# SANDALWOOD RESEARCH INSTITUTE OF WESTERN AUSTRALIA

## SANDALWOOD RESEARCH AND DEVELOPMENT PLAN 1989-1994

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### PREFACE

This plan has been produced by the Sandalwood Research Institute of Western Australia, a non-profit organisation funded by sandalwood industry funds from Western Australia. It is intended to guide research and development activities which might be funded by the Institute over the next quinquennium, subject to the availability of funds.

It is the intention that this will be a rolling five year plan, revised annually in the light of research results as they come forward and as priorities for research change. The plan has been prepared in consultation with the Department of Conservation and Land Management, the organisation charged with responsibility for administration of the sandalwood industry in WA. It takes account of the research which CALM will be supporting in respect of sandalwood over this time frame.

The basic philosophy of the SRI is to support research and development activities which appear to have good potential to contribute to the maintenance and expansion of the sandalwood industry in WA, in line with the State's overall plan for the future of the industry. This means that SRI will support projects concerned with either the endemic Santalum spicatum or any introduced Santalum species. Priority will generally be given to those activities which show promise of economic benefit to the industry and the State.

The source of funds for the SRI in the past has been funds made available by the Australian Sandalwood Company arising from Commonwealth export incentive awards. Future fund allocation will come from monies directed from the ASC under the Western Australian Government's industry management plan. As these funds are industry-sourced, they will be used as far as possible to attract other external funding, for example, from the Australian Special Rural Research Fund. For planning purposes a notional allocation of up to $100,000 per year should be allowed for.

The intention is that the Institute will from time to time call for expressions of interest for undertaking research projects which conform with the priorities identified in this plan.

### SECTION ONE - THE SANDALWOOD RESEARCH INSTITUTE

The Sandalwood Research Institute (SRI) exists to fund and promote research on sandalwood in Australia. It was set up in 1980 by the Australian Sandalwood Company as a non-profit industry research institute. It is recognised by the Australian Taxation Office as an "approved research institute".

The basic objectives of the SRI are to promote scientific research, investigation and experimentation of:

(a) The incidence and habitat of sandalwood in Australia.

(b) Reforestation of the species in Australia.

(c) Study the biotic strains of sandalwood and the union with host plants.

(d) The species of sandalwood in other countries and methods employed to regenerate, propagate and improve stocks of sandalwood.

(e) The introduction of foreign species of sandalwood into Australia.

Its activities so far have been to disburse funds for research projects, mainly at tertiary institutions in WA, which were deemed to provide information useful for the continuation of the sandalwood industry. These projects have covered research on both S. spicatum and S. album. The SRI has also supported an annual seminar on current sandalwood research in order to improve communication among those interested in this field.

The SRI receives administrative support from the Australian Sandalwood Company and is governed by a Board of Trustees.

## SECTION TWO - INDUSTRY AND RESEARCH ENVIRONMENT

The Western Australian sandalwood industry currently produces about 1800t per year of sandalwood for export. Of this total, about 1000t comes from dead wood and the remainder from live trees above a minimum diameter of 10 cm at 30 cm from the base. Almost all the present harvest comes from the arid and semi arid parts of WA ranging from Shark Bay to Kalgoorlie.

Harvesting of sandalwood is very tightly controlled by CALM and all harvested material is processed by the Australian Sandalwood Company.

The overseas market for sandalwood remains strong and there is every likelihood of this situation remaining so for a long time. There are few other large producers of sandalwood in the world and Western Australia can remain a significant producer if it pays careful attention to quality control of the product and maintenance of its resource base.

A comprehensive inventory of sandalwood resources by CALM has shown that there is sufficient resource for some 50 years at the present rate of harvest. However, there is very poor regeneration of the species, due largely to the effects of browsing by sheep, rabbits and goats. The existing growing stock is also growing very slowly. At Kalgoorlie, it takes about 100 years to grow a tree of commercial size, and about 45-50 years in the wheatbelt at Narrogin. Therefore, the long term future of the industry requires either a vigorous reforestation programme in the wheatbelt or a transition to another species at some time in the future.

Research on sandalwood regeneration problems commenced around 1900 and has continued spasmodically to the present, supported by the Forests Department and, since 1982, by the SRI. Some of this research has been supported in Curtin and Murdoch Universities. As a generalisation, it can be said that it is possible to regenerate sandalwood fairly reliably in the wheatbelt, provided it is protected from fire and grazing, but regeneration in the more arid areas is much more uncertain. In neither area does culture of the species for wood production alone meet normal economic criteria.

