Cost price calculation and profitability in ornamental horticulture

Make informed business decisions and harvest success!

PCS VMS AVBS

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Economically sustainable

The profit margins of many ornamental products have often decreased over time, and profitability within the ornamentals industry is under severe pressure. In addition, growers are expected to invest in making the sector more sustainable. However, economic sustainability is a prerequisite for sustainability in other areas.

Whereas in the past it was often enough to focus on the technical side of production, today it is at least as important for a manager to focus on the figures and to have a good understanding of product profitability. Increasingly, a knowledge of product marketing is also expected of growers.

Every decision you make as a manager has an impact on the cost price and profitability of your crops. To be sure of making the right business decisions, it is important to simulate this impact.

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This publication serves as a guide to carry out your own cost price calculations and gives tips on how to increase the profitability of your nursery and its products.

1. Introductory concepts

Before we start with the cost price calculation, we will give some general information about accounting and types of costs and where to gather the necessary data. Take control of your accounts and do the exercise yourself!

1.1. TAX VERSUS BUSINESS ACCOUNTING

Every ornamental plant grower has **tax accounts**. They can be single (simplified) or double-entry (complete). In the case of double-entry accounting, annual accounts are drawn up each year and include at least the following components:

- The **trading profit and loss account** provides an overview of your nursery's income and expenditure over a given period. Operating costs start with the number 6, operating income with the number 7.
- The **balance sheet account** consists of two parts balancing each other: the assets (buildings, stock, amount in cash, etc.) and the liabilities (equity and debt).

So tax accounting gives you an idea of the income and revenues at the nursery level.

Business accounting goes a little further. This accounting provides you with more information on the cost structure and profitability of your business and products and can serve as a guide for developing a future strategy for your business. So you can learn much more from business accounting than from tax accounting. The government strongly encourages the use of business accounting.

For a cost price calculation, as explained in this guide, it is not necessary to have a business accounting system, tax accounting will suffice.

1.2. TYPES OF COSTS

The costs from the accounts can be divided in two ways:

- fixed and variable costs
- direct and indirect costs

Fixed and variable costs

Fixed costs are costs that do not depend on your production volume and that remain, even if you stop production. Some examples are internet and telephone charges, membership fees, insurance, etc.

Variable costs, on the other hand, depend on your production volume. If you stop producing, these costs are eliminated. Growing media, labels, heating in the greenhouse and labour costs are examples of variable costs.

Direct and indirect costs

Direct costs are costs that are allocated to your product, and if you no longer produce your product, these costs also disappear. Planting materials, pots and labels are some examples of direct costs. Indirect costs, on the other hand, are not directly allocated and are costs incurred for several groups of products or generally for your business. The accountant, insurance and membership fees are examples of indirect costs.

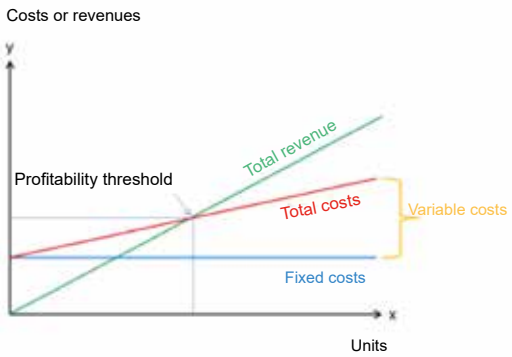
Depending on what level you look at, the same costs can be direct and indirect. If you invest in a potting machine for your nursery's entire production, the cost of this machine is a direct cost for all your products. Once you stop producing, you no longer need the machine. For one product in your range, this cost is indirect: if you decide to stop growing this product, you still need the machine for your other products.

1.3. PROFITABILITY THRESHOLD

The profitability threshold indicates the point at which total revenues equal total costs. Profits are therefore made from this point onwards. This point is also called the dead or critical point.

With the help of the graph below, we will explain the profitability threshold in more detail.

Profitability threshold



The units are displayed on the lower horizontal axis, the x-axis. These units can be either 'number of pots' or 'number of carts' and thus represent a product volume. Amounts are shown on the vertical axis, the y-axis. These amounts arise from both revenues and costs. This vertical axis is therefore expressed in €.

First, we will show the costs. As mentioned on the previous page, there are both fixed and variable costs associated with your business. The fixed costs will form a line parallel to the x-axis. After all, these costs are independent of the production volume.

Then, we add the variable costs. However, these costs depend on the production volume. When there is no production, these costs are zero. In production, costs rise with the volume. Total costs are the sum of fixed and variable costs.

In addition to costs, we also have revenues. If we do not sell, the revenue is zero. The revenue increases as we sell more.

The profitability threshold is the point where the line of total costs intersects the line of total revenues. On the vertical y-axis, you can see how much € you need to generate to cover the costs. From this point on, you make a profit. On the x-axis, you can see how many units you need to sell to break even.

For nurseries that have large profit margins, e.g. because of short-supply chains, the profitability threshold will be closer to zero. So less has to be sold before the critical point is reached. For nurseries with smaller margins, and who rely more on volume sales, this point will be further from zero. Of course, this intersection must be reached within the production capacity of your business, otherwise your business will be running at a loss.

Please note: This graph is an abstraction of reality. In the case of ornamentals nurseries, costs and revenues are not straight lines, but rather curved lines. Nevertheless, the profitability threshold can give you some insight into the profitability of your business.

1.4. CASH FLOW PLANNING

Costs and revenues vary throughout the production year, and there are many invoices and repayments to be paid before production yields are generated. This can sometimes cause problems, especially in ornamentals businesses with long production cycles. Ideally, the costs should be paid by the profits of the previous operating year. However, in certain cases, such as after a bad sales year, the costs are paid from the working capital (from own resources or from borrowed capital).

There is a risk that these resources will be exhausted and that business operations will come to a standstill. Therefore, cash flow planning is an excellent tool for gaining an overview of the terms on which invoices and repayments can be paid.

With cash flow planning, you look at what expenses are incurred and what income is generated each month. Since this is a forecast, it is important not to minimise the costs and not to overestimate the revenues, everything must be taken into account. In this way you calculate the monthly balance or the free cash flow per month, in other words the money you have available. Both positive and negative monthly balances are carried over to the next month.

You will often see that certain months have a negative monthly balance and that in the following months, once the income comes in, the monthly balance becomes positive. So you know which period must be bridged during the year.

Of course, if all months have a positive monthly balance, there is no problem. When certain months have a heavy negative balance, you can consider two actions based on the cash flow planning:

- Request advance payment from customers and thus bring forward revenues.
- Request a deferred payment or staggered payment to suppliers. Thus, the costs are pushed back or are better distributed throughout the year.

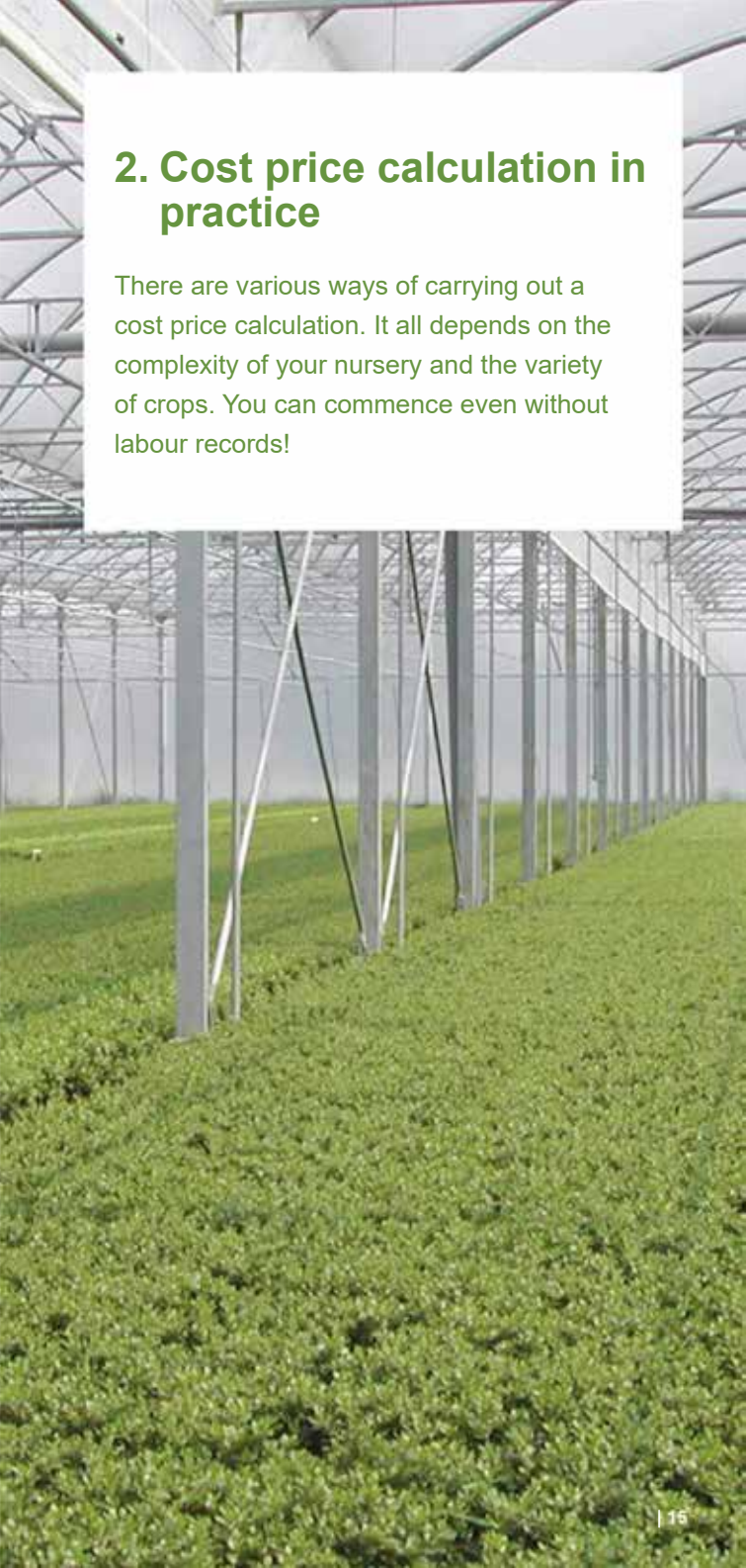
Even though cash flow planning is a forecast, it is very useful to adjust it during the year. That way, you can still intervene in time if necessary.

