

Status of Sandalwood Resources in Vanuatu¹

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Abstract: On eight islands of Vanuatu archipelago, sandalwood stands have been heavily exploited since the late 1800's. Because of the over-exploitation, which worried the Vanuatu Government, a moratorium was imposed in early 1987. The status of the valuable wood and the beginnings of research into one of the country's potential commodities are reviewed.

Sandalwood is one of the most common commodities in Vanuatu and has been valued by people who own the trees as a direct sources of cash. This valuable commodity has been extensively cut throughout the country from the early 1800's until 1987, when a 5-year moratorium was imposed to ban the exploitation of this valuable resource in the country. It is believed that sandalwood has been completely depleted from one island (Aneityum) as a result of the big rush to exploit the resource between the 1800's and the early 1900's.

This paper details the Department of Forestry's views on the future use and development of sandalwood resources in Vanuatu after the current running moratorium, January 1, 1987 to January 1, 1991. It uses the earlier reports by Neil (1986) and Barrance (1989a).

STATUS OF SANDALWOOD IN VANUATU

Sandalwood occurs on eight islands: Espiritu Santo (the west side of the Cumberland Peninsula), Malakula (Dixon Reef), Efate, Erromango, Tanna, Aniwa, Futuna, and possibly Aneityum (*fig. 1*). It is believed, however, that this valuable resource has been depleted on Aneityum as a result of over-exploitation during the last century. A moratorium on the cutting of sandalwood for 5 years is currently being imposed.

In early 1987 the Vanuatu Government sent a formal request to the Australian Government to fund a national Forest Resource Inventory Survey, with an emphasis on investigating Vanuatu's sandalwood resources. Subsequently, Vanuatu Government approached the Centre Technique Forestier Tropical (CTFT)—a division of the International Center of Agriculture Research for Development (ICARD)—for assistance. CTFT has done a lot of work on the biology and silviculture of the sandalwood. Initial contact with Vanuatu has been established, with ICARD's official resident representative there requesting a Fact-Finding Mission by ICARD to the country. C'I FI or ICARD could also offer research and development support. It is our hope that after

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this Fact Finding Mission, coordinated research and development programs will be established in Vanuatu with ICARD's participation.

A Smallholder Sandalwood Extension planting program is being proposed but would not eventuate until the department is fully equipped with the expertise to implement the program successfully. Demonstration plots will be established prior to this extension program on islands where sandalwood occurs.

The objective here is to attract landowners' interests and acquire the necessary techniques before developing the program on a smallholder scale. An extension policy has yet to be decided on by the Department of Forestry, which may extend the current moratorium on cutting of sandalwood for another 5 years after January 1, 1991.

The possibility of establishing a Market Unit in the near future within the department is our consideration. The objective is to identify, monitor, and advise on potential markets in the country and overseas for all forest products expected from existing and proposed Industrial Forest Plantations and any developed Smallholder Forestry Ventures. Recommended prices for sandalwood would be publicized by the Unit to protect the producers from unscrupulous purchasers.

TRADE AND HISTORY OF SANDALWOOD EXPLOITATION

Sandalwood produces a scented and oily heartwood much prized for its valuable aromatic oil, which is used in perfumery and medicines. In China, it was and still is used in connection with various religious observances. It was the high prices available in the eastern ports at the beginning of the 19 century that sent swarms of adventurers in search of the wood and started the "Sandalwood Trade."

The first Pacific Islanders to feel the effect of scramble for sandalwood were the Fijians. To all intents, their sandalwood had been cut out by 1816 (Shineberg 1967). The Marquesas were stripped of their sandalwood at around the same time, and Hawaii was exploited between 1811 and 1828.

Erromango was the first island in Vanuatu to have its sandalwood exploited for trade to China after missionary Peter Dillon visited the island in 1825. None of the islanders in this area made use of their sandalwood except for some of the people on Tanna, who used it as fuelwood. Thus, no special value was placed on the wood. Exploitation of stands on the Isle of Pines, Loyalty Islands, and New Caledonia (mainland) started in the 1840s.

