

The Avon Sandalwooder

Welcome to the first edition of the Avon Sandalwooder, a newsletter produced by the Avon Sandalwood Network

The Avon Sandalwood Network (ASN) has recently been formed thanks to funding from the Department of Education and Training and the Avon Catchment Council's 'Enterprising Landcare' project. The funding has enabled current sandalwood growers and those with an interest in the industry come together to share information and work together to further develop this exciting new industry.

Inaugural ASN Workshop and Field Trip a success.

The first ASN workshop and field trip was held on the 15th of October 03 in Northam, attended by 29 enthusiastic people, most of whom were current sandalwood growers. In the morning session, presentations were delivered by Jon Brand (Forest Products Commission), Geoff Woodall (Cooperative Research Centre), and Ron Mulder (New Forrest Enterprises), with a demonstration of macadamia nut harvesting and cracking equipment by John Corey (Shelterbelter).

There was much interesting discussion and debate from participants during the morning session, with many questions and issues raised by the ASN members. Following lunch there was a field trip to several sandalwood plantations in the Beverley area, including a large recently established irrigated sandalwood project. For copies of the presentations delivered at the workshop, contact (08) 9621 2400.



ASN members inspect a young sandalwood plantation East of Beverley as part of the inaugural ASN workshop

Where to now with the ASN

At the workshop on the 15th of October, a steering committee was formed, consisting of: Graham Storer (Cunderdin), Heather Frank (Toodyay), Les Mactaggart (Koorda), Ron Mulder (Chidlow), Tim Emmott (Northam) and Paul LeGear (Moora)

The steering committee is working towards the incorporation of the ASN, and developing the next workshop. Our current member base consists of 38 people, from various locations and backgrounds. At this stage the next ASN meeting and workshop will be held on the 8th of April 2004 at Calingiri. If all goes well, we hope to have a tour of the 900ha Forest Rewards plantation at New Norcia. Stay posted.

At the next ASN meeting we will be calling for nominations for the executive committee. Please consider nominating for one of the positions, and contribute towards a successful Avon Sandalwood Network!



Growers Update & Views

Bruce and Bev Storer, Farmers, Sandalwood Growers and ASN Members, Cunderdin WA

Happy New Year Sandalwooders! 2003 was a great year for wheat crops but it seems not so for sandalwood seed. Of about 250 remnant trees we found only 2 trees in fruit and after such a good season we expected them all to be loaded.

Is there a delay with sandalwood recovery from poor seasons? Two trees have good large seed and in reasonable quantity but the rest had almost zero. Have other growers noticed this? Our seed planting's produced low germination of about 20% from uncracked nuts planted in June with a potiputki at about 5cm.

Some seed seems to be still germinating but we will re-sow all vacancies again in April. Perhaps nuts do need to be cracked to obtain good germination. We will certainly be looking for information on easy cracking methods such as soaking etc.

On a brighter note we have noticed good germination in our natural stands of timber where we harvested older trees. At each site where we removed a tree we have found approx 5-10 seedlings which is very encouraging from a replacement point of view. Rabbits will be the next challenge.

In 2004 we aim to increase our host plantings in plantation form, re-sow any failures of sandalwood seed on existing hosts; harvest 2 tonne of dead and green wood from existing stands; and collect seed from these stands should they fruit. We do envisage collecting enough seed to sell, requiring about 6-10kg for our own use. Seed collection to date has proven to be fairly time consuming and even if it is available we have yet to determine if it is economical for us to attempt commercial quantities.

Our opinion is that the wood is the only viable product in the long term, given the scale required to make money from seed sales: i.e. 1 tonne wood = \$5,000, 150kg seed @ \$35/kg = \$5,250. While we support efforts to find alternative profit from sandalwood, timber production remains the foremost reason we have joined the group.

Having tried deer among other alternative agricultural ventures, marketing appears to be the greatest hurdle. After some effort we can often produce products but the demand and problems associated with packaging, labelling and of course freight often prove hard to overcome.

Not wishing to be a doomsdayer, we believe the topics of disease; pests; growth rates; seeding techniques; host selection; site selection; and cooperative marketing of timber are ones that the group can benefit from learning about the most. We will of course be quick to jump on any bandwagon that comes along to prove the contrary.

Looking forward to the next meeting. Regards, Bruce and Bev Storer.