For these reasons, attention from about 1984 was increasingly directed towards the possibility of replacing S. spicatum with the tropical S. album which grows in India and parts of eastern Indonesia. SRI supported research on the tissue culture of this species and CALM established several field trials in the Kununurra area. CALM also became involved with the management of an ACIAR research project in Timor which was partly concerned with research on regeneration of S. album in that province of Indonesia. Most of the sandalwood research component of the ACIAR project has been contracted out to Curtin University, and CALM is in contact with research on various sandalwood species in Indonesia and New Caledonia.

## SECTION THREE - RESEARCH PRIORITIES

The Department of Conservation and Land Management is charged with responsibility for management of the sandalwood industry and resource in WA. It has produced a Sandalwood Management Plan (CALM 1989), which sets out the State's long term plans for conservation of the species and utilisation of the resource.

In brief, the plan calls for use of funds derived from the ongoing sandalwood harvest to purchase grazing leases in the pastoral zone so that after destocking, sandalwood will be able to regenerate unhindered, provided there is a suitable run of growing seasons. Farmers in the wheatbelt will also be encouraged to plant sandalwood in areas of land withdrawn from production or reforested for land conservation purposes. Funds from the same source will be available for research and development on S. album in the Kimberley area, as it is the long term aim to supplement and eventually replace the harvest of the native sandalwood with a plantation crop of the introduced species. If this is done, the markets available to the WA industry will be wider as the tropical sandalwood have a considerably higher oil content than the WA species. We would then be able to market the high-priced distiled oil as well as the timber for the incense trade.

CALM therefore has an obligation to support some research on the introduced sandalwood and it is important that the SRI programme is integrated with that followed by CALM. The CALM Sandalwood Management Plan indicates that the Department will concentrate on the silviculture of S. album, ie, selection of optimum secondary host species, adaptability of the species to different soil types in the Kimberley area, determination of optimum stocking patterns of sandalwood and hosts and collection of growth data. There is no intention by CALM of continuing research on S. spicatum at this stage.

It is also important to keep in touch with current research on sandalwood in Indonesia and New Caledonia, to ensure that duplication of work does not occur and that any useful developments can be followed up here. At this stage, this contact is maintained through CALM's involvement in the ACIAR project. Should this terminate, other avenues of maintaining contact will be developed.

The SRI has considered this position and has taken the view that the only research it would sponsor on S. spicatum will be in connection with its potential use as a food nut source, since the development of a by-product of this nature could completely change the economics of the species in the wheatbelt. Apart from that area of research, all SRI funds will be directed to work on S. album.

The principal areas of research priority identified at this stage are as follows:

1. Tissue Culture

   It is necessary to develop reliable techniques for the field establishment of sandalwood clonal material. This holds great potential for mass propagation of genotypes with high tree and oil quality. The possibility that physiologically mature clonal material might produce oil-containing heartwood earlier than seedling plants also needs investigation.

2. Research on Heartwood Formation

   Research is required to determine how soon heartwood is formed on various soil types and what degree of genetic variation on oil content exists. An iso-enzyme technique for non-destructive assessment of oil content appears promising and needs to be further developed and refined.

3. Establishment of S. album

   There is still not a reliable technique for the production of vigorous and healthy seedlings of this species. The optimum primary (nursery stage) host for WA has not yet been determined. Once adequate local seed supplies are available, it is very desirable to develop a reliable method of establishing this species by direct seeding.

4. Use of S. spicatum as a food nut

   There are promising indications that sandalwood nuts may have commercial potential but a number of aspects need further research.

## SECTION FOUR - MANAGEMENT OF SANDALWOOD RESEARCH

Following investigation of possible avenues of attracting Commonwealth research funds to this area and advertisement of SRI's intention to fund research, the Trustees of the SRI will consider expressions of interest which come forward. Subject to expected available finance and conformity with the priorities set out here, the SRI will then invite selected parties to present detailed submissions for research support.

Funding will not normally be agreed to for a period longer than three years. It is recognised that annual funding makes efficient planning of research of this nature very difficult. Under some circumstances, the SRI will fund travel which is associated with research in line with its areas of interest.

All funded projects are subject to a formal contract and agreement between the Institute and researcher over intellectual property rights. All funded projects are required to present a detailed annual report which will be reviewed by the Trustees. The SRI reserves the right to terminate any research project if there is deemed to be unsatisfactory progress.

The Institute will also produce a formal annual report which will account for its expenditure and describe the results of research which it has funded.

All correspondence with the SRI should be directed to:

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