

PAT RYAN

To: All Participants in February 1997 Sandalwood Seminar

LIST AS PER AGENDA AND ADD AS NEEDED

RECORDS
HEADQUARTERS
28 FEB 1997
CALM
GERALDTON

**NOTES FROM SANDALWOOD RESEARCH
AND PLANTATION SEMINAR - FEBRUARY 1997**

The attached notes were made by the chairman of the February 1997 Sandalwood Research Seminar. I apologise for the delay in circulating them and assure you that many of the action items have been addressed. Especially those part of the 1997/98 budget process.

The notes are to serve as a memory jogger.

The seminar only loosely followed the agenda (attached) so some agenda items are covered collectively in the notes.

The various research papers and summaries presented were circulated during and before the seminar. If participants have other notes or summaries relating to sandalwood research, please also circulate these to relevant people to facilitate ongoing communication.

Thank you for your attendance and input. Please undertake allocated action items.

Ian Kealley
REGIONAL MANAGER - GOLDFIELDS REGION

79F31

1997 SANDALWOOD RESEARCH AND PLANTATION SEMINAR

Training Centre, Como

11-12 February 1997

MEETING NOTES

DAY 1 - 11 FEBRUARY

1. OPENING ADDRESS

Don Keene

- Sandalwood important for Department revenue, 10%.
- Marketing - Taiwanese position.
- Long-term strategy to augment *spicatum* with *album*.
- Trials and plantations, ex SCARP funded projects, good results for both *spicatum* and *album*.
- Salinity strategy. Big opportunities for NHT funding and planting of sandalwood. Biodiversity (supplementary) planting in the Wheatbelt to incorporate sandalwood.
- This seminar (two days). I expect you to pull together options and priorities for research and integrate findings and needs with operations. Information exchange. Leads to development of a research program.

Syd Shea

- History of industry.
- Sandalwood revenue important.
- In history - paradigm shifts occur.
- Sandalwood. An harmonic convergence has occurred allowing a paradigm shift.
- Pats/Andrews work, major leap forward in technology. On the verge of capacity to commit and ability to produce significant amounts of sandalwood.
- Combine with tree technologies that select trees for oil to get quality planting and huge productivity increase.
- Reproduction technology is available.
- Andrews work. Establish, grow and select. Get oil earlier in greater concentrations. We now have the capacity and technology to produce quantities in our lifetime.
- Ord. Anticipate greater planting as it expands.
- Sandalwood has a valuable role in the establishing of perennial species in the Wheatbelt. Combined with pine and other species.
- Sandalwood as a productive crop opportunity as part of biodiversity planting. Helps overcome the psychological barrier to tree crops.
- Think big - quadruple production combined with creative marketing.
- Taiwan. Slowly picking up. A large market in mainland China.
- Other opportunities:
 - local use
 - Indian market
 - oil and perfumes
- What's the Future. Sandalwood's time has come. Lots of long and short term opportunities. A lot of work needed.

- New markets
- Japan
- Wine. Hotham Valley
- USA
- Boutique markets
- Spirits. Romantic matou?
- Oil
- Utilisation.
 - maximise, incentives needed
 - root extraction needed
 - root excavation needed
- Possibilities. Bring industry ex Asia back to Australia for production. Create jobs, value adding. Important time for sandalwood.
- Research/Operations.
 - need more integration and communication
 - integrate research and operations
- Need people in research, management and operations (including processing and marketing) that are good at ideas and have the capacity to put into practice.
- Still looking for the “Gold Nugget sandalwood”.