Sandalwood Plantation Oil Sampling

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In 2004, I will be sampling young sandalwood (Santalum spicatum) plantations of age 8-15 years, to determine oil content and composition.

Although we are achieving relatively fast stem diameter growth rates of up to 10mm/year (at 150mm above the ground), we have only limited information on oil production within plantations. Since heartwood volume and oil content set the price of sandalwood, it is important to know more about oil yields within plantations.

Our main source of information on oil yields was obtained from 10-year-old trees near Northampton, Western Australia. In 1998, an auger was used to extract core samples at 150mm and 250mm above the ground from 12 trees. The oil was extracted from the wood using supercritical fluid extraction (SFE), with carbon dioxide as the extraction fluid. Using SFE, the total oil content was 2.3-2.6%, which was comparable to that from natural stands (1-3%).

However, the oil yields from natural stands were determined using steam distillation and solvent extraction, which are less efficient than SFE. Within the sandalwood oil from Northampton, there was 16.7-21.1% α - and β -santalol, which was very encouraging because these are the compounds that give sandalwood its distinct fragrance. Although these findings showed that sandalwood trees are capable of producing valuable oils before age 10 years, we need more information on sandalwood oil contents at different ages, within different sections of a tree and variation between provenances.

To address these questions, I will be taking core samples from a number of CALM, FPC and private plantations in the Wheatbelt. The cores will be taken through the midpoint of the stem and will be cored all the way through to the opposite side. After the cores are removed, the holes will be filled with a piece of dowel and sealed with wood glue to prevent infection. The oil percentage and composition will be determined using solvent extraction and steam distillation.



*FPC Acacia host trials Narrogin & Dandaragan
Hosts planted 1998 (833/ha)*

*Jam (A. acuminata), Golden wattle (A. saligna), Manna wattle (A. microbotrya), Tan wattle (A. hemiteles)
Sandalwood planted in 1999 (416/ha)*

Host Trees for Parrot Protection

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Within our sandalwood seed orchard that we began to establish in 2001, we have planted the sandalwoods and host trees in a number of different ways for experimentation purposes.

One of the main issues that we wanted to address was how to reduce or even eliminate the terrible damage of the emerging sandalwood seedlings caused by parrots. In the past we have experienced total devastation of young sandalwoods in some areas due to parrots simply snapping the seedlings in half.

We found that all of the damage was being done where the sandalwoods were planted along side the broad leaf variety of Jam tree (*Acacia acuminata*). We had also planted a large portion of our orchard with the fine leaf variety of Jam and planted the sandalwood seed within 100mm of the host. The fine leaf variety grows more like a shrub, as opposed to the broad leaf variety which grows quite straight.



Three year old sandalwood emerging through the foliage of Acacia acuminata (narrow leaf variant) hosts.

In the first year we were concerned that the shrub like host trees would smother the sandalwoods and possibly have a negative affect on their growth. By year two we had noticed that the sandalwoods were growing vigorously within the foliage of the shrub like hosts and that the stems of both the sandalwoods and hosts had no signs whatsoever of parrot interference.

Now three years old, many of the sandalwoods are emerging through the top of the shrub foliage. These host trees are continuing to provide protection from the parrots. Although the more traditional ways of reducing parrot numbers around farm forestry projects are still important, it seems that this parrot problem can be reduced within the establishment of sandalwood plantations in a more natural way.

The fine leaf acuminata tends to have quite a sharp point at the leaf end. At this stage we can only assume that this may be the deterrent to the parrots although this has yet to be proven. The results of our trials will not be known for many years as we watch our trees grow. We are realising however the importance of diversification within the species of host trees could prove to provide us with positive growth results.

Sandalwood Seed Available

Greening Australia (WA) has quality seed available including sandalwood and a variety of host species from various wheatbelt provenances. Phone Mark Ochtman (08) 9621 2400 for details.

Sandalwood Markets

Peter Jones, Renew Environmental Services, PO Box 507, Harvey WA 6220, Ph (08) 9729 2290, Mob 0439 911 757

Peter Jones has over 18 years experience in operational forestry with CALM and FPC being directly responsible for the State Governments arid forestry, tropical and sandalwood programs. He is now Managing Director of Renew Environmental Services, providing key services to sandalwood growers to assist in achieving profitable returns through environmentally sustainable systems.