Cash flow planning is the ideal tool to gain your business partners' trust. If there are no problems or if you are not dependent on borrowed capital or suppliers, cash flow planning is more an internal tool to gain better insight into your business operations. So cash flow planning is not only useful for nurseries in trouble, every nursery can benefit from it!

More information on cash flow planning and some useful spreadsheets can be found on the 'Boeren op een Kruispunt' (Growers at Crossroads) website: www.boerenopeenkruispunt.be.

2. Cost price calculation in practice

There are various ways of carrying out a cost price calculation. It all depends on the complexity of your nursery and the variety of crops. You can commence even without labour records!



Cost price calculation is indispensable if you want to check the profitability of your product range. It is therefore an important part of a good business model. Cost price calculation reveals the cost structure of your nursery and your products.

Insight into cost structure is of great importance to:

- know what costs are associated with your product
- save costs
- justify certain business decisions

However, cost price calculation in ornamental horticulture is not an easy job. Many ornamental growers have tried it before, but the calculations often fail. In the following sections, we explain the various aspects of the cost price calculation in detail. This way you can get started on your own!

Before undertaking any cost price calculation, we must of course define what we mean by cost price.

"Cost price includes the sum of all costs incurred to provide a particular product or service."

The cost price consists of three pillars: the **product costs,** the **labour costs** and a share of the **operating costs.**

Cost price = product costs
+ labour costs
+ a share of the operating costs

2.1. PRODUCT COSTS

Product costs include all direct material costs per production unit incurred from the start of production to the finished product. This mainly covers growing media, pots, planting material, labels, sleeves, sales trays, etc. These costs are directly allocated and easy to calculate. This data can be found on the suppliers' invoices. Since everything is delivered in large quantities, it is important to determine the price per unit, so you can calculate exactly the product costs for one unit of delivered product (for example, one pot chrysanthemum).

Product cost per 4 litre pot chrysanthemum	
Planting material	€ 0.18 per pot
Pot 4 l	€ 0.16 per pot
Growing media pot 4 l	€ 0.18 per pot
Sleeve	€ 0.10 per pot
TOTAL	**€ 0.62 per pot**

Fertiliser and sprays

In principle, fertilisers and plant protection product applications are also direct material costs and should therefore be included in the product cost. However, experience has shown that the cost of fertilisers and sprays per plant or product often amounts to less than € 0.01. An exception is therefore made, and we include these costs in the general operating costs.

Of course, we make an exception for fertiliser and sprays that are expensive and that can be directly allocated to a specific product, such as plant growth regulators. By dividing the cost price of a certain quantity of this product by the number of plants in the area, you can easily calculate the cost per plant (or product).

$$\text{Cost price per plant} = \frac{\text{cost price per area}}{\text{number of plants per area}}$$

2.2. LABOUR COST

The second important element of cost price is the labour cost. It is therefore necessary to calculate how much labour is needed to create a product that is ready for sale. Experience shows that this is the most complex part of cost price calculation.

Importance of time records for labour

The labour cost can best be calculated if some form of recording is done, so that the work undertaken on the nursery can be divided between different batches or products.

If this is not the case, it makes little sense to include labour separately in the cost price and it is advisable to consider the labour cost, including income from work, as a general operating cost and to include it via the €/week-m^2 principle as described below. The disadvantage of this practice is that you do not distinguish between batches or products that are labour intensive and those that require less labour. Plants at a lower density, i.e. fewer plants per m^2, in an area and which remain on the nursery for longer

will thus be allocated more labour costs than plants in smaller pot sizes and a shorter production cycle. This important nuance should always be kept in mind when considering labour costs as a general operating cost. In some cases, however, labour records are not necessary, for instance when all the products on your nursery are similar in terms of labour intensity.

Allocated versus unallocated labour

Two types of work are always performed on the nursery. Firstly, we have directly allocated labour: this is the work that can be immediately assigned to a batch or products. Often, these are production-related processes. Allocated labour can be expressed in 'number of plants/products per hour'. Some examples are taking cuttings, potting and pruning.

In addition, there is also unallocated labour: this usually involves general processes that are not batch or product specific. Spray application, weeding, book keeping, preparing orders, delivering orders,... all these fall under this heading.

Allocated labour	Unallocated labour
Cuttings	Accounting
Potting	Customer service
Pruning	Spraying
Spacing	Weeding
Sales preparation	Order preparation
...	...

Often the share of unallocated work of a manager will be higher than that of any other worker. It is also often greatly underestimated. A manager of a family business will easily spend 40 to 50% of their time doing unallocated work, whereas for a temporary employee, for example, it will be 10 to 20%.

If we want to add a labour cost to the cost price, both types of labour must of course be taken into account. In other words, this labour cost should not only cover the labour cost required to perform the crop-specific processes, the allocated work, but also the costs arising from unallocated work.

Employment of family members

Do not forget to include the work undertaken by family members in the calculations. Even though this is often done on an unpaid basis, there will come a time when this extra help is no longer available and a paid employee will need to be recruited to assist the team. It is very important that the (unaccounted) labour cost of this employee or employees are included in the calculations. A business can be perfectly profitable and suddenly lose profitability because of the loss of this help.

Select the labour costing method specific to your business

We provide a few possible solutions on how to calculate labour costs, considering the above. It is important that there is always a good balance between simplification of the calculations and accuracy/reality of the final labour cost.

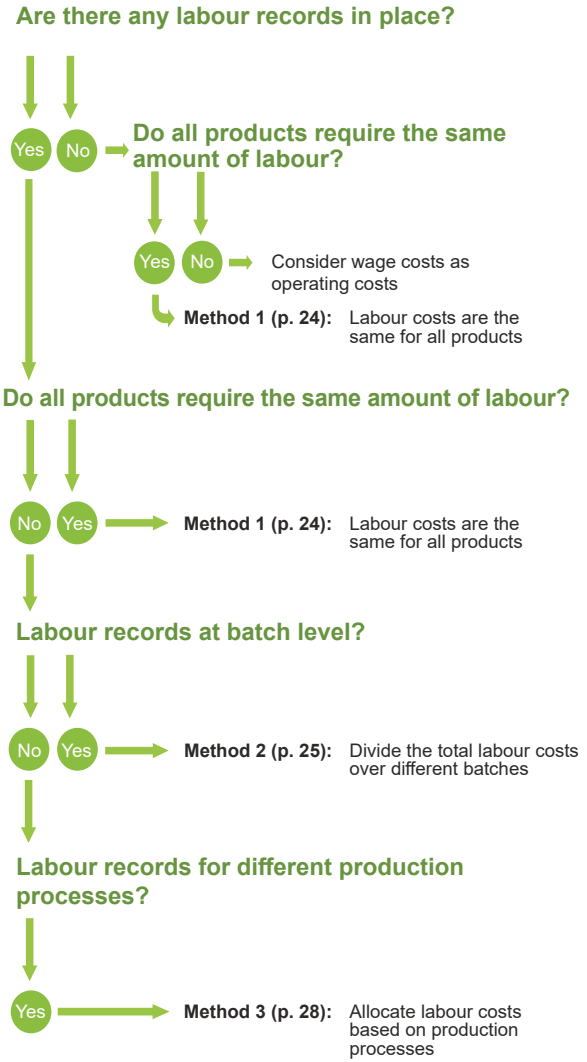
The way labour costs can be allocated to a batch or product depends on the following factors:

- the complexity of the batches on your nursery
- the extent to which labour records are already in place

The flow diagram on the next page can help you make your choice.

Please note: In case of products with a long production period, spread over several years, such as certain tree products, it is recommended to work with an average hourly wage, as described in the third method (method 3b, p. 33).

Selection scheme for the allocation of labour costs



METHOD 1: LABOUR COSTS ARE THE SAME FOR ALL PLANTS

This is the easiest way to allocate labour costs to your products. Here, the total gross salary cost (including any income from work) over a year is divided by the number of plants produced in a year.

$$\text{Labour cost per plant} = \frac{\text{gross salary cost per year}}{\text{number of plants per year}}$$

The logical consequence is that no distinction is made between labour-intensive and labour-extensive batches. This solution is ideal for nurseries where the products do not differ in labour demand. No labour records are required for this method of calculation.

Please note: It is not self-evident that monoculture nurseries fall under this category, as summer and winter crops of a monoculture can differ greatly in terms of labour.

EXAMPLE

We calculate the labour cost on a nursery that grows ornamental grasses. However, the different grasses all have approximately the same labour requirements and differ little in production method. The nursery has a gross salary cost of € 120,000 per year. Every year, 500,000 ornamental grasses are grown and sold.

Labour cost per plant = € 120,000 / 500,000 = € 0.24

This is just an example, in reality the labour cost may differ from the above amount.

METHOD 2: DIVIDE TOTAL LABOUR COSTS BETWEEN DIFFERENT BATCHES

If batches of plants clearly differ in terms of labour demand, it is of course better to also pass on these differences in the labour costs. First of all, these batches must be defined with the total number of plants per batch.

STEP 1: Determine plant batches and division of labour

The batches will consist of groups of plants requiring the same labour demand. It is therefore possible that different products are part of the same batch. Next, a percentage distribution of labour is made for each batch. This does not require extensive records, you only record the time spent on each batch.

$$\% \text{ Labour of batch} = \frac{\text{number of hours of work on batch}}{\text{total number of hours of work per year}}$$

Labour allocation per batch

Batch	Number of plants	% Labour
Batch A	180,000	25%
Batch B	70,000	15%
Batch C	250,000	30%

STEP 2: Unallocated labour

In the above example, we see that the total % of recorded labour for all batches combined is not 100%. The remaining percentage (30%) is due to unallocated labour. To calculate this, determine the factor by which the total percentage of recorded labour can be brought to 100%. This can be done by applying the 'rule of three'.

EXAMPLE

Factor unallocated labour
= 100 / total percentage of recorded labour
= 100 / 70
= 1.43

STEP 3: Calculate the unallocated labour element to be taken into account per batch

Then multiply each the labour percentage of each batch by this factor.

