

Making Ends Meet in the Forest Nursery Business

J. Kitchen

Pacific Regeneration Technologies Inc.
#410 – 355 Burrard Street, Vancouver, BC V6C 2G8

For my presentation at the Thin Green Line Symposium, I was asked to address the following three questions:

How do forest seedling nurseries remain cost-effective and still meet the needs of a wide range of customers?

How do nurseries meet the challenges of rising costs and flat pricing and still make money?

How challenging is this for PRT?

To start with, I have to explain that I was brought up by a teacher and an engineer – a terrific combination I think!

My Dad was a pulp mill engineer and he would come home from work and head straight for the shower, get out of his work clothes because my mom wasn't too fond of the smell. I think I was 5 or 6 yrs old when I started to wonder about that smell, and I asked him what it was. He gave me a very complex answer, and the only thing I can remember is that the human nose can detect 4 parts per billion of sulfur dioxide in the air and that is a very small amount and it won't hurt you, and to get it below that costs more money than I would be able to imagine. I asked him again one day, and if I was anything like my own kids, that was probably about the 30th time I said "Why?" that day.

So I got the short answer when he said "Son, that's the smell of money!" I thought about that answer for a long time - maybe a year or more. Eventually I made a decision. One thing I would never want to have a lot of... was money.

So with that out of the way, let's talk about nurseries. The first step in addressing the challenge of market prices, competition and rising costs is: *Stop whining about the price.*

In 1962, you could buy a refrigerator for around US\$470¹ and if you apply inflation to that number it would cost you US\$2,536 by 1998, let alone today. The 1998 average price was about US\$750, less than 30% of the 1962 price. Material and energy costs have gone up, shipping has gone up and labor has gone up, but people all over the world got better at making refrigerators. In my opinion, the same applies to seedlings.

The next step is to engage people in solving the problem and there is some magic in this. Inspired people are great people. No matter who they are, if they are inspired by what they are doing, they will invent great solutions. We can talk about a lot of management buzzwords, like "Economy of scale", "production efficiency" and "lean thinking" but inspired people think of these things by nature.

An example of lean thinking is something we call the "Combined Lift Method", but what I personally like to think of as the "Ontario Lift Method", because Ontario is where we learned about it. People will naturally arrange work in assembly lines when they get the chance. Other methods seem counter-intuitive² but the reality is that "assembly line" production generally only works for processes that involve very large quantities of identical tasks and products. The reason is that the engineer in all of us can identify and fix bottlenecks one at a time. As each bottleneck is eliminated, a new one pops up. In the business of forest seedlings, we are growing an ever wider variety of seedlings to meet the changing needs identified in my opening questions. Therefore, a more integrated approach, such as the lifting technique used here in Ontario, has proven more cost-effective for us. With this system, one person extracts seedlings, bundles and boxes them. Wasted time is reduced and this method is safer because the employees perform a wider variety of tasks, reducing the risk of repetitive strain injury. The reason for success is that each person is a master engineer of their own best methods. They will naturally find the best time to bend and the worst time to turn. I'm sure you've all watched treeplanters or planted trees yourselves. Imagine what would happen (and used to happen!) if each treeplanter was required to plant trees the exact same way, and in step with a group of other people. The whole operation would slow down to the productivity of the slowest common denominator, and the vast majority of workers would be frustrated by the lack of control over their actions, and disappointed by the low productivity. Let people use their own ingenuity and the best process controller ever known – the one between their ears – will increase productivity more than you could have imagined.

¹ <http://qrc.depaul.edu/djabon/cpi.htm>, Malkiel, Burton G. A Random Walk Down Wall Street. W. W. Norton and Company, New York 1999.

² Womack, James P. Lean Thinking, New York, Free Press, 2003, p. 22

Table 1. Comparison of three harvest methods.

Method - 112 cavity styroblock	Capital Cost	Cost per Seedling \$12.00 hourly rate	Trees per Shift	Trees lifted per worker - hour - block moving, sorting, packaging and supervision
Conventional harvest line	\$5,000 to \$15,000	\$0.020	Limited by length of conveyor belt	760
Combined lift method	\$3,000 to \$10,000	\$0.019	Limited by number of stations	810
Semi-automated	\$160,000	\$0.015	One pin extractor feeding two sorting belts – approx 130,000	1,030

The point here is that nursery people, like any other successful business people, must open their eyes to different ways. The answer will be a local one, depending on size of the nursery, labor cost, the variety of seedling products, and the number of seedlings that must be lifted per shift. (Table1).