By the early 1850's sandalwood was gradually becoming more and more difficult to find in Vanuatu. Aneityum had been completely stripped; the forests of Efate had been greatly depleted; only Erromango still had large amounts of wood, but it was not easy to obtain (MacClancy 1981). However, in 1853, sandalwood forests were discovered on Espiritu Santo and for the next decade, exploitation continued. By 1865, the sandalwood trade had practically ceased (Shineberg 1967). The wood was still taken in small quantities in the late 1860's and later as supplementary cargo.

Sandalwood must have occurred in prolific amounts in some of these Melanesian countries to have survived unremitting

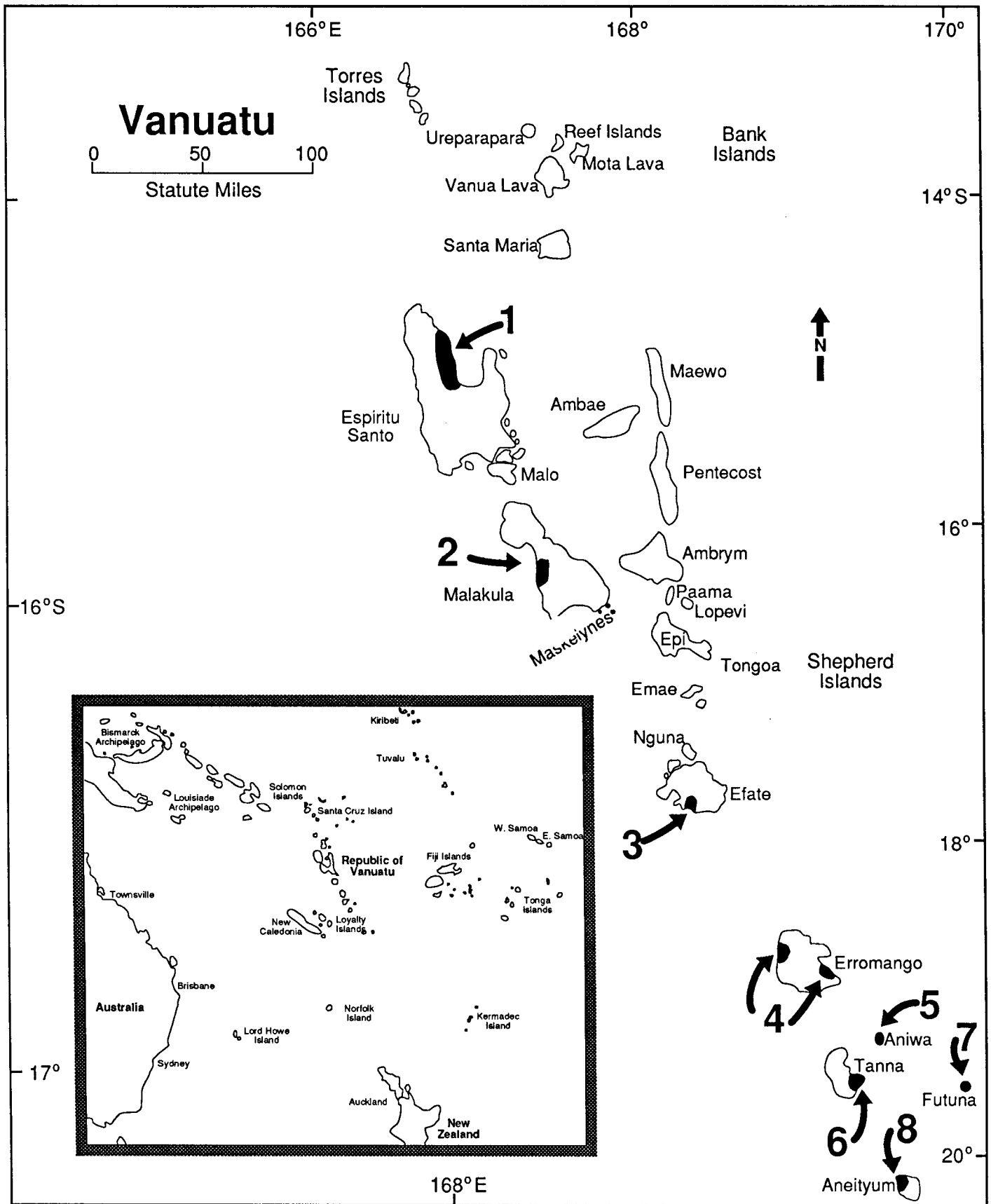


Figure 1—The island republic of Vanuatu.

exploitation for over 30 years, as there were apparently no attempts at conservation or replanting. In particular, Erromango must have been extremely rich since despite being one of the first islands in Vanuatu to be exploited, and being continuously visited during the whole period, it was still yielding wood in 1865. In addition, the sandalwood from Erromango was reputed to be of superior quality than that cut elsewhere (Neil 1986).

Exploitation of sandalwood continued in Vanuatu until the first of January 1987, when the government imposed the current moratorium on cutting of sandalwood following Neil's proposals (1986) (table 1).

PROBLEMS WITH SEED SUPPLY

The Department of Forestry has proven through research that the Vanuatu species of sandalwood—*Santalum austro-caledonicum*—is especially suitable for planting. The main problem is seed supply; it is difficult to ensure a consistent supply of viable seed from different mother trees because they tend to be very variable. Seeds also need careful handling to prevent them from deteriorating. Trees have started producing well again since the devastation of Cyclone Uma in 1987.

CURRENT INTEREST

Thus far three foreign companies have proposed to manufacture sandalwood products within the country for export markets, primarily Taiwan and China. All three proposals were rejected for various reasons.

CURRENT RESEARCH