2. INTRODUCTION

Ian Kealley

- Welcome
- Important time for the sandalwood industry and therefore research.
- Operational matters:
 - Industry restructure complete
 - Harvesting tenders (contractors) underway
 - Processing and marketing restructured with new market potential, changes in processing, powder and new opportunities.
 - Operations staff, SBU Manager, Inventory and Planning.
 - SCARP. Changes envisaged to current project. Research linked to operations. Operational aspects into normal budgets.
 - Plantations (*album* and *spicatum*) developments.
 - Ongoing research.
 - Sandalwood oil has potential.
 - Other aromatic timbers worth investigating.
 - Pastoral management, access and issues are critical.
- Also in the next few years:
 - Management Plan needs to be re-written incorporating new research and inventory results and data.
 - A sandalwood industry strategy to cover all aspects of industry.
 - Inventory and planning closely linked to operations and management.
 - Competitive neutrality and competition policy.
 - Private Property. Sandalwood Act amended re plantations and issues.
 - International connections.
 - Huge pastoral and rangeland issues, NSRM, ESD, NBS. Local planning and strategies.
- Research:
 - Need to fine tune and apply priorities.

- History is relevant. Don't redo work, use old plots and data (e.g. Loneregans) and results.
- Havel report still very relevant.
- Brand/Rado current research.
- Future. What we are here to discuss.
- Suggestions:
 - Spicatum:*
 - Operationally orientated. Emphasis on management of natural stands, ecology, sustainability and plantations.
 - Alternative harvesting techniques and regeneration and products will need research.
 - Plantations. Will need/have a research and development component.
 - Album:*
 - Plantations.
 - Tropical Forestry link.

Following discussions during the seminar, priorities and budgets will be set.

Discussion and Issues

- Seed store could have a role in keeping seed from specific provenances.
- Need to expand research and identify sandalwood beyond phenotypic selection. Oil vs growth etc. Work on heartwood formation and oil %. Get smart.
- Management. Issues expanding and sandalwood getting caught up in ESD, Biodiversity strategies. Also NSRM and Commonwealth assessment.
- Political aspects:
 - resource access on pastoral and aboriginal leases and lands.
- Sustainability. Ecologically sustainable management.
- Expect changes.
- Management plan update needed and strategy.
- Sustainability on pastoral areas compared with State Forests and CALM leases and reserves. Research and inventory work needed.
- Dead vs Green harvest 50:50. Quota and future management.
- Impacts of plantations in the future on management of natural resource.
- Provenance testing. Uni West Sydney mechanical nose for screening e.g. oil.

ACTION: Contact name and possible application to be investigated.

- Tree selection and more comprehensive testing. Chem Centre? Many possibilities.

3. SANTALUM ALBUM RESEARCH

Andrew Rado

Presentation. Andrew set the scene, covered past history.

Pre 1992. Program bumping along, no responsibility, run by remote control. Lots of failures. Under review.

1992 - Appointed to research, ACIAR 1/2,
 SCARP 1/4,
 SRI 1/4 - now disbanded.

AR was responsible to all these areas.

1995/96 - SBU funded Album.

- Split in two - Operations - E.Kimberley District
- Research AR within SID.

Andrew ran through a series of slides, setting the scene.

Pot host trial explained and results given. Successful outcome on Pot host trials.

Postgrad studies commenced. Phd Murdoch. Research project involving *S.album* plantation parasitism and heartwood development.

Research

1. Alternanthera sowing time experiment. Timing critical. x 4 production of biomass.
2. Inducing heartwood formation in young sandalwood 5 yo: Using two chemicals. Various treatments were successful in inducing heartwood and intermediate wood formation. Oil content in formed wood. Sap 0.2%, Heart 0.5 - 3% vs True heart - < 1% oil from plantation.

Stunning result. Radial and longitudinally. Induced oil has the right chemical components and α and β compounds. Repeating in 10 yo plot.

Question

How long does xylem tissue remain functional to 'treatment chemicals'. Unknown.

3. The influence of host quality on linear distance from sandalwood. Model developed.
4. Influence of five host treatments as intermediate hosts on *S. album* growth. Early results.
5. *S. album* stand density. Long term host ratios influences on plantation growth and stem development. Estab. June 1996. Long term aspect of sandalwood research.

The Future Where should we be heading.