There are two questions anyone contemplating commercial sandalwood growing asks, "How much can I get for it?" and "Who's going to buy it?" The further you are from the point in time that the sale takes place, the more difficult the answer becomes to accurately predict.

It is possible to use currently available information about existing market conditions, industry structures and estimates of yields to provide a best estimate of the likely returns you can expect.

"Who's going to buy it?"

Traditionally the market for Western Australian sandalwood *Santalum spicatum* has been in North and South East Asia with Taiwan and Hong Kong being the major markets and with China rapidly increasing its imports of WA sandalwood, over recent years.

The market structure varies between countries; however, in general an import/export company would be the first point of sale for exporters from Australia. The import company will then on sell the sandalwood to a number of "powder men". In turn the "powder men" sell sandalwood powder to incense makers who in turn supply to retail outlets.

It is not uncommon to see vertical integration within overseas sandalwood markets with importers powdering sandalwood and in some cases manufacturing their own brand of incense products.

Foreign oil producers normally obtain their sandalwood in a powder form from importers or powder men. Large foreign oil producers, most notably in India, powder sandalwood purchased direct from government auctions or importers. They will not tend to buy direct from a sandalwood grower unless the grower can supply significant volumes on a regular basis and provide quality assurance.

On the domestic scene, there are a small number of buyers who utilise sandalwood in the production of sandalwood oil and incense sticks or export direct to buyers overseas.

The domestic demand for sandalwood has increased considerably over the last five years due to the increased value adding of sandalwood into a range of products that are supplied into domestic and foreign markets. This trend is likely to continue and new entrants into the sandalwood industry, in relation to the manufacture of a range of sandalwood products, can be expected.

"How much can I get?"

The price paid by a buyer will primarily depend upon a number of factors;

- The volume of heartwood

The more heartwood a piece of sandalwood contains the greater its value. The aromatic oils are contained within the heartwood. The best oils are concentrated in the oldest heartwood, making the butt and roots more valuable than the trunk and in turn the branch wood.

- The presentation of the wood

The more value-adding that occurs prior to the sale the greater the price a buyer is willing to pay e.g. water debarked logs will fetch a higher price than un-barked logs. Packing of the sandalwood in a manner that reduces handling cost to the buyer will also gain a higher price.

However the additional costs of value adding needs to be balanced against the expected returns to ensure a higher net price is actually achieved.

The amount of value-adding done on the farm also needs to be considered. Most buyers will not purchase powder or oil unless they have a long term association with the grower and can be assured of the quality of the powder or oil.

- The source of the sandalwood.

Prices for sandalwood from native stands will continue to remain higher than those achieved for plantation grown sandalwood. This is due to the longer time to harvest which provides better heartwood to sapwood ratio. To date the oil quality achieved from plantation grown sandalwood does not meet the levels achieved from native stands.

- Production techniques

Consumers are demanding production methods that address the environmental impacts of growing and harvesting sandalwood. This is particularly the case in buyers whose products are destined for consumer markets in the US or Europe.

Growers should establish an Environmental Management System (EMS) to ensure that buyers can provide the end consumer with assurances that the sandalwood has been produced in a manner that does not have significant environmental impacts.

In the case of many other agricultural products the concept of receiving a higher price for a "clean, green" product has not eventuated. What has occurred is a clear consumer preference for "clean, green" products when they are at the same price as traditionally produced products.

- The total volume available to the market

To anyone involved in agriculture this is an obvious point. However in the case of sandalwood the level of world demand will remain beyond the capacity of growers for the foreseeable future.

For the Australian sandalwood industry, the greatest short term threat is the inability of growers to meet demand. Many end users of sandalwood will switch to alternative products which will be difficult to compete with once the alternatives have become established.

Prices

Prices achieved for WA sandalwood in overseas markets varies according to the grade of product sold. High grade products such as butts can achieve up to AUD \$10,000 per tonne, while small branch wood may achieve AUD \$3,000 per tonne delivered to the market.

In general the average price for WA sandalwood across all product grades in overseas markets, is approximately AUD\$6,000 to AUD\$7,000 per tonne, delivered to the market.

On the domestic market growers can receive between AUD \$4,500 and AUD \$5,500 per tonne, delivered to the buyer, depending on quality.