Economy of scale is undoubtedly important. A competent owner or manager with a ½ time admin person, travel costs, accounting, insurance, office supplies and so on is going to cost \$200,000 if not more. If the nursery grows 12 million trees, that's \$0.02 per tree. At 6 million trees it's \$0.03, and at 3 million trees it's a whopping \$0.07.

Nursery size and ability to automate may be even more important as it gets increasingly difficult to find industrious seasonal workers. Two pin extractors or a transplanting line will cost around \$200,000 to buy, or about \$50,000 a year to achieve a reasonable return. On the same nursery sizes, that's \$0.004, \$0.008, and \$0.016 per seedling respectively, so you can see what I mean.

In times of slim returns, we have to be very careful with capital investments to improve the nursery. I'd like to talk about an example where my own personal views were dead wrong – irrigation booms vs. fixed irrigation. My own nursery in northern BC had booms in every greenhouse and I was a strong believer. If anyone had tried to talk me into fixed irrigation, I would have listened and then dismissed the idea. But let's talk about that. I learned a lot when I sold Summit and joined PRT in 1994 and had the benefit of all those inspired people to set me straight!

With respect to irrigation, issues to think about include, in order of importance:

- seedling recovery and quality;
- capital cost for the equipment;

- efficient water use and fertilizer consumption;
- labor, and;
- maintenance.

PRT proved to me beyond a doubt that by using a well designed fixed system, seedling recovery and quality were the same as what could be achieved with irrigation booms (Table 2). This was a big surprise to me. I looked at over 50 cultural units and the evidence was clear. So with recovery and quality clearly out of the way, let's look at cost.

This results in a savings of about \$0.002 per tree – a significant amount in a tight market. This is just one example from a myriad of opportunities that can be explored if nurseries are willing to test their assumptions.

As far as what's ahead, I believe there are two or three significant factors that will change how we all think about seedling prices.

It's important to recognize that the cost of propagules is rising very quickly. Seed cost in BC has increased ten-fold for some species in the last 10 years. This increasing value of propagules, as more seed orchards come on stream – up to \$0.05 per seed – will dramatically change the relative value of nursery production. Our future also includes variety based forestry, including somatic embryogenesis and other forms of asexual propagation. There is potential for the value of the propagule to exceed the production cost of the seedling. This could easily lead to requirements for larger seedling size, maximum recovery, single sowing, transplanting and other techniques to ensure that nurseries retain maximum value from expensive propagules. This issue will also test the ability of both nursery people and customers to assess the entire value chain.

Table 2. Operating cost comparison for boom and fixed irrigation.

Irrigation Type	Irrigation Boom		Fixed Sprinklers	
Source of Cost	Description	Annual Cost	Description	Annual Cost
Invest in equipment	\$3,000 amortized over 10 years	\$450	\$500 amortized over 10 years	\$75
Water & Fertilizer	Annual cost	\$600	20% more for fixed	\$720
Labor	½ hour per boom, twice a week for 20 weeks	\$300	15 minutes per greenhouse or bay, twice a week for 20 weeks	\$150
Maintenance		\$200		\$100
Total Annual Cost		\$1,550		\$1,045

High heating costs are a new reality. Solutions vary by location, but of course careful buying is important. Approaches such as group buying and buying forward will help, but they can not eliminate the new cost for energy. Therefore the best defense is conservation. Can you reduce or eliminate energy consumption? One competitor told me that he can save \$1,000 by shutting down his boilers for a week. So he looks ahead at the weather, decides whether or not ambient temperatures will be adequate, and if so, the boilers are shut down. By continuing to watch the weather forecast carefully, he can delay re-firing the boilers until the forecast indicates a need within the next 48 hours. Boiler shock is avoided and he's saved important resources – cash! On the other hand, many growers and heating specialists will tell you this can't be done.