Labour allocation per batch including unallocated labour		
Batch	**Number of plants**	**% Labour x factor (1.43)**
Batch A	180,000	35.75%
Batch B	70,000	21.45%
Batch C	250,000	42.90%

Now all the work performed on the nursery, including the unallocated labour, has been divided between batches.

STEP 4: Total labour cost per batch

The total gross wage cost, including any income from work, is then divided among the different batches according to the final percentages of labour allocation, including unallocated labour. In the example, we again assume that the gross wage cost at the nursery is € 120,000.

Total labour cost per batch		
Batch	**Number of plants**	**Labour cost**
Batch A	180,000	€ 42,900
Batch B	70,000	€ 25,740
Batch C	250,000	€ 51,480

STEP 5: Labour cost per plant

By dividing the number obtained per batch by the number of plants/products in the respective batch, the labour cost per plant/product can be obtained.

$$\text{Labour cost per plant} = \frac{\text{labour cost of the batch,}}{\text{number of plants in the batch}}$$

Labour cost per plant		
Batch	**Number of plants**	**Labour cost per plant**
Batch A	180,000	€ 0.24
Batch B	70,000	€ 0.37
Batch C	250,000	€ 0.20

Comments

Obviously, this exercise does not need to be repeated every year; it suffices to calculate any change in gross wage cost (by factor of x, whereby the new wage cost = x times the old wage cost) to the labour cost per plant by multiplying it by the same factor of x.

When you decide to increase or decrease the size of certain batches in the following season, in theory there will be little change in the labour cost per plant.

However, if you decide to start new batches, which differ greatly from those already defined in terms of labour demand, the whole exercise must of course be repeated.

METHOD 3: ALLOCATING LABOUR COSTS BASED ON PRODUCTION PROCESSES

When a nursery has a fairly good idea of the duration of the various production processes, the choice can be made to proceed with this data and to determine labour cost for the products on the basis of this. This third option can be implemented in two ways. You choose which method you prefer.

3a. Assigning a 'normalised value' to the various production processes

STEP 1: Define batches

As with the previous method, the batches are first defined. These consist of groups of plants that have the same labour demand.

STEP 2: Output from the production processes

Subsequently, for each batch, the production processes should be defined with the respective duration, expressed in 'plants per hour per man'. Often, the same processes will occur in the different batches (cutting, pruning, etc.), but the speed may vary from batch to batch.

Output from the production processes (expressed in 'plants per hour per man')	
Process	**Output**
Batch A - Cuttings	150 pl/h
Batch A - Pruning	100 pl/h
Batch A - Sales preparation	80 pl/h
Batch B - Cuttings	120 pl/h
Batch B - Spacing	250 pl/h
Batch B - Pruning	120 pl/h
Batch B - Sales preparation	80 pl/h
Batch C - Cuttings	180 pl/h
Batch C - Pruning	120 pl/h
Batch C - Sales preparation	80 pl/h

The speeds in the table are examples, you have to measure them yourself.

STEP 3: Normalised speed

Subsequently, these values should be normalised across all batches, not within a batch. You can do this for example by taking the slowest process as a reference and giving it the value '1' and determining how the other processes relate to this reference. To do this, you must divide the value of the reference process by the value of the other process.

$$\text{Normalised speed} = \frac{\text{speed of slowest process}}{\text{speed of other process}}$$

The normalised values obtained will be less than 1, because those processes take less time than the slowest process (which has value 1).

Production processes at normalised speed	
Process	**Normalised speed**
Batch A - Cuttings	0.53
Batch A - Pruning	0.80
Batch A - Sales preparation	1
Batch B - Cuttings	0.67
Batch B - Spacing	0.32
Batch B - Pruning	0.67
Batch B - Sales preparation	1
Batch C - Cuttings	0.44
Batch C - Pruning	0.67
Batch C - Sales preparation	1

You have reduced the list of production processes and their outputs to the same list, but with normalised values. Think of this as a kind of points system.

STEP 4: Determine the number of plants per batch

Number of plants per batch	
Batch	**Number of plants**
Batch A	180,000
Batch B	70,000
Batch C	250,000

STEP 5: Normalised speed per batch

Finally, multiply each normalised value by the number of plants in the respective batch. You do this for all batches.

Production processes per batch at normalised speed	
Process	**Normalised speed per batch**
Batch A - Cuttings	95,400
Batch A - Pruning	144,000
Batch A - Sales preparation	180,000
Batch B - Cuttings	46,900
Batch B - Spacing	22,400
Batch B - Pruning	46,900
Batch B - Sales preparartion	70,000
Batch C - Cuttings	110,000
Batch C - Pruning	167,500
Batch C - Sales preparation	250,000
TOTAL	**1,133,100**

You then take the sum of all these numbers, in the example this is 1,133,100, and divide the nursery's gross salary cost, for example € 120,000, by this number. Now you know how much the slowest process costs.

$$\text{Cost of slowest process} = \frac{\text{gross wage cost}}{\text{sum of normalised speeds}}$$

EXAMPLE

Cost of slowest process = € 120,000 / 1,133,100

= € 0.11

STEP 6: Labour cost per production process

By multiplying this amount by the standardised value of the other processes, you can also calculate the labour cost of those processes.

Production processes per batch with labour cost	
Process	**Labour cost**
Batch A - Cuttings	€ 0.06
Batch A - Pruning	€ 0.09
Batch A - Sales preparation	€ 0.11
Batch B - Cuttings	€ 0.07
Batch B - Spacing	€ 0.04
Batch B - Pruning	€ 0.07
Batch B - Sales preparartion	€ 0.11
Batch C - Cuttings	€ 0.05
Batch C - Pruning	€ 0.07
Batch C - Sales preparation	€ 0.11

STEP 7: Labour cost per plant

Then all that remains is to add up the values obtained within the batches to obtain the total labour cost per product.

Labour cost per plant		
Batch	**Number of plants**	**Labour cost per plant**
Batch A	180,000	€ 0.26
Batch B	70,000	€ 0.29
Batch C	250,000	€ 0.23

The great advantage of this system is that all labour on the nursery is allocated to the actual production processes and that you do not need to know the share of unallocated labour, which is automatically accounted for.

3b. Allocating a labour cost to the various processes on the basis of an average hourly wage

A second way to calculate the labour cost, when you have a good idea of the duration of the different production processes, is to allocate a labour cost to each process based on the average hourly wage on the nursery.

STEP 1: Average hourly wage

We first calculate the average hourly wage by dividing the total gross wage cost, including any income from work, by the number of hours worked at the nursery on an annual basis.

Work performance and wages on the nursery

Type of employee	Hourly wage	Hours/ year	Annual salary
Business manager	€ 35	1,920	€ 67,200
Full-time employee	€ 25	1,824	€ 45,600
Temporary employees	€ 12	600	€ 7,200
TOTAL		**4,344**	**€ 120,000**

$$\text{Average hourly wage} = \frac{\text{total gross wage cost}}{\text{total number of hours of work}}$$

EXAMPLE

Average hourly wage = € 120,000 / 4,344

= € 27.62

STEP 2: % of unallocated labour

This average hourly wage must then be increased by a certain factor in order to include the unallocated labour. For this purpose, the % of unallocated work of each employee must be estimated. As already mentioned, this percentage will usually be higher in the case of the manager than for a temporary employee. After all, the manager is often busy with book keeping, dealing with customers, managing staff, etc

Unallocated labour (%) of employees		
Type of employee	**% unallocated labour**	**Number of hours of unallocated labour**
Business manager	50%	960 h
Full-time employee	15%	274 h
Temporary employees	10%	60 h
WEIGHTED AVERAGE	**39.7%**	

We then use this data to calculate the weighted average of the unallocated labour on the nursery, expressed as a percentage. The % of unallocated labour of the manager will therefore be given more weight than that of a temporary employee, for example. In the above example, it is 39.7%.

STEP 3: Effective hourly wage

The effective hourly wage cost with which we will determine the labour cost per process is obtained by multiplying the average hourly wage on an annual basis by 100 and then dividing it by the weighted average percentage of allocated labour (= 100% - 39.7% in the example).

$$\text{Effective hourly wage} = \frac{\text{average hourly wage} \times 100}{\text{weighted average \% allocated labour}}$$

EXAMPLE

Actual hourly wage = € 27.62 x 100 / 60.3
= € 45.80

STEP 4: Total labour cost

Then we can calculate the labour cost per process by dividing the effective hourly rate by the speed of the processes, expressed in 'number of plants/products per hour and per man'. The sum of the labour costs of the processes within each batch gives the total labour cost of the products in that batch.

Production process output and labour cost

Process	Output	Labour cost
Cuttings	300 pl/h	€ 0.15
Pruning	150 pl/h	€ 0.30
Spacing	250 pl/h	€ 0.18
Sales preparation	120 pl/h	€ 0.38
TOTAL LABOUR COST		**€ 1.01**

Check

This method requires an additional check to make sure that the effective hourly wage is correct, as the percentages of unallocated labour are estimated. By multiplying the number of plants/products within each batch by the labour cost per plant/product, and summing up these amounts

one can check whether the total gross wage cost is thus reached. If the amount obtained is lower, this indicates an underestimation of the average percentage of unallocated labour and the effective labour cost must be increased. The reverse is also true.

2.3. SHARE OF OPERATING COSTS

The third pillar that makes up the cost price of a product is its share of the operating costs. Every year, a number of costs are incurred to keep the business operational. Most of these operating costs are not directly linked to the crops. This includes insurance, fees, internet and telephone, membership fees, etc. On the other hand, there are of course costs that are directly related to your production: heating costs, electricity, auction costs, transport costs, etc.

The latter costs can usually not be allocated to a specific batch. Should this be the case, you can opt to deduct them from the product cost.

As mentioned earlier, you can consider the cost of spraying plant protection products as an operating cost, unless it is very expensive.

If you have not made any labour records and therefore have no idea how labour can be distributed correctly over your crops, we also strongly recommend that you consider labour costs as an operating cost. This way you can be sure the labour cost is included.

How can we include operating costs in the cost price?

As with labour costs, there are again a number of ways to account for these costs. One way is easier than the other.

