonly keep. The accuracy of the costs will depend on the accuracy of the data retained by the nursery. All the information required for finding the unit costs of each line should be available from the normal records and accounts kept by most nurseries. However it may be necessary to modify some of the records to give more accurate costs.

It is not necessary to include all the costs individually because some costs are so small when taken on a unit basis that they will make little difference to the overall cost structure. For example, if a nursery spends £504 on compost tea and produces 250,000 plants each year, the cost per plant is 0.2p per plant. However, several items such as this will amount to a more significant sum — it is easier to handle such items as a group rather than individual items.

On most nurseries costs tend to be historic and dynamic. To cost accurately it is usual to take historic data that will have been affected by circumstances within that time span, e.g., weather affecting sales, disease causing crop loses, etc. This should never be an excuse not to attempt a cost exercise because the results will be very informative and will help considerably in planning and price setting. However it should be noted that costs are controlled by many variables and as these change with time then so will the unit cost.

## TYPES OF COSTS

**Variable Costs or Direct Costs.** Variable costs are those that can be directly attributed to the crop such as pots, plants, labels, and so on. They can account for 35% to 40% of the total cost. They should be easy to allocate to a particular crop. Because most nurseries purchase their requisites from the same wholesalers, the price of most of these items is relatively constant.

In some costing exercises this is as far as the costing would go. The variable costs are taken from the output (sales) figure to give a margin. This gives an indication of the profitability of the crop but this is limited unless other factors such as time and space are taken into the calculation.

**Partial Variable Costs.** These are items usually included in fixed costs or overheads that can be calculated and applied to various crops. The best example would be transport, the cost of which can be easily calculated and added to the crop costs as a percentage or as a cost per unit.

In a similar way the cost of glasshouses or a heated propagation unit can be calculated either on a plant unit or an area basis, and this can be added onto the cost of plants that require these structures.

**Fixed Costs.** Fixed costs, or overheads, are those costs that cannot be directly related to a specific crop. Items include accountancy and other professional services, administration costs, insurance, and so on. Once labour and partial variable costs have been removed there should be relatively few true fixed costs to allocate.

Any allocation is going to be purely arbitrary, and it will be a matter of what best suits the nursery. Below are some of the methods used:

**Table 4.** Calculating labour costs from time sheet task analysis.

| Task | Crop A (no.) | Crop B (no.) | Crop C (no.) | Total (h) | Total cost | Units | Unit costs |
|---|---|---|---|---|---|---|---|
| Seed sowing | 100 | | | 1 | 10 | 100 | 0.10 |
| Cuttings | | 100 | 100 | 3 | 30 | 200 | 0.15 |
| 1st pot | 100 | 100 | 100 | 3 | 30 | 300 | 0.10 |
| Trimming | | | 100 | 2 | 20 | 100 | 0.20 |
| Staking | | | 100 | 2 | 20 | 100 | 0.20 |
| Weeding | 100 | 100 | 100 | 4 | 40 | 300 | 0.13 |
| 2nd Pot | 100 | 100 | 100 | 4 | 40 | 300 | 0.13 |
| Watering | 100 | 100 | 100 | 3 | 30 | 300 | 0.10 |
| Trimming | | | 100 | 2 | 20 | 100 | 0.20 |
| Dispatch | 100 | 100 | 100 | 5 | 50 | 300 | 0.17 |

**Table 5.** Calculating unit labour per crop from task unit cost.

| Task | Crop A (no.) | Crop B (no.) | Crop C (no.) |
|---|---|---|---|
| Seed sowing | 0.10 | | |
| Cuttings | | 0.15 | 0.15 |
| 1st pot | 0.10 | 0.10 | 0.10 |
| Trimming | | | 0.20 |
| Staking | | | 0.20 |
| Weeding | 0.13 | 0.13 | 0.13 |
| 2nd Pot | 0.13 | 0.13 | 0.13 |
| Watering | 0.10 | 0.10 | 0.10 |
| Trimming | | | 0.20 |
| Dispatch | 0.17 | 0.17 | 0.17 |
| Unit Cost | 0.70 | 0.78 | 1.38 |

**Table 6.** Cost comparison between a similar plant produced in a 1-L and 2-L pot.

| | 1-L container | 2-L container |
|---|---|---|
| Plug and label | 34 pence | 34 pence |
| Growing media | 7 | 14 |
| Pot and tray | 5 | 7 |
| Total cost | 46 | 55 |
| Price | 123 | 191 |
| Margin | 77 | 136 |

A. Plant numbers

$$\frac{\text{Total OC*}}{\text{Total plant number}} = \text{Overhead/plant}$$

B. Compost Volume

$$\frac{\text{Total OC}}{\text{Total volume compost}} = \text{Overhead/litre compost}$$

C. Time and Space

$$\frac{[\text{Time (mo)} \times \text{area (m}^2\text{) Crop A}] \times \text{total OC}}{\text{Sum (time} \times \text{area) all crops}} = \text{OC/Crop A}$$

*OC = Overhead costs

I prefer the time and space method because it reflects directly on the profitability of crops. It works best for a nursery that produces similar crops over a similar time scale but does not work as well for nurseries that produce very different crops over different time scales, such as a mixture of liners and open ground trees.