As previously mentioned, the Ministry of Agriculture, Forestry and Fisheries, issued a 5-year moratorium on sandalwood cutting and exporting in January 1987 with the following objectives:

- (a) to protect the remaining resources;
- (b) to allow time for an inventory of total production, from which sustainable annual cut yields could be calculated;
- (c) to allow the Research Section to investigate the ecology of the species, with the goal of enhancing field production;
- (d) to allow the Research Section to establish an extension program.

So far the Research Section has established two trials to investigate the most efficient means of growing sandalwood.

Trial No. 1

The first trial, established in 1987 under the direction of P.E. Neil, the Forest Research Officer, was designed to gain basic information on sandalwood growth rates and performance at the Ipota plantation site on Erromango. The trial was of simple random design with 3 m by 3 m spacing, with growth rates being measured annually. The seedlings were raised from seed from neighboring Aniwa, a small, low lying island southeast of Erromango.

Table 1—Statistical information for 1977-1987

Year	SANTO		VILLA		TOTAL	
	Metric Tonnes	Thousand ¹ Vatu	Metric Tonnes	Thousand Vatu	Metric Tonnes	Thousand Vatu
1977	4	170	35	1,740	39	1,910
1978	—	—	40	3,400	40	3,400
1979	—	—	47	2,960	47	2,960
1980	—	—	61	3,440	61	3,440
1981	—	—	11	80	11	80
1982	—	—	44	3,141	44	3,141
1983	—	1,834	35	2,656	60	4,292
1984	—	493	44	3,118	52	3,612
1985	—	—	58	4,247	58	4,247
1986	73	13,748	37	2,582	110	16,330
1987	32	8,688	172	14,932	204	23,620
Totals	142	24,933	584	42,296	726	67,032

Source: National Planning and Statistics Office, Vila, Vanuatu. Government of Vanuatu.

¹ About 120 atu = U.S. \$1.

The site was typical of the Ipota area, being covered with secondary bush, of which the dominant species were a grass species, burao (*Hibiscus tiliaceus*), navenu (*Macaranga* spp.), and small patches of melek tree (*Antiaris toxicaria*). The soils are of moderately humic, unsaturated ferrallitic, red-brown type and are rich in clay minerals. The site relief is undulating, being on a moderately dissected plateau ranging from 150-200 m elevation, and on the wetter (avg. 1200 mm) side of the island.