Again, **we recommend finding a good balance between simplification and accuracy**. We give two methods by which you can account for the operating costs. Which method to use, depends on the type of nursery and the variation in crops.

Use method 1 only when the following conditions are met:

- The products all remain on the nursery for the same length of time.
- The products all take up the same amount of space on the nursery and have the same pot size.
- The products all require the same infrastructure and growing conditions (temperature, humidity, lighting).

If these conditions are not met, use method 2.

METHOD 1: DIVIDE THE OPERATING COSTS BY THE NUMBER OF PRODUCTS

This first method is also the simplest. The total sum of all operating costs (without labour and product costs, because you count these separately) are divided by the number of products produced in a year. If the product cost and labour cost are the same for all products on your nursery, the total sum of all costs can of course be taken.

Note that: This method does not distinguish between products that have been on the nursery longer or occupy more space, the share of operating costs will be the same for all products.

$$\text{Share of operating costs per plant} = \frac{\text{total operating costs}}{\text{number of plants}}$$

EXAMPLE

A nursery with a heated greenhouse produces 450,000 products annually. They all have the same pot size and production duration. The general operating costs (without labour and product costs) amount to € 260,000.

€ 260,000 / 450,000 = € 0.58

The share of operating costs per product is therefore € 0.58.

METHOD 2: DISTRIBUTE THE OPERATING COSTS OVER THE PRODUCTION AREA(S) OF THE NURSERY (€/WEEK-M²)

In this second method, we go a little further: instead of dividing the operating costs (without labour and product costs) by the number of products, we now divide them by the net production area(s) of the nursery, per week or per year.

This method is better known as the **€/week-m²** (or **€/year-ha for longer crops**) method, and relies on the logic of the following two assumptions:

- Products with a longer production period contribute more to the operating costs compared to products with a shorter production period.
- Products that take up more space contribute more to operating costs than products that take up less space.

The objective is to divide the cost of one square metre per year over the plants that are on it during that year. For this you have to calculate what a square metre of 'production area' costs are. After all, it is important that operating costs are calculated based on the surface area on which products are actually growing and the time that they are present there.

In reality, costs are constantly being incurred on your nursery, even at times when not all locations are optimally utilised.

If you were to calculate what a square metre per week would cost on your nursery, without taking the fact that the area is not always used into account, you will create a deficit in the cost price calculation.

To solve this, proceed as follows:

STEP 1: Types of locations

First of all, determine what location types your nursery has. Locations are different if they differ in infrastructure or the set growing conditions. Different types of locations are for example container bed, cold greenhouse, warm greenhouse, propagation greenhouse, forcing areas, cold room and open field.

Please note: When you have a number of physical locations of a certain location type (e.g. two container beds), but they do not differ in terms of infrastructure or growing conditions, then you see them as one location. If they do differ, but if it does not matter whether a batch of products is on one or the other, you see them as one location.

STEP 2: Net area per location

Then you calculate the net surface area per location type. This is the gross area without pathways, spray alleys etc. In other words, the area on which plants are actually grown. With nurseries that have only one location type, there will also only be one surface.

STEP 3: Utilisation rate per location

Finally, you determine the utilisation rate per location type. This utilisation rate is applicable **in both time and space**. If a particular location is only 80% occupied for half the year and the rest of the time it is empty, the utilisation rate is 40%.

STEP 4: Usable area per location

By **multiplying the net surface area per location type by the respective utilisation rate in %**, you obtain the usable surface area per location type.

Usable area of the different locations on a ornamental plant nursery

Location type	Gross surface area	Net surface area	Utilisation rate	Usable area
Propagation greenhouse	3,000 m²	2,700 m²	50%	1,350 m²
Cold greenhouse	10,000 m²	7,500 m²	100%	7,500 m²
Container bed	20,000 m²	18,000 m²	40%	7,200 m²
TOTAL	33,000 m²	28,200 m²		**16,050 m²**

We will soon see that the usable area of the nursery is much less than the gross area, about half in the example. Of course, this has a lot to do with the utilisation rate of the various locations.

STEP 5: Distribute operating costs across locations

Now that we have calculated the usable areas, all that remains is to calculate the operating costs. To do this, we list all operating costs incurred in a given accounting year - or a budget if you want to do a pre-calculation or a simulation - and determine for each cost whether it is a general operating cost or a location-specific cost. Most of the costs will be general operating costs, except, for example, electricity, heating costs, certain insurances, etc.

Distributing operating costs	
General operating costs	€ 95,500
Propagation greenhouse	€ 23,000
Cold greenhouse	€ 30,000
Container bed	€ 1,500
TOTAL	**€ 150,000**

Thus, we have divided the total operating cost (without labour cost and product cost) into x+1 number of parts, where x is the number of location types. So there is one additional part, namely the costs that are general to the nursery, not to a specific location.

STEP 6: Calculate €/week-m²

The final €/week-m² of the locations is the sum of the €/week-m² of the nursery and the site-specific costs.

$$\text{€/week-m}^2 \text{ of location} = \left\{ \frac{\text{general operating costs}}{\text{usable area of nursery}} + \frac{\text{location-specific costs}}{\text{usable area of location}} \right\}$$

52

€/week-m² of the different locations			
Location	**Operating costs**	**Usable area**	**€/week-m²**
Nursery	€ 95,500	16,050 m²	€ 0.114
Propagation greenhouse	€ 23,000	1,350 m²	€ 0.114 + € 0.327 = € 0.44
Cold greenhouse	€ 30,000	7,500 m²	€ 0.114 + € 0.077 = € 0.19
Container bed	€ 1,500	7,200 m²	€ 0.114 + € 0.004 = € 0.12

Once we have determined the €/week-m² of the different locations, we are set to go. After all, we now know how much a square metre costs per week per location.

STEP 7: Define batches

Then divide your nursery's products into batches. Again, try to simplify as much as possible and group together different products that go through the same production process and have the same pot size. The trick is to reduce your diverse range to a few representative batches.

STEP 8: Determine the production stages

A batch will go through a number of stages during the entire production period. It is important to define these stages for each batch. A batch enters the next stage if one of the following two conditions is met:

- The batch is moved to another location type on the nursery. So another €/week-m^2 has to be taken into account.
- The density of the number of plants per m^2 changes. So more or fewer plants have to bear the cost of that m^2.

For each stage, you should collect the following data:

- The type of location where the products are.
- How many weeks they remain in this location.
- How many products there are per m^2.

STEP 9: Determine the proportion of operating costs per stage

The proportion of the operating costs per product and per stage can be calculated by then multiplying the €/week-m^2 per stage by the number of weeks a batch stays at this stage, and dividing it by the density.

Different stages of a product with pot size 12 share of operating costs

Stages	Location + €/week-m^2	Production period	Density	Share of operating costs
Cutting stage	Propagation greenhouse (€ 0.44)	7 weeks	70 pl/m^2	€ 0.044
Post-potting	Cold greenhouse (€ 0.19)	15 weeks	70 pl/m^2	€ 0.041
Final spacing indoors	Cold greenhouse (€ 0.19)	15 weeks	21 pl/m^2	€ 0.136
Final spacing outdoors	Container bed (€ 0.12)	13 weeks	21 pl/m^2	€ 0.074
TOTAL		50 weeks		**€ 0.30**

STEP 10: Determine total share of operating costs

In the end, you only have to take the sum of the calculated location costs per stage. In the above example, € 0.30 will be added to the labour cost and product cost.

2.4 WHAT SHOULD WE NOT FORGET IN THE COST PRICE CALCULATION?

There are a number of factors that should definitely be taken into account when determining the cost of a product. These include:

Transport costs

Transport costs should not be underestimated, especially since the introduction of the kilometre charge. There are various ways of charging for transport. On the one hand, you can consider transport costs as a general operating cost. On the other, you can add a transport cost on top of the cost price. This will of course depend on the distance to the customer and the size of the order.

Order preparation

The preparation of orders greatly depends on the size of the order. Relatively speaking, larger orders of plants or products will be prepared faster than smaller orders. It is not easy to allocate a cost to this. The preparation of orders in principle falls under unallocated labour. However, many growers work with tiers: large orders may be subject to a quantity discount, while small orders pay the full price. Of course, a large order can also consist of a number of small quantities of various products, which again makes it difficult to pass on the additional cost of the extra work.

Fictitious interest

A lot of your personal capital is often invested in the nursery. You can see this investment as a risky investment. It goes without saying that you will be

compensated for this. You could opt to include a fictitious interest rate on this capital in the cost price, for example 5%. You can then consider this as an operating cost.

Investments

Of course, it is very important to take current and future investments into account, both in infrastructure and in equipment. It is best to include a margin for this in your costings.

As far as **current investments** are concerned, you can include their amount in the operating costs. If you use the €/week-m^2 (or €/year-ha for longer crops), you can spread depreciation over the different locations in case of infrastructure investments. Investment in equipment can in most cases be seen as a general operating cost rather than a location-specific cost.

In most nurseries, a lot of investments have already been written off. In which case, it is very important to list what **investments will be needed in the future** to keep the business running. This can include new investments or replacement investments. Again, for each investment, you determine the annual amount you would need to be able to make that investment within x number of years. If this concerns infrastructure investments, you can include them again in the €/week-m^2 of the respective location. With replacement investments, it is important to start from the new value and adjust it regularly as the new value price changes.

