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# Steps in the Development of a New Nursery

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## INTRODUCTION

North Forest Products (NFP) has recently commissioned a new 10 million per year capacity container nursery in N.W. Tasmania to produce *Eucalyptus nitens* and *E. globulus* seedlings, mainly for its own tree farm program in Tasmania.

## BACKGROUND

**The Company.** NFP is Tasmania's largest private forestry company with tree farm programs (including Australia's largest tree farm south of Burnie), a leading tree breeding and research centre, and export woodchip operations. North Forest Products is the leading supplier of hardwood to the Japanese pulp and paper industry and operates four export pulpwood mills in Tasmania. It is part of North Limited, a diversified resources company.

**Previous Nursery Operations.** For about 40 years NFP has operated forest nurseries to produce seedlings for its own tree farm programs. The new nursery replaced two older nurseries:

***Container Nursery.*** This nursery had been built up incrementally over the years as the company's operation increased. Maximum production of about 4.5 million plants in paper pots per annum was the limit for the site we were on. All this was achieved using a very simple but labour-intensive pricking out system. The main component of the potting substrate was the typical NW Tasmanian red basaltic soil, which was difficult to keep free of weeds. Its high organic matter content, coupled with the necessary use of controlled-release fertilisers, made it difficult to manage seedling growth and quality. Our internal customers had no option but to take what they were given.

***Field Nursery.*** About half the annual container nursery crop was transplanted into a field nursery to produce a "half: half". The term half: half is used in forest nurseries to describe a seedling that has started life in a container nursery (i.e., spent half its life there) and finished off in a field nursery (i.e., the other half of its nursery life) within the same year. The main difference between half: half and regular container seedlings (i.e., those that went directly to the field from the container nursery) is one

of size. Typically the collar diameter of a good half : half is about 10 mm and height >40 cm. A good container plant is >3 mm and about 25 to 30 cm high. These plants were more suitable for establishment on the harsh winter planting sites that exist on some of our freehold land. However, field nurseries require very large areas of land, especially if a sensible rotation regime is carried out. Having already incurred the costs of container nursery production, these half : half seedlings were ultimately very expensive to produce.

In the earlier nineties, NFP's seedling requirements reached about 6 million per year. This exceeded the production capacity of the two nurseries. The balance of our requirement was farmed out to contract growers. Given that these growers obviously need to include a profit margin in their rate, contract-grown seedlings were expensive compared with those produced "at cost" in-house.

Four years ago NFP entered into a joint venture with Mitsubishi to establish tree farms in N.E. Tasmania. This venture lead to a quantum increase in the seedling requirement to 7 million, all of which would have to come from contract growers. A review was called for of the seedling supply system.

## A NEW NURSERY PROJECT

**Review of Nursery Operations.** In the modern corporate world, "core business" is a phrase often heard. The core business of NFP is to grow and supply wood fibre. Many processes ancillary to the core business had been contracted out by the company over the last decade, e.g., clearing, cultivation, planting, and fertilising, to name a few. The first question we asked, therefore, was "should NFP be in the nursery business at all". Why not leave it to someone for whom it is "core business".

The decision was quickly made to keep the nursery operation in-house, the supply of seedlings was seen to be a critical step in the value chain. In tree farm establishment a significant cost is incurred prior to planting the seedling. This investment, e.g., cultivation, weed management, and vertebrate pest management, can only be realised if a seedling is planted that season. If the nursery had a major failure and was unable to supply seedlings for that season, these "on farm" activities needed to establish the plantation would have to be repeated the following year. It provided us with greater control, and more confidence, to carry out the nursery operations internally.

Given that we had made the decision to stay in the nursery business, a number of important questions needed answering:

- Should we modify the existing nurseries or start afresh?
- What sort of nursery did we want?
- Did we want to change from seedling to clonal production?
- What was the best way to deliver the project?

The answer to the first question was simple, neither the field nor the container nursery lent themselves to expansion. It was decided to rebuild on a green-field site. We would start afresh.

**A New Nursery.** The second question required more study before an answer could be found. It could also be answered at two levels, the general and the specific. At the general level we quickly determined that we wanted a nursery which:

- Produced the most cost-effective seedling with the quality attributes our customers wanted; and

- Was safe to work in (best practice in terms of occupational health and standards) and environmentally sound (e.g., water use and run-off management).

To determine some of the specifics, we looked closely at forest nurseries and nursery technologies worldwide.