On analyzing the measurement data to date in October 1989, the 22-month-old trial then had mean heights of 1.91 m and a basal diameter of 10.40 cm. Adrian Barrance, a former forestry research officer from the United Kingdom, suggested in his assessment of the trial (Barrance 1989b) that sandalwood in Vanuatu appears to grow very well without association with a host plant. This view is apparently contrary to results found in other countries where host plants are regarded as essential to good production (Barrance 1989b).

However, since the question of the relationship between sandalwood and its host(s) remained unresolved by the first trial, Barrance suggested that a second trial be established to investigate the matter further.

Trial No. 2

The second trial was established to compare establishment success and initial growth rates with the most promising primary host(s) currently known to us, *Alternanthera sessilis*, against fertilized and untreated controls.

Seed stock was taken from Ipota, Erromango. The trial, of nursery scale type with seedlings growing in bags on Cyclone mesh wire beds in plots of 150, includes the following treatments:

- (a) seedlings with primary "host" *A. sessilis*,
- (b) seedlings with NPK fertilizer, and,
- (c) seedlings without treatments as a control.

The trial was established at the Vila Tagabe Nursery in January 1990, and height increments are measured and general performance is observed weekly. It is too early in the trial to draw any conclusions; the first initial assessment is planned for June 1990, when the trial will be 6 months old.

Extension

The program and extension materials have been kept simple, both to make them easier for the islanders to understand and to allow our Forest Rangers to gradually build their experience in this field. The following outlines the extension steps taken to date:

(a) Leader farmer demonstration plots. Demonstration plots with seedlings have been established and free technical advice is being provided on the land of a number of leader farmers on Aneityum and Erromango, the main sandalwood-growing islands in the group. It was considered important to establish these plots on private land to ensure full and visible participation by landowners to encourage others to follow suit. Any revenues arising out of these plots will go to the landowners, but it is intended that there will be a charge for future materials and/or technical advice—the ultimate aim being to make this project self-sustaining.

(b) Extension. In addition to the leader farmer demonstration plots, Forest Rangers are also visiting other smallholders, discussing the project, and distributing an explanatory leaflet on the subject. This leaflet, written in simple terms in Bislama (Vanuatu pidgin), the national language, contains a step-by-step sandalwood growing guide from seed collection and treatments to establishment and crop care methods (*appendix*).

FURTHER WORK NEEDED

The following sections outline further research and extension requirements for promotion of the project:

Extension

(a) Publicity. Further publicity by radio, either by a specific program or as part of existing Agriculture Extension programming, would be useful. The Research Section is looking into this.

(b) Expansion of Demonstration Plots. More leader farmer demonstration plots, especially in areas distant from Forestry Stations, are planned to extend the project to a greater number of people.

(c) People with forestry expertise are needed for extension efforts.

Research

Establishment of international provenance trials is planned.

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APPENDIX

FORESTRY DEPARTMENT - VANUATU GOVERNMENT

PLANT SANDALWOOD ON YOUR LAND !

Lots of people have considered cutting sandalwood growing on their land in order to earn money. In some parts of Vanuatu, sandalwood is in short supply or has been completely exploited. For this reason, the Government has imposed a 5 year ban on sandalwood cutting which is from 1978 to 1992. During this period, an inventory will be conducted and research carried out. This will be a good time for sandalwood planting - don't wait until your sandalwood has disappeared !

1. Collecting Seeds

Sandalwood seeds ripen twice a year: sometimes in May and at about October - November. Collect only ripe seeds which are bluish in colour and are soft. Seed collection from trees or have just fallen are good. Old seeds which are on the ground are not suitable for planting.