Product losses

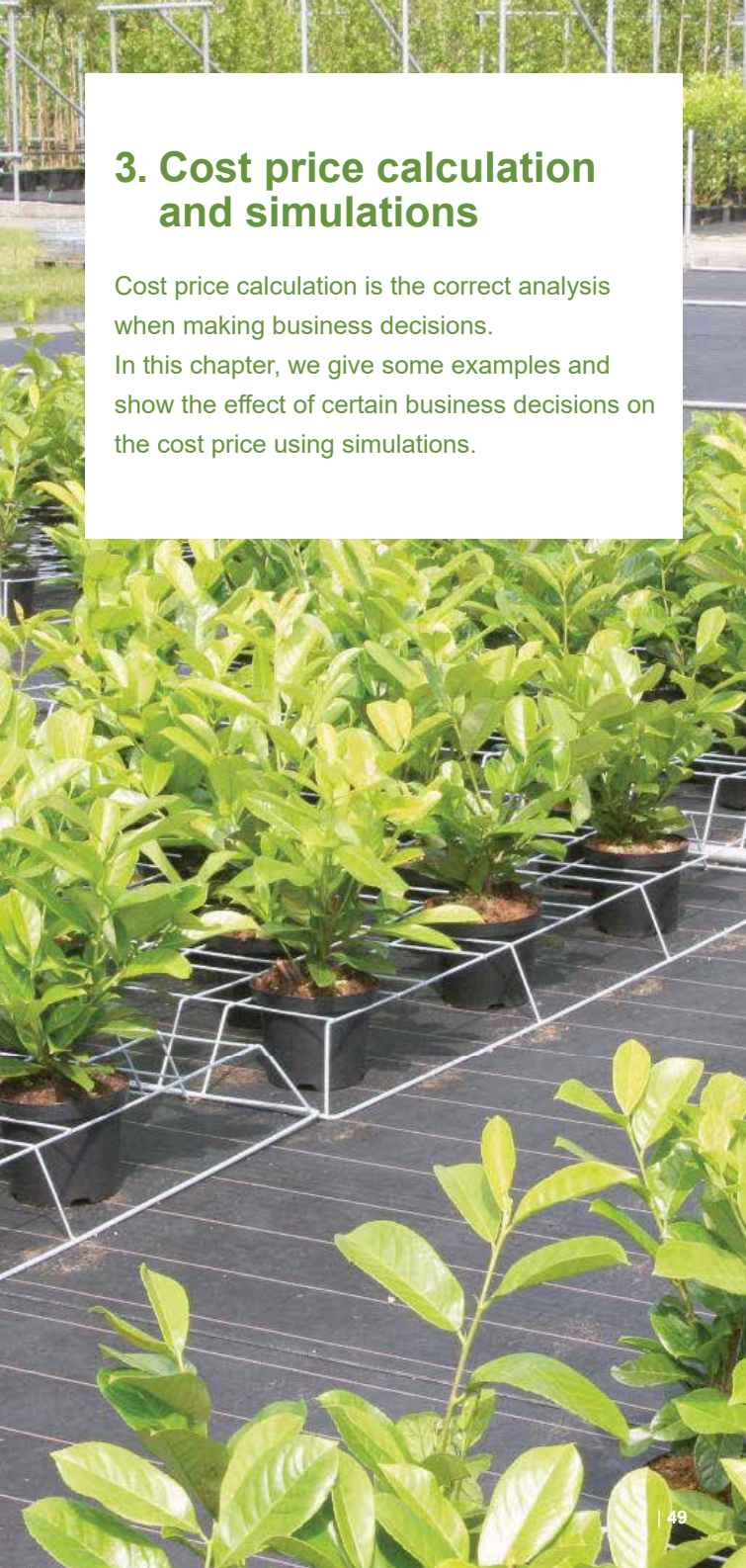
The cost price must also be corrected in the event of losses. By losses we mean the loss of products during the production period, but unsold products can also be considered as losses.

In the first case, you can determine a loss percentage per stage and offset the costs incurred up to and including that stage against the number of plants remaining. The earlier losses occur, the smaller the effect of losses will be on the cost price. After all, a lot more costs may have been incurred by the product later in its production than earlier.

Unsold product can be seen as losses in the final stage. This will obviously have a major impact on the cost price of your product. You could decide to include the cost of unsold product in the operating costs so that they are borne by all products. To do this, you include the cost price of the unsold products, as well as any destruction costs.

3. Cost price calculation and simulations

Cost price calculation is the correct analysis when making business decisions.
In this chapter, we give some examples and show the effect of certain business decisions on the cost price using simulations.



Business decisions are often taken based on 'a gut feeling'. This is a false argument. Whatever business decision you make, whether it is automation, scaling up or down or hiring an extra worker, these decisions have an impact on the cost price of your products. It is therefore important to simulate the effect of these decisions in advance, so that the profitability of your products and your business is not compromised.

In this chapter, we give some practical examples, with simulations. The examples are based on real situations in Flemish ornamental nurseries from the various subsectors, using average figures. The cost price for the same product differs from one nursery to another, since operating costs, labour organisation and efficiency, nursery size and investment costs can vary greatly.

It is very important not to compare your own nursery with the following examples, as they serve only to illustrate cost price calculation in practice and show how you can carry out simulations yourself.

3.1. AZALEA

To many consumers, growing azalea seems like a monoculture. There are some differences in pot size, in flower colour and in shape, but beyond that, there seems to be little variation. Nothing could be further from the truth, of course. Thanks to the cultivar H. Vogel with all its colour mutations, azaleas are available most of the year. There are large differences in production methods, which translate into different cost prices.

Infrastructure of the azalea nursery

The example nursery is 3 hectares in size, with 1 hectare of container beds and 2 hectares of greenhouses. Within the greenhouse area, there is a 2,000 m^2 greenhouse, a 200 m^2 cold store and a 500 m^2 forcing area. To start an azalea nursery of this size from scratch today, you need about € 1,750,000. This includes the complete infrastructure (land, container beds, greenhouse, heating, access ways, sprinkler system, etc.), the machinery, rolling stock, office space and a warehouse. The propagation greenhouse is equipped with underfloor heating. The forcing area has underfloor heating, lighting via high-pressure sodium lamps and is equipped with an ebb and flow system, so the flower buds are not damaged by irrigation.

Summer cuttings versus winter cuttings

We compare an azalea from a summer cutting (July), pot size 12 with four cuttings, which is sold in early September of the following year and the same azalea from a winter cutting (November/December), which is sold in February. Both plants are on the nursery for about 15 months, but have a different cycle. The summer cuttings are taken in July and spend seven weeks in the summer propagation greenhouse, where the plants are at a density of 70 plants per m^2. At the end of this period, they are pinched for the first time to remove the growing point and spend the late summer (September-October) in the summer greenhouse. When winter comes, the plants remain in place until March, this time in the winter greenhouse, and receive their second and final trimming. The density of the plants is still 70 plants per m^2 . It gets a little warmer, from April onwards we charge the €/week-m^2 of the summer greenhouse, where they stay until the end of June. The plants are bigger and have a density of 21 plants per m^2. In July, to ensure uniform flowering, the plants are put into cold storage at 7°C. Since the plants are on a Danish trolley with four shelves, the density here is 64 plants per m^2. The plants are a little further apart in cold storage to avoid *Botrytis*. Finally, the plants are forced into flower in the forcing area for three weeks at a density of 21 plants/m^2, so that they can be sold from the end of August - beginning of September. The process with the winter crop is similar, but has a period on the container beds during spring and summer.

Product cost per azalea

The product cost includes a pot, the growing medium, the cutting material and a sales tray. In reality, cuttings are often taken from other proprietary crops. If you purchase azalea cuttings, this amounts to approximately

€ 0.01 per cutting We stick to this price, as taking the cuttings also requires labour. Together, we arrive at a product cost of € 0.15 per pot.

Product	Cost per pot
Pot 12 cm	€ 0.05
Growing media per pot 12 cm	€ 0.05
Four cuttings	€ 0.04
Sales tray	€ 0.01
TOTAL	**€ 0.15**

Labour cost per azalea

The labour cost includes the cost of taking the cuttings, pinching, spacing, bringing in and taking out (to the container bed, to the cold store or to the forcing area) and getting the product ready for sale. We use method 3b (p. 33) to allocate a labour cost, however, the cost of the manager, € 40,000 on an annual basis, is added to the nursery operating costs. Other work performed on the nursery (employees, seasonal work etc.) is charged at €15 per hour. The speed of these processes obviously varies from nursery to nursery, which is why we have averaged four existing nurseries for this calculation exercise. As the production method of a summer cutting differs from that of a winter cutting, the labour costs of a winter and a summer cutting are also different. After all, the summer cutting will be placed in the cold store towards the end and the winter cutting will not. The winter cutting will in turn spend the spring and summer on the container beds, while the summer cutting will remain in the cold greenhouse. In the table below, all production processes of summer and winter cuttings are grouped.

Process	Output (pots/h per man)	Cost of process
Cuttings (a, b)	360	€ 0.04
Pinch 1 + move (a, b)	600	€ 0.025
Pinch 2 + spacing (a)	600	€ 0.025
Pinch 2 (b)	800	€ 0.02
Taking out (b)	600	€ 0.025
Bringing in (b)	800	€ 0.02
In/out of cold store (a)	600	€ 0.025
In/out forcing area (a, b)	600	€ 0.025
Sales preparation (a, b)	100	€ 0.15

(a) summer cutting, (b) winter cutting

The total labour cost for a green, non-flowering summer cutting is € 0.27 and € 0.30 if it is sold while in flower. With the winter cutting, the azalea is € 0.01 more expensive in both cases: € 0.28 if sold green, € 0.31 for a flowering plant.

Share of operating costs per azalea

Operating costs, electricity, insurance, membership fees, heating fuel, etc. are allocated using the €/week-m^2 principle. The heating costs are charged according to consumption during the winter to the greenhouse, the propagation greenhouse and the forcing area. The cold store runs on electricity, which we also partly pass on to the location cost of the cold store.

The investment of € 1,750,000 results in an annual repayment of € 101,500 (depreciation on 40 (land), 25 (infrastructure), 15 (installations), 10 (construction of container beds), 7 (rolling stock) and 5 years (lamps)).

To keep the nursery operational, about € 150,000, of which € 40,000 are the managers' costs, is needed annually. By allocating the operating and investment costs to the different locations and taking into account their utilisation rates in both time and space, we obtain a different €/week-m² for each location.

Location	€/week-m²	Utilisation rate
Container bed	€ 0.206	50%
Summer greenhouse	€ 0.210	95%
Winter greenhouse	€ 0.217	95%
Summer propagation greenhouse	€ 0.315	70%
Winter propagation greenhouse	€ 0.509	70%
Cold store	€ 1.119	33%
Summer forcing area	€ 0.606	40%
Winter forcing area	€ 2.106	40%

We then divide both batches into stages, depending on the location and density of the batch. For each stage, we can calculate the share of operating costs as explained in the previous section.