We also asked ourselves what might appear to some to be a silly question, "what is a nursery?". We developed a paradigm shift in answer to that question, and what I'm about to say will be anathema to some of you, a nursery is not a "green thumbs" operation. The growing side of a nursery operation is merely the application of scientific principles, there is no magic in it. This represents only 10% at most of what a large wholesale nursery is about. The rest of the time is spent on management tasks and paperwork, housekeeping, training and developing staff, processing orders, despatching, shipping, customer relations, etc. A large slice of time is, in fact, spent moving stock from one place to another, e.g., into germination rooms and out again; putting it under shade and then out again; and finally into the despatch area.

When we thought about it, we saw a nursery as just another factory, nothing special about it. You take a series of inputs, in our case potting media, seed, water, sun light — and transform them into an output, a seedling, which is warehoused for a length of time. Admittedly it is an unusual warehouse in that the inventory changes shape while it's on the shelf. But when you look at factories and warehouses you often find that their success is usually underpinned by efficient material handling systems. These often provide their competitive edge.

Over the years we had visited forest nurseries in South Africa, South America, Spain, Portugal, Scandinavia, Morocco, France, and New Zealand and seen many good ideas. However we focused a lot of our research on the Celbi nursery built in Portugal in 1992, which incorporated mostly Dutch nursery technology and automation that addressed the material handling issue and consolidated the best of what we had seen in our travels. We liked the concepts we saw. Known as "Dutch frames" in America, "containers" in Holland, or maybe "rolling benches" here and running on rails, we immediately recognised the efficiencies this system would bring to our new nursery. Closer to home we also had the opportunity to visit a celery transplant grower in Victoria who had installed a similar system.

The green-field site allowed us a clean slate, a once in a lifetime opportunity to try and get it right. We also knew from history that we would need to be able to increase seedling production in the future. A clear expansion path needed to be identified so that we didn't make decisions now that closed out future options.

We also knew that we did not want to keep on pricking out seedlings. In our 40 years of nursery ownership we had allowed technology to pass us by. We now had superior genetic material coming on line and direct seeding technology would make the optimum use of this expensive seed.

We also wanted to apply all nutrients through the irrigation water (fertigation). This we knew would give us unprecedented control over the seedlings we produced. You can't stop a controlled-release fertiliser releasing when a seedling gets to its size specification, but you can very easily turn off an injection pump.

**Clonal or Seedling?** The Celbi nursery in Portugal had initially been built to produce Tasmanian Blue Gums (about 1 million hectares of *E. globulus* are grown in Spain and Portugal). There were close similarities between Celbi in Portugal and

NFP in Tasmania. A common species of course, but it went deeper than that. We both had sophisticated tree improvement programs including extensive research programs to try and realise the potential of clonal production. When we compared research, we often found we had similar results.

Celbi were confident that they could produce operational quantities of clonal plants and they built their nursery accordingly. After about a year of operation it was converted to seedling production. We were confronted with the same decision as them — clonal or seedling? Fortunately, in 1994 we were able to spend a fortnight working in their nursery and repeatedly asked "if you could do it all again, what would you do differently". The knowledge gained from this was applied to the now developing specification for the new NFP nursery.

Taking into account Celbi's experience with large-scale clonal production, as well as carrying out a review of the value of the genetic gain to be expected from a number of seedling and clonal scenarios, we opted to build a seedling nursery.

## PROJECT DELIVERY

We were planning to spend a lot of shareholders money. As a commodity-based company, we were beginning to see price falls in most of our products. A factory needs engineering to ensure it all fits together. A well engineered project that could be built to a price and, more importantly, with minimal likelihood of a cost overrun, was essential.

There are various ways to package projects like this. They can be ranked according to where the degree of risk is located — with the engineer or with the principal. At one extreme is the fully reimbursable, where the principal pays the engineering firm for every item and for every hour clocked up on the project. All the risk lies with the principal and consequently the engineer operates with his lowest margins. If some unanticipated problem crops up, however, you pay for the remedy.

At the other end of the scale is design and construct built to a fixed contract price (lump sum). If a problem occurs, the contractor incurs the cost. Of course, this risk is factored into a larger margin in their tender price — if things go well the engineer makes a tidy profit on that project.

We opted to go down the path of design and construct to a fixed contract price. We wanted the satisfaction of knowing exactly how much it was going to cost. To tender the project we produced a specification that was performance based rather than prescriptive. In the ideal world our contract would have contained one sentence "build a nursery to produce 7 million eucalypt container seedlings per year". We eventually ran to a hundred pages or so to make sure we got what we wanted!

## SUMMARY

We would do very few things differently. We now have a very efficient nursery that produces a quality seedling. Our internal customers (always the hardest to please), who have no alternative but to get their seedlings from us, are more than satisfied with the service and product.

We have vowed not to rest on our laurels and let nursery advances pass us by. We are currently attempting to identify the thresholds in production quantity which justify the next level of technology and automation.