**Labour.** Labour is the largest single cost on most nurseries. It is also a cost that continues to rise. Nurseries, which have reduced their labour costs, are among the most profitable. Monitoring and accurately costing labour could well be the key to managing a successful and profitable business. It should be noted that not all of the labour cost is productive time. In nursery studies only 55%, on average, of the total labour budget is used on productive (crop-related) work. The remainder includes holidays, sickness, and non-crop-related work. It is important that this “down time” is included in any nursery cost exercise.

There are many ways of allocating labour costs. It will depend on the data available from the nursery how this can be tackled. The more sophisticated the nursery’s recording systems the better the results should be. The results will also depend on the cropping systems of the nursery. It will be more difficult to allocate labour to specific crops when a nursery produces small numbers of many crops, than on a nursery that produces large numbers of a few crops. It would be possible to group crops according to similar labour needs.

Some nurseries treat labour as an overhead and allocate it in the same way as for other overheads, as explained above.

Another way is to record specific tasks on the time sheet and then allocate them to specific crops. Table 4 shows how task unit cost may be calculated once the total number of hours that each task takes. These costs can be used to calculate the unit labour cost for each crop (Table 5).

It is also possible to time the individual tasks that are involved in producing a plant, such as potting, trimming, etc. These sample times from the majority of tasks can be combined to produce a cost per crop or plant group. This method will not capture all of the labour cost but will help proportion the labour between crops. In previous exercises the best that sampling has achieved is 55% of the total labour cost. It is very important that these other labour costs are included in the calculation.

Some nurseries are starting to use data loggers to record labour data. This should give extremely accurate labour data per crop.

## FACTORS AFFECTING PROFITABILITY

**Time and Space.** Table 6 compares the cost of growing in two sizes of container. It would appear that the higher price commanded by the larger container gives a

**Table 7.** The effect of space on margin.

| | 1-L container | 2-L container |
|---|---|---|
| Margin | 77 pence | 135 pence |
| Number of plants per m$^2$ | 59 | 34 |
| Margin per m$^2$ | 4543 pence | 4590 pence |

**Table 8.** The effect of time on margin.

| | 1-L container | 2-L container |
|---|---|---|
| Margin (pence) | 77 | 135 |
| No. of plants per m$^2$ | 59 | 34 |
| Margin per m$^2$ (pence) | 4543 | 4590 |
| Production time (months) | 1.5 | 2 |
| Margin per m$^2$ per month (pence) | 3029 | 2295 |

**Table 9.** Value of waste from five nurseries.

| | Value of waste (£) | Waste as % of turnover |
|---|---|---|
| 2002 | 315,027 | 7.85 |
| 2003 | 383,081 | 8.81 |
| 2004 | 409,237 | 10.00 |

**Table 10.** Analysis of waste.

| Not sold | 90% |
|---|---|
| Watering | 3.2 |
| Disease | 2.3 |
| Poor grade | 1.9 |
| Pests | 1.4 |
| Weather | 0.8 |
| Poor culture | 0.3 |
| Weeds | 0.04 |

**Table 11.** Cost comparisons of two liner crops.

| | *Berberis thunbergii* 'Atropurpurea Nana' | *Spiraea* ×*bumalda* 'Anthony Waterer' |
|---|---|---|
| Number potted | 9354 | 3501 |
| Cost | £1821 | £633 |
| Unit cost | £0.19 | £0.18 |
| Number sold | 9254 | 1746 |
| % Yield (%) | 98.9 | 49.9 |
| True unit cost | £0.20 | £0.36 |

**Table 12.** The effect of reducing production:

| | Initial production | Reduced production |
|---|---|---|
| No potted | 3501 | 1770 |
| Cost £ | £633 | £319 |
| Unit cost £ | £0.18 | £0.18 |
| Number sold | 1746 | 1746 |
| Yield (%) | 49.9 | 98.6 |
| True unit cost | £0.36 | £0.18 |

greater margin and is therefore more profitable. However, if you look at the space each crop takes up it gives a slightly different picture (Table 7). In a given area, the number of 1-L pots that can be produced in a given area is greater than 2-L pots; thus the margin per given area will be greater

Table 8 shows how time affects profitability. A 2-L pot will take longer to reach a marketable size than a 1-L pot; thus in time and space terms the smaller pot is the most profitable.

In general the faster that a nursery can turn over its space then the more profitable it will become.

**Yield and Waste.** Waste on nurseries has been increasing over the last few years. While the average on individual nurseries is now about 10% (Table 9) there is a considerable range of between 4% to 24% waste. This figure is for finished plants and generally does not include propagation or young plant waste. If these plants were sold, that income would go straight onto the bottom line. Table 10 shows the analysis of waste from one nursery. The majority of waste is not from pests, diseases, or plant losses but from plants not being sold. Therefore, if the nursery's total waste was 10% of turnover, 9% would be due to lack of sales.

Table 11 shows the affect of yield (where %yield = 100 – %waste) on two liner crops. Initially the *Spiraea* looks the most economic crop because it is a penny cheaper to produce. However, only half the crop is sold so the true unit cost is much higher than originally estimated. It is important that, when calculating unit costs, the total cost is divided by the number sold not the number produced.

By reducing production, and therefore increasing yield by reducing waste, considerable savings can be made and profitability improved (Table 12).

## CONCLUSIONS

It is possible to calculate the cost of each line produced by a nursery. The methods used will depend on the quality of data produced by the nursery. It is important that the cost calculation is tailored to the specific nursery.

Once calculated, the costs will become historic but they still provide a very effective management tool in improving profitability.

The crop yield, the time the crop spends on a nursery and the space it takes up will also have an effect on profitability.