Legalities

It is important to note that the export of sandalwood in a log or chip form requires an export licence and growers considering exporting should contact the Federal Department of Agriculture, Fisheries and Forestry (AFFA). Export Control guidelines for Unprocessed Wood can be downloaded from AFFA's website at www.affa.gov.au.

Within WA the harvesting of sandalwood must be conducted in accordance with the Sandalwood Act and the Wildlife Conservation Act which are both administered by the Department of Conservation and Land Management. (CALM). Growers should contact CALM prior to harvesting any sandalwood on their property to ensure all the relevant permits are obtained.

Summary

In summary, growers and prospective growers should gather as much information about the sandalwood markets and products as possible to ensure they are aiming to produce a product that will meet the markets requirements.

Response - Issues Raised at the ASN Workshop

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Greetings sandalwood growers! In this article I thought it would be beneficial to respond to several issues raised at the inaugural sandalwood workshop on the 15th of October 2003, those being: Insect Pests; Parrot control; and Soil/Site suitability.

Pests: *Delias aganippe* and parrots

Sandalwood saplings and mature trees are remarkably tolerant of insect attack. While affected trees/saplings may look unsightly for some period of time they generally bounce back after attack and are rarely killed. Sandalwood seedlings that are less than a year old are rarely attacked.

The caterpillars of *Delias aganippe* (see Figure 1) can partially or fully defoliate sandalwood trees but they will always recover even if total defoliation has occurred. The insect also attacks a number of other species from the Santalaceae family. The juvenile caterpillars (early instars) are pale brown with white hairs; mature caterpillars (late instars) are dark brown to black with white spots out of which white hairs emerge.

Although generally not necessary, the caterpillars can be controlled by spraying infected trees with a range of contact or systemic insecticides. Note however that, to my knowledge no herbicides or insecticides are registered for use on sandalwood (and they are unlikely to become registered).

In subsequent issues of this newsletter I will discuss other pest such as Rutherglen Bug and other sap sucking insects such as Scale bugs.



Figure 1 A *Delias aganippe* butterfly on a sandalwood shoot, note its eggs on the stem

Parrots

The Port Lincoln ringneck parrots cause serious economic damage to a number of agroforestry species in WA, including sandalwood – its hosts. Two options to control parrot damage in sandalwood plantations are: removal of the parrots (shooting, trapping etc) or; designing plantation systems that minimise parrot damage. "Shooting with a licensed firearm is legal for all farmers in the south-west division (outside the Perth metro area) under a current open season.

Ringneck parrots can be shot at any time of the year on private property where there is a reasonable expectation that they may

damage primary production" (as per Tree Note 26). Trapping can be successful but it is not permitted unless licensed by CALM. Diversionary feeding at strategic times of the year can also be successful in minimising damage in plantation of other agroforestry species.

Alternatively, it's quite easy to design plantation systems that minimise parrot damage. Host plants that have spines or form dense, low, laterally spreading bushes provide protection (and camouflage) to sandalwood that is grown amongst such hosts. Having mix of host forms (i.e. tree + shrub species) established at a high density can also minimise parrot damage of hosts and sandalwood. (See Figure 2)



Figure 2 The small dense bush underneath this sandalwood and sheoak has prevented parrots ringbarking the main sandalwood stem

Soil and site suitability

The commonly held view that sandalwood only grows in red loam soils over clay is not valid. Sandalwood can and does grow in a variety of soils that have very different characteristics. It grows naturally in acidic soils (e.g. yellow acid sands of the northern wheatbelt) and basic soils (eg calcareous soils east of Esperance).

It grows well in red loams, gravels and even deep sands, although the soils can vary, well drained soil is a must for a productive plantation. While it is possible to cultivate sandalwood in a range of soils, it is inherently more difficult to establish hosts and sandalwood in some soil types (leg deep sand). It should also be realised that some host species do better in particular soil types.

Become an ASN member!

We welcome your feedback on the first edition of the Avon Sandalwooder, and if you have a suggestion for topics for the next ASN workshop or newsletter, we would love to hear them. Members are encouraged to submit articles relating to their experiences with sandalwood.

To become a member of the Avon Sandalwood Network or for more information, contact (08) 9621 2400.

This newsletter is a compendium of articles written by many different people. The views expressed are those of the authors, not necessarily those of the Department of Education and Training, the Avon Catchment Council or Greening Australia (WA)