2. Washing Seeds

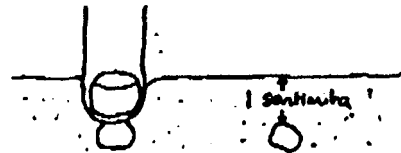
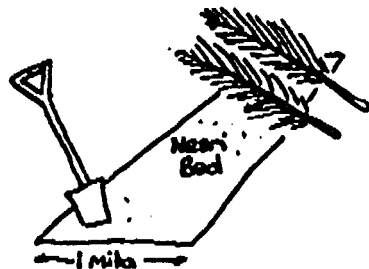
The seeds should be washed directly after collection to remove the flesh: the flesh should not be left to rot on the seeds. The seeds should be sowed directly after washing. If this is not possible, they should be stored in a dry, cool and well ventilated area. Plastic bags should not be used as they cause mouldiness to the seeds.

3. Establishing a Nursery

An area behind the house should be appropriate where the soil is easy to work with and accessible to water. The bed should be dug about 1cm wide. Work the soil until you have a fine tilth then smooth off the bed and water it.

4. Sowing in the Nursery

To sow, push the seeds into the bed one at a time, using your index finger to a depth of about 1cm, that is about to the top of your finger nail. Bury them lightly. Coconut fronds can be used for shade.

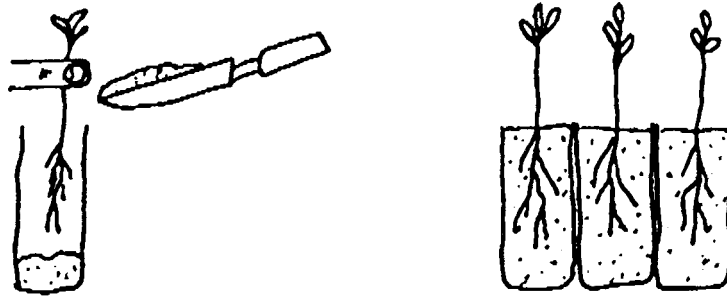


5. Containerising

Dig up some dark soil, but don't dig too deep to use red or solid material. Work the soil to a fine tilth removing roots, stones and hard lumps of soil. Pile the soil in the nursery. Get some small plastic bags which are about 15-20cm long and 5cm in diameter.

6. Transplanting

When the seeds germinate, dig them up and transplant them into the plastic bags. The transplanted seedling should have some soil attach to the roots. Holding the seedling in the plastic bag, start filling the soil. When filling make sure the roots are vertical for good support and anchorage. If potting is done first then planting, the roots may easily be damaged or anchorage would be poor. After transplanting, the seedlings may be watered and may be put under coconut frond shade.



7. Land Preparation

Select somewhere where the bush should not be too dense. The area should not be totally cleared because sandalwood grows well in proximity with other trees, such as among Acacias.

If there is cattle morning around, the area should be fenced off.

When the trees are ready for planting, the area should be marked out and use a spacing of 3 x 3m. At each location (only), the site should be slightly cleared.

8. Planting

Allow the trees to grow to about 20-25cm in height, which by then they should be ready for planting. Hardening-off should be done 1 or 2 weeks before planting, but if scorching is seen, shading should be placed back. At each location marked for planting, a hole should be dug to about 30-40cm deep and 20cm across. The plastic bag must be removed before planting. Put some soil back into the hole in order that the seedling root collar is level to the surrounding ground. Fill the hole up and press with your hand to ensure that the seedling is firm.





The Forest Service, U. S. Department of Agriculture, is responsible for Federal leadership in forestry. It carries out this role through four main activities:

- Protection and management of resources on 191 million acres of National Forest System lands
- Cooperation with State and local governments, forest industries, and private landowners to help protect and manage non-Federal forest and associated range and watershed lands
- Participation with other agencies in human resource and community assistance programs to improve living conditions in rural areas
- Research on all aspects of forestry, rangeland management, and forest resources utilization.

The Pacific Southwest Research Station

- Represents the research branch of the Forest Service in California, Hawaii, American Samoa and the western Pacific.

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