Share of operating costs summer cuttings			
Stage with location	**Period**	**Pots/m²**	**Cost**
Cutting stage Summer cuttings -greenhouse	July 7 weeks	70	€ 0.031
Summer phase Summer greenhouse	Sept. - Oct. 8 weeks	70	€ 0.024
Winter phase Winter greenhouse	Nov. - March 21 weeks	70	€ 0.065
Spring phase Summer greenhouse	April - June 13 weeks	21	€ 0.13
Cold storage stage	July (4 weeks)	64	€ 0.07
TOTAL green azalea from summer cuttings			**€ 0.32**
Forcing stage Summer forcing area	August 3 weeks	21	€ 0.09
TOTAL flowering azalea from summer cuttings			**€ 0.41**

Share of operating costs for winter cuttings			
Stage with location	**Period**	**Pots/m²**	**Cost**
Cutting stage Winter cutting-greenhouse	Nov. - Dec. 8 weeks	70	€ 0.058
Winter phase Winter greenhouse	Jan. - April 14 weeks	70	€ 0.043
Summer phase Container bed	April - Sept. 24 weeks	21	€ 0.235
Late summer phase Summer greenhouse	Sept. - Oct. 5 weeks	21	€ 0.05
Winter phase Winter greenhouse	Nov. - Jan. 11 weeks	21	€ 0.114
TOTAL green azalea from winter cuttings			**€ 0.50**
Forcing stage Winter forcing area	January 3 weeks	21	€ 0.30
TOTAL flowering azalea from winter cuttings			**€ 0.80**

Total cost price per azalea

Now that the three pillars of costing for the azalea products have been determined, we can calculate the total cost for the example nursery.

	Summer cuttings		Winter cuttings	
	Green	**Flowering**	**Green**	**Flowering**
Product cost	€ 0.15	€ 0.15	€ 0.15	€ 0.15
Labour cost	€ 0.27	€ 0.30	€ 0.28	€ 0.31
Operating cost	€ 0.32	€ 0.41	€ 0.50	€ 0.80
TOTAL	**€ 0.74**	**€ 0.86**	**€ 0.93**	**€ 1.26**

We learn from this that the summer cutting is remarkably cheaper in cost price than the winter cutting. Since the sale price of an azalea in August-September is usually higher than the sale price in January-February, most profit can be made with the summer cutting. Keep in mind that the winter cutting is a little harder in leaf, due to its stay outside on the container bed, and that different varieties can be grown as winter cuttings. Only the early H. Vogel colour mutations are suitable as summer cuttings.

3.2. KALANCHOE

As a second example, we calculate the cost price of a kalanchoe, a seasonal, heated greenhouse crop with a relatively short production period.

Infrastructure heated greenhouse

The example nursery has 1 ha of heated greenhouse. The total cost of starting this business today is about € 2,000,000. This includes the machinery and the entire infrastructure of the company building, the warehouse, the greenhouse, as well as a truck and a forklift. In this example, we have the various investments written off over 7 (rolling stock, potting machine, other equipment), 15 (heating, screens, lighting, etc.) and 25 years (greenhouses, warehouse, etc.), so that the annual amount to be paid in repayments (depreciation + 2% interest after setting off VLIF support) is € 170,000. In addition, € 120,000 is spent annually on insurance, membership fees, maintenance, fertilisers and sprays, heating, electricity, etc

New start up business versus established business

We compare the cost price of a kalanchoe at a new start up nursery and a nursery where two-thirds of the investments have already been paid off.

Product cost per kalanchoe

We charge € 0.40 per kalanchoe for a 6 cm pot, the growing media, the planting material and a label.

Labour costs are allocated within general operating costs

We argue that no labour recording has been done on the nursery and that labour is not equal for all batches. Then it is best to include the labour cost in the €/week-m² of the nursery.

In addition to the manager and his wife, the business employs two seasonal workers and two full-time employees. The manager pays himself and his wife a modest joint labour income of € 40,000 per year and a labour cost of € 100,000 is applied for the other employees at the nursery. On an annual basis, a new, start up nursery will therefore have to pay about € 430,000 (salary costs + repayments + operating costs) (without product costs).

€/week-m² at a new start up nursery versus an established nursery

The net area of the 1 ha nursery is 8,500 m^2 (without warehouse, company building and paths), and the utilisation rate (in time and space) is 85%. All costs must therefore be attributed over 7,225 m^2, which amounts to an €/week-m^2 € 1.144.

EXAMPLE

€/week-m² = (€ 430,000 / 7,225 m²) / 52 weeks
= € 1.144 (including labour costs)

On a nursery that is already two-thirds paid off, the repayments are obviously a lot lower, but the maintenance and repair costs increase due to an outdated infrastructure and machinery. We charge an additional € 10,000 per year for this. The annual costs on this nursery fall to € 330,000, which gives an €/week-m^2 of € 0.878.

EXAMPLE

€/week-m² = (€ 330,000 / 7,225 m²) / 52 weeks
= € 0.878 (including labour costs)

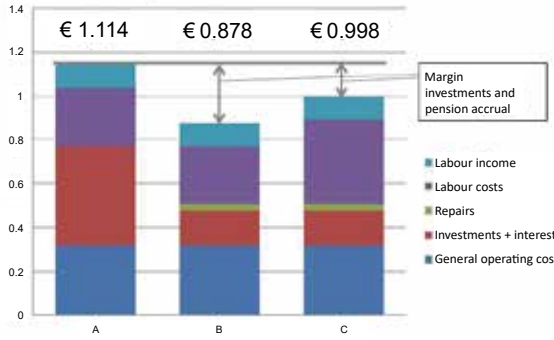
Effect of additional labour force on €/week-m²

The manager is getting older and decides to work a little less on the nursery, without sacrificing the family's working income. Of course, the business must continue to run, so an additional full-time employee is hired. As a result of this decision, the annual salary costs increase to approximately €185,000 and the total costs to € 375,000. The €/week-m^2 here is € 0.998.

EXAMPLE

€/week-m² = (€ 375,000 / 7,225 m²) / 52 weeks
= € 0.998 (including labour costs)

€/week-m² heated greenhouse



Cost structure of the € /week-m² for the three nursery scenarios. **A:** New nursery with all investments ongoing. **B:** Established nursery where two-thirds of the investments have already been paid off. **C:** Same as B but with additional full-time staff. The grey arrows show the margin for investments and pension accrual.

Kalanchoe cost price in the three scenarios

What does this mean in real terms? Let's take kalanchoe, pot size 6 cm, which remains on the nursery for 16 weeks (winter production) as an example. During these 16 weeks, the crop is grown at a density of 54 pots per m². The share of operating costs (including labour costs) per plant is € 0.34 for the new, start-up nursery and thus the total cost is € 0.74.

EXAMPLE

Cost price = (€ 1.144 x 16 weeks) / 54 pots / m²
+ € 0.40 product cost
= € 0.74

The established nursery is already making a little more profit, the share of operating costs for the same plant is € 0.26 and the cost price drops to € 0.66.

EXAMPLE

Cost = (€ 0.878 x 16 weeks) / 54 pots / m²
+ € 0.40 product cost
= € 0.66

For more free time for the nursery manager and his family, the cost price rises to € 0.70 per plant.

EXAMPLE

Cost price = (€ 0.998 x 16 weeks) / 54 pots / m²
+ € 0.40 product cost
= € 0.70

The differences are not that great. This is because kalanchoe is a rather short term crop and the density of the plants, at pot size 6 cm, is quite high, so that the share of the operating costs remains limited. As already indicated in the previous figure, ideally the sale price of the product should be based on the cost price of the new nursery. As depreciation falls away over time, a budget is created to pay for replacement investments, possible higher personnel costs and pension accrual.

3.3 POT CHRYSANTHEMUM

In recent years, the sector has been trying to promote potted chrysanthemums as a trendy patio plant. After all, it is a beautiful plant that can brighten up gardens and terraces with a sea of flowers at a time when nature is becoming more sombre. Of course, this floral splendour comes at a price; effort, time and space have been invested in it before a pot chrysanthemum is marketed. In this example, we are trying to put an accurate figure to it.

Effect of nursery size on the cost price of pot chrysanthemum

We distinguish between a nursery with 2 ha of pot chrysanthemum, a nursery with 5 ha of pot chrysanthemum and a nursery with 10 ha of pot chrysanthemum. As the operating costs are divided over the area, this will make a big difference to the cost price. Since most pot chrysanthemum growers also grow other crops besides pot chrysanthemums (bedding plants, vegetables, nursery stock products, etc.), we charge 50% of the operating costs and investments to the small and medium-sized businesses (2 and 5 ha) and 75% to the large business (10 ha). We also only take into account costs and investments related to the production of pot chrysanthemum, not in the production of the other

products. For the 10 ha pot chrysanthemum nursery, we calculate an annual sum of € 195,000 for operating and investment costs, all investments are ongoing, for the 5 ha pot chrysanthemum nursery this is € 143,000 and for the 2 ha pot chrysanthemum nursery € 108,000.

€/week-m² at different nursery sizes and investment scenarios

The following figure shows the €/week-m² of the different nurseries, each with two scenarios: a scenario in which all investments are still ongoing (100%) and a scenario in which two-thirds of the investments have already been paid off (33%). Thus, we learn that on the smallest nursery (100% scenario) a m² costs € 0.120 per week, while on the biggest nursery it is only € 0.06. Of course, nursery and investment costs do not double with the jump from 2 to 5 and from 5 to 10 hectares, the figures

€/week-m² pot chrysanthemum nurseries

€/week-m² for different nursery sizes and investment scenarios. Red bars represent general operating costs, blue bars represent investments. All nurseries are calculated with a net surface area of 86% of the gross surface. For the nurseries with 2 and 5 ha of pot chrysanthemum, we work with an utilisation rate of 100%, and for the nursery with 10 ha of pot chrysanthemum, a 75% utilisation rate has been calculated.

in this example are quite realistic and based on real nurseries. The difference between 5 and 10 ha has become small due to the difference in % calculated operating costs, namely 50% for 5 ha and 75% for 10 ha. We also see that the investment cost is much lower than the other operating costs, so that the differences between the two scenarios, relative to the investment cost, are actually not that big.