We're just beginning to look at temperature integration for conifers and this may be a significant technique within a few years. Assuming adequate light levels, the growth rate of most plants is determined by the average temperature over a period of time. By looking forward at the weather (and despite all the jokes, weather forecasters have proven to be amazingly accurate) we can wait for sunshine to heat our greenhouses within a few days, and allow the plants to run cooler when artificial heating costs are high. People often ask me "So have you looked at solar as an alternate energy source?" Greenhouse operators have been in the solar heating business forever. By using temperature integration, we can make that even better.

I won't spend much time talking about labor, because that's probably the area we all understand best. I want to make one major point on labor though. Don't get caught

in the under-spending game. Industries do not become prosperous by focusing solely on cost-cutting. Remember that we as an industry have improved recovery of cavities sown by at least 20% over the last 20 years, and people are a big part of that. If you single-sow to save thinning costs, you will pay for it in heat and capital for additional greenhouses. You may be forced in this direction due to seed cost, but as long as seed is reasonably priced, be sure to run the cost-benefit analysis comparing empty cavities with saved labor.

So how does PRT cope with the new realities of our business? In my view, there are five fundamentals of successful business: Market, People, Community, Capital and Continuous Improvement. For the next few minutes, I'll talk about each of these from PRT's perspective.

Understanding the Market

We stay focused on our primary job as a business-to-business supplier - helping our customers be more competitive in their industry. That means assisting in their quest to compete with low-cost fiber and labor from around the world. It means understanding why they are certifying their forest operations. It means realizing that they must improve their return on capital. We try to help them with that. If a smaller seedling will do the job, we do some cooperative research and find out. Selling them on the merits of a large seedling to pad the bottom line at the nursery will only hurt the customer and ultimately that will hurt the supplier too. On the other hand, if a larger seedling will negate the need for costly site prep or follow up treatments, then we get out there and prove it. We owe it to our customers and our industry to test the assumptions and help them compete globally.

Inspired People = Great People

No matter what the problem, it is highly unlikely that consultants with silver bullets are going to solve it. It will come from within, from people who understand the problem, care about it, and find local solutions. We spend time to make sure our people know where we stand and what the problems are so they can contribute to the solutions. We keep them informed about what is working well and what is not working well. We engage them in our risk management planning. We help them understand costs and the importance of the capital invested in our business. We invest in leadership at least as much as we invest in technical and administrative training.

Social Acceptance

We encourage everyone at PRT to be active in the industry and in the community. The forest seedling industry has a great story to tell. One entertaining story I heard many years ago was about a crew of employees at a nursery who wanted the afternoon off to attend a logging protest. I can assure you the nursery manager was ready with appropriate options for his people! But more importantly, it opened a dialogue with people to help them understand how we fit within the community, and the obvious importance of the forest industry's well being! I try to devote some time to getting our story out – to help our communities understand that wood is an important and viable renewable resource, and how nurseries fit within the forest industry.

Access to Capital

To ensure ongoing access to capital, we need to make a profit and we need to be careful with capital. This is a focus for us at PRT. You often hear that the reason for a business is to make money. This is not particularly close to the truth. The need to make money is a necessity of business³, not the end. If we don't make a profit, we will not get the capital to maintain and to improve our business. Improvement and innovation, driven by the industrious nature of people and funded by new capital, is what sustains the business. As a result, businesses support people, help make communities livable and safe, and provide the economic engine for us and for our children. For me, that is what business is all about.

Continuously Improving Process

I don't believe we can rely on others to do our research and development. I think it's important to be realistic and define the real problems. An example for PRT is the high cost of energy. After initiating a plan to reduce consumption 5 years ago, people throughout the company have continued to build on that start. We have managed to keep energy costs relatively stable, despite a doubling of cost per unit of heat energy. Temperature integration will be a big step as well, but for now, we haven't even begun to overcome the obstacles. Growth modeling for conifers would be a big help with this challenge.

In summary, the same five drivers will guide every successful business – market, people, community, capital and continuous improvement. We can understand and use these factors to our advantage, or we can let them dictate what we will be forced to do. My choice is to accept our realities, and be sure that we're wagging our own tail.

³ Drucker, Peter F. Management: Tasks, Responsibilities and Practices. Harper Business, New York. 1985. p. 71