

# The essence of trees

Paul Greaves

## The start

Twenty-four months ago I teamed up with a number of people, including Steve Johnson and Jared Greaves, investigating making essential oil from Douglas fir wildings. Essential oils are aromatic oils containing volatile aroma compounds produced from plants and they are used in aromatherapy for the purpose of improving one's mood and feeling of well-being. The oil is 'essential' in that it contains the 'essence' of a plant's characteristic fragrance. Making and selling these types of oils has been ongoing for many centuries – it was prescribed as a medicine in earlier times.

We looked at ways to get the wildings off the hill, including the use of helicopters, but came to the conclusion that we needed better access and a more concentrated resource provided by the forest plantation estate. New Zealand has been populated with a diverse range of people from all over the world and they all brought a piece of their country with them, and some came with the seeds of different tree species. We now work with the various companies, and although we have not stopped with the wildings, it is just a smaller part of the resource.

## Sales and marketing

We approached the market before we started going all out making oil, as we needed to understand the process all the way and understand the consumer. We worked with a buyer based in Utah in the United States, doTERRA International, that produces and distributes high quality Certified Pure Therapeutic Grade® essential oils. They have over three million 'wellness

advocates' who sell on commission. Beginning in 2008, the company is now growing at 120% annually and in 2015 had a turnover of USD\$1.3 billion.

doTERRA launched our oil as a showcase in the September 2015 convention at Salt Lake City. Being present was an eye opener, as over 27,000 people passed through the hall in three days, living, breathing essential oils. They called it the mystery oil and hyped it. Our oil was at centre stage along with Winter Green from Nepal.

## The market is growing

We make 10 to 27 litres of oil a day which goes into 5 ml bottles and is marketed at USD\$22.50 per bottle. The end shelf value to the customer is USD\$4,500 per litre. Our small, fourth drum sent in August 2015 had a shelf value of NZ\$400,000. We get much less than that as a bulk supplier, so we are following the log producer in sending the raw product away.

The storage and arrival of oils from the four corners of the world goes through one factory for scientific analysis. doTERRA employs automatic bottling and top of the line systems for processing all products in and out the door to their sales section.

We send a sample before shipping, and the drum arrives and is tested by a third party company and then by doTERRA scientists. We have only had one fail and that was before we started shipping. It was in the early testing phase and it was picked up by us, with 0.01% phthalate found due to a seal failure in the reflux pump. We have now shipped 2,916 kg to doTERRA with clear results.

## NZ operation

For us to reach this level involved talking to the forest companies and from my background that was very helpful. The most help we had was from the Otago and Southland offices of Ernslaw One, PF Olsen and Rayonier. The Department of Conservation, Wenita Forest Products and Blakley Pacific are in the wings, so to speak.

Douglas fir is the target species. Road edging is a big part of our operation. The first job is tip cutting, followed by second level tip cutting with pole saws. The branches are stacked at the roadside, then chipped – this is an important phase as chipping is for a set type of biomass.



Steve Johnson and Jared Greaves harvesting wilding Douglas fir, stacking ready for helicopter lift down to Arrowtown



Branches stacked at roadside. Inset: Douglas fir and Sitka Spruce essential oils bottled and ready for sale

## Branches stacked at roadside

The bags come straight off the chipper and are loaded on a trailer and head to the plant. Each bag weights about 80 kg if the biomass is done correctly. We leave the site in a better state as areas that were becoming impassable are now clear.

The chipped material arrives at the plant. Making essential oil has been carried out as a back-yard cottage industry for many centuries. We needed to have an edge and for it to work in the environment we have in New Zealand. So I looked at the systems that were out there and kept coming back to an idea of vacuum distillation that my brother and I had 10 years ago. I then designed a system that had the following characteristics:

- Able to be batch loaded and work with minimum down time
- It is moveable
- Able to process about 3 to 5 tonnes of material a day.

The 'Prototype Still' uses 85 kg bags that are loaded straight into two pots. The system is closed and operates under vacuum and gauges show the operating system parameters. The more recently developed 'Production Still' now has four pots with similar gauges and it handles 160 kg per pot every 100 minutes, (see back cover). Each pot is heated with a burner and produces in excess of 800 ml of steam flow per minute. To harness that heat we had to design a chamber that would work in the vacuum environment, which took some work and trial and error, and we are still refining this area.

Each system requires an 'essencer' which separates the oil from the water. The oil is about 14% lighter than water and the flow of oil can be seen rising to the top of this essencer. There are two essencers on the four pot

system to handle the steam flow and to help with the shut down of the system for reloading.

## Where to now?

We are the largest producer of Douglas fir aromatherapy grade oil in the world. In fact, our process is the only one in the world at this scale. We are looking at design changes to the distillation system with heating etc. We are also examining the chemical make-up of the oil from each provenance, which is the subject of a current research project we are looking at starting with Scion.

The old timers and the early forest service set us up in a way as we look at different species: larch, ponderosa, macrocarpa, spruce and many others. Unfortunately radiata pine foliage is not suitable at the moment because it has a low oil yield, but we will try this again and market it ourselves in small bottles. The next step is setting up cropping sites to grow species short term (five years) and then harvest for the oil. There are many questions generated by this business and we are hoping to find answers to them all.

We are now looking at creating markets for the oil that is not required for our bulk oil contracts, as well as exploring options with natives – mānuka and kanuka. We are also involved in another company looking at solvent extraction and CO<sub>2</sub> critical extraction on the West Coast of the South Island and are well down that track with resource and processing methods. Some of these methods are a first in this country and the world.

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