Cost price of late-flowering pot chrysanthemum

We calculate the cost price of a late-flowering pot chrysanthemum (production from 1 June to 30 October, pot size 19 cm) at the different nurseries. The plants are first put on a holding bed for a fortnight (25 plants/m^2) before they get their final place in the field (20 weeks at 2.3 plants/m^2). We allocate € 0.37 product cost (planting material, pot, growing media, sleeve) and € 0.55 labour cost (average hourly wage of € 25) per plant. The following figure shows the total cost price of the late flowering pot chrysanthemum at the different nurseries, with the two investment scenarios.

Cost price of pot chrysanthemum

It soon becomes clear that the cost price of the pot chrysanthemum on a 2 ha nursery will often exceed the sale price. For a nursery with 5 or 10 ha of pot chrysanthemum, the cost price is much lower. Notice again the small difference between these two nurseries, again due to a difference in the percentage of allocated operating costs. We also see that the difference in investment scenario is small, because the production of pot chrysanthemum requires only a small investment cost.

Because pot chrysanthemums take up quite a lot of bed space and the late-flowering varieties spend 22 weeks on the nursery, we see that **just under half of the cost price can be allocated to operating costs,** calculated using the €/week-m^2 principle. Reality shows that the share of operating costs is often underestimated by ornamental plant growers.

3.4. PEDUNCULATE OAK

As a final example, we calculate the cost of a pedunculate oak (*Quercus robur*). It is a long production period, so the principle of €/week-m² is replaced by €/year-ha.

Wetterse study group of tree growers method

To calculate the cost price, we use the cost price calculation tables developed and prepared by the Wetterse study group of tree growers. In these tables, the different processes are predefined per year for the tree growers. There is a separate table for each type of nursery tree product.

Production programme - pedunculate oak

Pedunculate oak is a five-year crop, preceded by a green manure year, so the land is occupied by this crop for six years. We take a 15 ha nursery and assume that 1 ha of pedunculate oak will be grown. The 1 ha plot has two headlands of 8 m each. The row spacing is 1.6 m, so there are 61 rows on this tree plot, of which 11 rows are unplanted (to allow for access to spray etc.), leaving 50 planted rows. The planting distance in the rows is 0.7 m. So on this 1 ha plot, there are 6,000 pedunculate oaks.

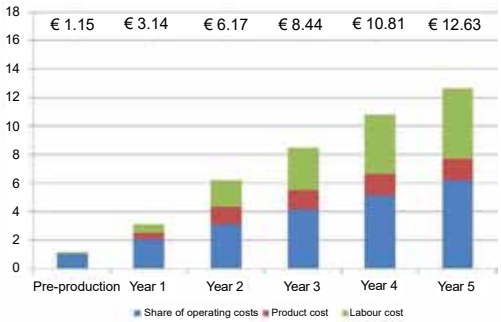
Labour cost

In order to work uniformly in the simulations, we calculate the labour for the green manure, tillage and mechanical weed control at the cost of a contractor, € 55 per hour. The remaining work, such as preparing the planting material, the planting, tying and pruning, is done by own employees at € 30 per hour.

€/week-m² versus €/year-ha

In this case, we use the €/year-ha principle to distribute the operating costs. This, of course, has everything to do with the scale and duration of production. A €/week-m² would be impractical here. Operating costs (water, insurance, membership fees, telephone, etc.) and investment costs total € 93,000. So € 6,200 of this amount is allocated to 1 hectare each year. This includes a lease cost of € 350 per year per hectare. This is quite cheap, if the lease cost was € 1,000, € 0.65 is added per plant (in total, not per year). We always calculate the **total cost without lifting**. If all the plants were sold after 5 years, the total cost of each pedunculate oak would be € 12.63.

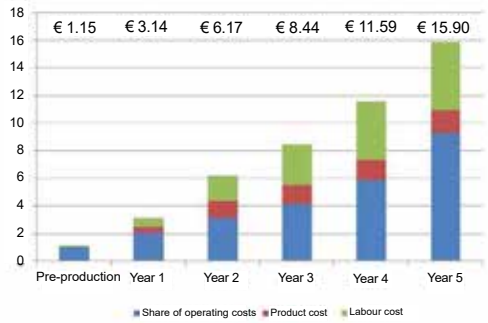
Cost price pedunculate oak tree on 15 ha nursery, sale after 5 years



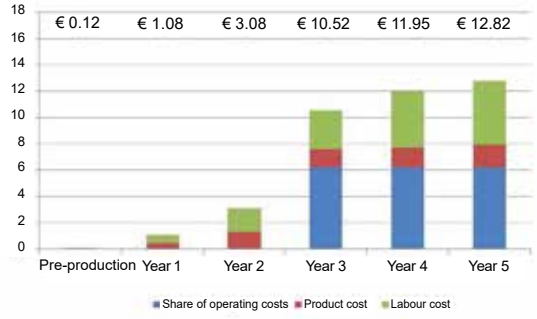
Of course, this is not the case. In addition to differences in scale, in time and space, there is another important factor that absolutely must be taken into account: the utilisation rate.

In the previous examples, we used a single utilisation rate per location. For short-term crops this is usually correct, as the vacant space will be filled in the same year with another batch. The utilisation rate of the locations will therefore not vary much over the years. On tree nurseries, the first plants are often sold as early as the halfway stage of the production cycle. However, the vacant place will not be filled. One starts with an empty field at the next green manure year. This means that from the moment of sale, the utilisation rate of a plot goes down and an ever decreasing number of plants have to bear the operating costs. In other words, we have to work with different occupancies from then on. The real cost price, taking into account different occupancies per year, is shown in the figure below. We see that the cost price has now risen to € 15.90. Here, 40% are sold in year 3, 30% in year 4 and 30% in year 5.

Cost price pedunculate oak nursery on 15 ha, sale after 3 years



Cost price pedunculate oak seedling nursery 15 ha, sale from year 3



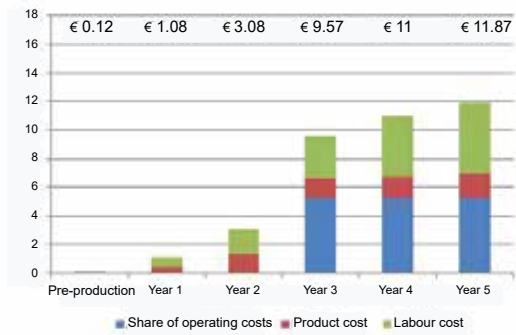
So the real cost price has become a lot more expensive, especially in the last year, where only 30% of the original number of plants have to bear the operating costs. To resolve this, we can allocate the share of operating costs to the plants when they are sold. In the example of our pedunculate oak, 40% is sold in year 3, 30% in year 4 and again 30% in year 5. Using the same percentages, we add the operating costs of 6 years (green manure year + 5 crop years) to the cost price of years 3, 4 and 5. The figure below clearly shows that the operating costs are indeed only allocated to the last three years of production.

The cost price of the pedunculate oak has now fallen to € 12.82 in year 5. In year 3 and 4, the cost price rose slightly to € 10.52 and € 11.95 respectively.

Impact of nursery expansion on cost price

The cost structure shows that the share of operating costs constitutes a large part of the cost price of the pedunculate oak. In order to lower this location cost - and thus be able to produce more cheaply - the tree grower is considering increasing his nursery to 20 hectares. This of course involves additional costs, such as rent and investment, increasing the annual operating and investment costs in the example to € 105,000. Annually, € 5,250 is allocated to a hectare. We are now convinced of the method of dividing the share of operating costs according to sale percentages and are only looking at this model. Since labour and product costs are calculated per hectare or per plant, these costs do not change in our model. Of course, the share of operating costs per plant is decreasing due to the increase in area. The simulation shows that the cost price drops to € 11.87 after the fifth year. So the tree can be produced a full euro cheaper.

Cost price pedunculate oak nursery on 20 ha, sale from year 3



4. What can you do with your cost price calculation?

Cost price calculation is an important part of your business model, the idea is to learn as much as you can from it and use it as a tool to increase the profitability of your crops.

A cost price calculation is something very specific, the results only apply to your nursery. You can learn a lot from it and it is necessary to repeat the exercise regularly and refine it where possible. It is useful to record labour from time to time and check whether the recorded labour corresponds to the labour cost you have calculated.

Calculation tool from PCS available

In most cases, the costs increase year after year, so the cost price changes as well. It is therefore important to keep your calculation model as simple as possible and to carry out the costings in a simple programme, so that the cost price remains accurate with simple adjustments. PCS makes calculation tables available to growers for this purpose, in which all formulas are already included. Once all the parameters of your nursery are entered into these tables and the calculations have been made, you can adjust the accounting figures in the following years, so that the cost price is automatically adjusted. A cost price calculation is therefore not static, you have to repeat it from time to time.

Would you, as a grower, like to start working with this calculation tool? Then contact the PCS.

4.1. OPTIMISE WHERE POSSIBLE

Once you know the cost structure of your product, you also know which major cost items contribute to the cost price, and how and where you can save. We will discuss this in more detail in the next chapter.

4.2. PRE-CALCULATION

When starting a new crop, it is very interesting to simulate the cost price in advance.

Thus, you can check whether the new crop will be profitable or not. Once you know the production parameters of the crop (at which location(s) it will be grown, the stages involved, at what densities, an idea of labour costs, product costs,...) you can determine the cost price. Of course, this will usually be an estimate. Pre-calculation gives you an answer to the question: "What can or should a product yield?".

4.3. POST-CALCULATION

Cost price calculation is used more often after production and gives you an idea to what extent your crop has been profitable. In other words: "What has it yielded?" Thus, you can, if possible, adjust the sales price or carry out production/technical amendments, so that the crop can become more profitable.

4.4. SIMULATING THE IMPACT OF BUSINESS DECISIONS

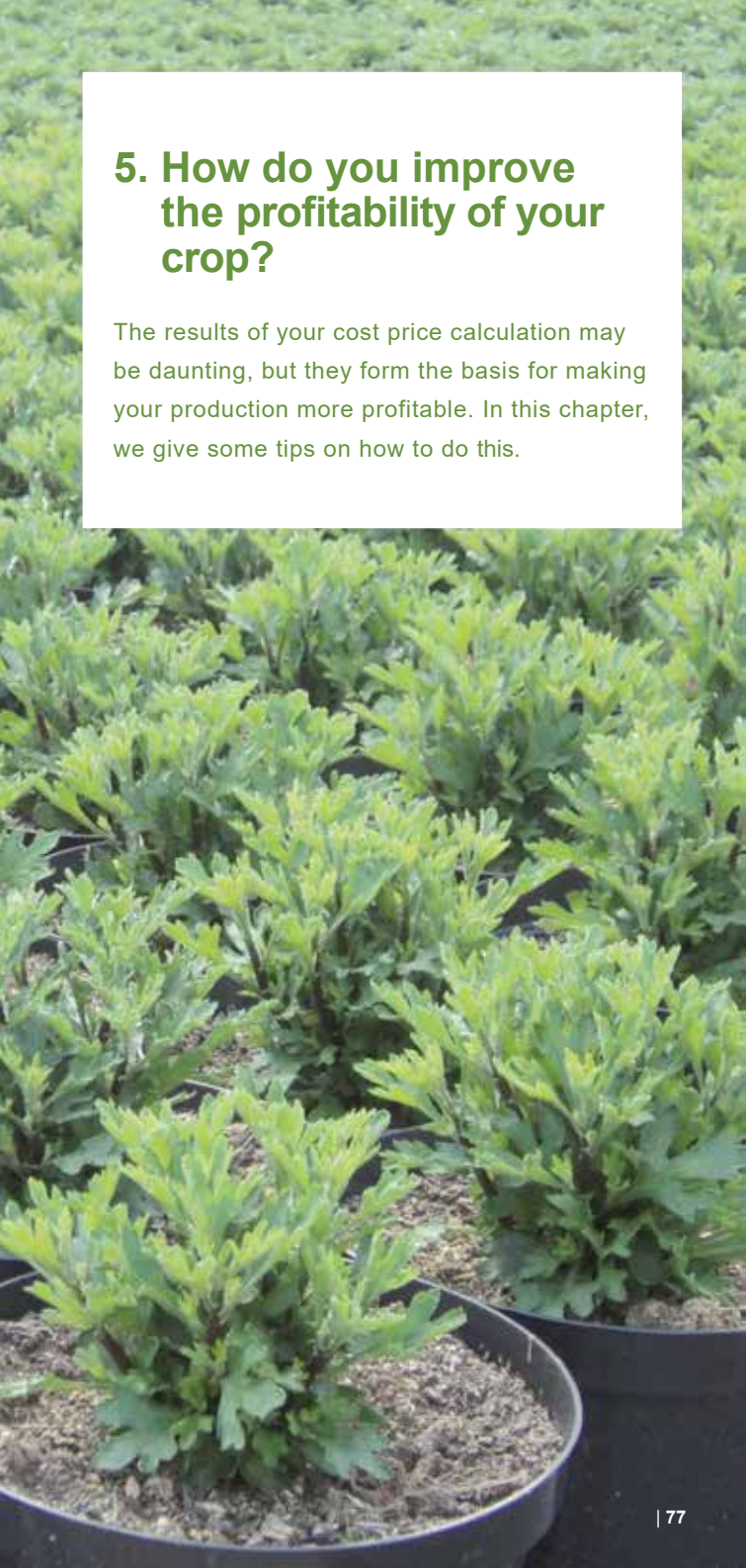
By now you are probably aware that certain business decisions have an impact on the cost price of your products. It is therefore important to calculate this impact in advance. In the previous chapter we gave some examples of simulations, and in the next chapter we will illustrate which business decisions can lead to cost savings.

4.5. NEGOTIATING TO INCREASE PROFITABILITY

Even though a cost price calculation is something very specific, the outcome itself can be used in price negotiations with your suppliers and customers. After all, the cost price has been calculated in a properly substantiated manner, and can strengthen your position when negotiating. Your customers and suppliers know perfectly well, sometimes better than yourself, whether or not you are a good negotiator.

5. How do you improve the profitability of your crop?

The results of your cost price calculation may be daunting, but they form the basis for making your production more profitable. In this chapter, we give some tips on how to do this.



Experience shows that most growers have both profitable and unprofitable products in their range. They often know which products they are. A cost price calculation makes it possible to take it further. This may lead to certain business decisions. Here too, it is important to simulate the effect of these decisions in advance in your cost price calculations. In this chapter, we elaborate on certain decisions that can make your production more profitable, and point out the things you should pay attention to.

Why grow unprofitable products?

Product range is an important factor why your customers buy from you. Removing unprofitable products from your range can lead to a loss of customers. Of course, we do not want this and it can thus be a reason to keep certain crops. You can decide to reduce the unprofitable batches and increase the profitable batches, provided there is no overproduction of the profitable crops. Overproduction can lead to a lower sales price, so these products also become less profitable or unprofitable. The unprofitable products should be a minority on your nursery.

Replace unprofitable products?

When you decide to reduce or stop the production of unprofitable products, this has a significant impact on the cost price and profitability of your other products. This has everything to do with the share of operating costs, an important part of the cost price of your products. After all, this share is often calculated according to the number of plants you grow (method 1, p. 38) or the production area of your nursery (method 2, p. 39). Reducing the size of batches also means that operating costs have to be spread over fewer products or a smaller production area, which in turn increases the cost price of other products. This decision reduces

the profitability of your other products. It is therefore extremely important to replace unprofitable products with profitable ones when making this decision, so that the utilisation rate of the locations does not decrease.

5.1. ADJUSTING THE SALES PRICE

The easiest method to increase the profitability of your products is to adjust the sales price. If the market determines the sales price, this obviously does not always apply. Nevertheless, you can use your cost price calculation to negotiate a better sales price with your customers.

Short-chain sales

The difference between your sales price and the price the end consumer ultimately pays is often very large. There are many other links in the sales chain that also have to be paid. Shortening this chain directly increases the profitability of your crops. More and more, we see that growers are thinking about short-chain sales or are already doing so. However, this has its advantages and disadvantages. Selling via the short chain increases your sales price, but must be clearly weighed against the extra time and effort, in other words the labour cost, that this involves.

Contract growing

Through contract growing, you make agreements with your customers in advance about the price and quantity of products. That way, your sales and income are assured.

5.2. LOGISTICS COOPERATION

For many growers, transport costs take a big chunk out of the budget. Practical examples show that thousands of euros can be saved annually through logistical cooperation. In logistical cooperation, growers whose nurseries are close to each other decide to organise transport together, so that transport companies' trucks are more fully loaded and the costs can be shared. Some transport companies also encourage this and provide such systems.

5.3 REDUCING PRODUCT COST

There are a few ways to reduce your product cost. One of them is participating in group purchases of materials. After all, negotiating a better price with your suppliers through **group purchasing** lowers the product cost.

5.4 REDUCING LABOUR COSTS

Labour costs can be reduced in various ways. Of course, it is important not to compromise the quality of your products in the process. Let's give some examples:

Automation

Labour is expensive. In certain cases, it is appropriate to automate specific technical or logistical production processes on your nursery. This obviously has an impact on the cost price of your products. Automation aims to reduce labour costs, but as a result the investment costs on your business increase. The investment costs are also calculated according to the number of products on your nursery (method 1) or the production area of your locations (method 2). It follows that automation can only be profitable if your business is big enough to bear these costs.

The savings in labour costs must be clearly weighed against the investment costs. A simulation in which you add the annual repayment of the new investment to the operating costs and offset the savings on labour costs, can give a decisive answer.

Increasing labour efficiency

Another way to reduce labour costs is to increase labour efficiency on your nursery. This does not mean working faster, but organising and running the processes that require labour more efficiently. This is not an easy job. First of all, you map out the various work processes, for example, potting or taking cuttings, moving pots to another location on the nursery, preparing products for sale, etc. Often, several workers are involved in these processes. You then look at how these processes can be made more efficient. In other words, you identify the bottlenecks that slow down the whole process, and try to speed them up. The layout of the nursery itself is also an important point. Make sure that distances are kept to a minimum, and that transport on your nursery is as efficient as possible. Often, this also means a form of automation by conveyor belt or by a means of transport.

Cheaper workforce

By far the easiest method to reduce labour costs is to use cheaper labour. However, you often have to compromise on reliability, because permanent employees know the ins and outs of your business better than temporary workers. Permanent employees also often need less management. So in many cases, when hiring more temporary workers, your own percentage of unallocated labour goes up. Therefore, when making this decision, the advantages and disadvantages must be carefully weighed.

5.5 REDUCING THE SHARE OF OPERATING COSTS

Operating costs also have a large share in the cost structure of your products. Therefore, it may be useful to analyse the operating costs. What are the biggest cost items? And can I lower them in any way?

Since operating costs are calculated based on product quantities or production area, there are two more, less obvious, ways to reduce the share of operating costs:

Business expansion

The bigger your nursery, the bigger the production area and the more the operating costs can be distributed. Increasing the size of a business also means that certain costs (heating, electricity, insurance, etc.) and investments (in infrastructure and equipment) will also increase. Wage costs and your own unallocated labour may also increase with business expansion. Nevertheless, increasing the size of nurseries usually results in a reduction in cost price. In the case of heated glasshouse production, where investments in infrastructure involve large sums of money, the reduction in cost price will be smaller than, for example, in tree and shrub nurseries, where investment costs rise much less rapidly with the expansion of the business.

Increase the utilisation rate

The most effective way to reduce the share of operating costs, which in many cases entails the least costs, is to adjust the utilisation rate. After all, the utilisation rate has a direct impact on the production area of your nursery. The higher the utilisation rate, the larger the production area, and therefore the more plants that can be grown in the same location. Increasing the utilisation rate can be done in various ways. On the one hand, you can choose to have extra batches on your nursery, which will take up space when your other crops are moved out of the locations. On the other hand, you can also look into the possibility of working with several production levels. The latter only applies to protected production. Think, for example, of hanging pots above other batches. This way, you increase the efficiency of your production infrastructure. However, with multiple levels of production, disease and pest pressure must be closely monitored. Always ensure that crops are compatible with each other. Increasing the occupancy often also leads to an increase in wage costs and investment costs. Here, too, simulations can help in making this decision.

6. In conclusion

As a manager, it is very important to have insight into your figures, and the profitability of your crops. With this practical guide, you can get started on your own nursery. For more information or advice, please contact the PCS.

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