1. Teak as timber and host.
2. Sandalwood even more attractive than in own right by adding tropical timbers e.g. Brazilian mahogany, African mahogany. Tropical Forestry proposal.
3. Provenance trial 4 ha. Expand.
4. Weed control major research.
5. Work on sand soils.
6. Field nutrition and fertilizer (no work yet).
7. Aspects of parasitism.
8. Tree breeding critical.

Priorities are 3 and 6.

Discussion

- Is it possible to induce heartwood formation in existing *spicatum* and increase oils? Unknown.
- Operational research required.
- Single family experiments applicable.
- How much time is spent on maintenance on operations? Little, AR advisory capacity.
- East Kimberley District has 4 ha. in 1996/97. Refine proposals. They also propose to plant 20 ha. in 1997/98 or later depending on funding and budget outcomes.
- Weed control - various options.
- 220 ha. Ord. Proposal on the table to proceed with this.

- Government Policy initiatives re tropical forestry in policy statement. Use these to reinforce.
- ACIAR - 2nd officer ex India for tropical forestry is proposed. Canberra OK. Indian researches OK. Detail to be resolved.
- "Complexities of growing flood irrigated parasitic species in the tropics should not be underestimated".
- Are we confident of the planting and establishment prescription? Yes.

ACTION: SID to develop and update a scientifically based operational prescription ex AR work and implement.

- Possibilities for future research on *album*:
 - weed control
 - nutrition
 Could use Gavin Ellis and R Fremlin's skills.
- Any operational person will have some research role and needs to use Department expertise e.g. weeds and tree breeding.

Summary

- 96/97 4 ha.
- 97/98 Propose 50 ha. and plant 20? ha. in June/July 98.
- Nursery - expansion proposal and needed.
- Tree breeding and other weed/fertilizer research to continue.
- Long term hosts. Tropical forestry will run parallel. An expanded range of species to be considered.

ACTION: Need to sort out the Ord operations future - 1997/98 onwards.

4. SANTALUM SPICATUM RESEARCH

Jon Brand

Jon gave an outline of his research in the Rangelands and Wheatbelt. Including sandalwood field ecology and regen. research. Supplemented by slides and overheads.

- effects of grazing
- seed enrichment
- population dynamics

Research at Burnerbinmah and Thundellara Stations

- 4 land systems Burnerbinmah and Thundellara. Histograms for height/diameter combined and for individual land systems shown.
- Tree size.
- Bark of sandalwood. Dry side NW side 0-40 cm. Moist WSW sides. Why? Combined effects or the result of heavy grazing?
- Fruit production. Oct. 96 lower than expected seed production. Exceptional winter. Possibly a cyclic sandalwood seed cycle and regeneration.
- Regen. Numbers of seedlings vs land systems.
- Seed enrichment. Sowed against hosts.
- Vegetation plots.

Ninghan Station trial

- Effects of different land management activities on sandalwood.
 - harvesting
 - enrichment
 - grazing
- Research site of 32 ha. 2 x 16 ha.
- Sandalwood histogram of sizes and stands shown.

ACTION: Check regen events vs rainfall. Check records (Ninghan) look at dendrology work on sandalwood and hosts in analysis.

- Natural regen low. Why? More work required to prove causes and develop theories.

Additional Trials and Future Research

- Duplicate Burnerbinmah/Thundellara trial at Adelong/Goongarrie.
- Sandalwood excavation proposed looking at roots, quantities and host relations.
- Sandalwood inventory data analysis.
- Monitor B/T and N trials.

Discussion

- Direct seeding remnant vegetation. Huge variation in survival. Could be related to age of hosts. How old? Unknown very difficult to age.
- Started on inventory work.
 - 2 stations Ag. WA landform maps and inventory data.
 - Analysis of sizes between land types and look at reasons.
- Induction of heartwood in *spicatum* needs to be looked at.

ACTION: Need to refine inventory techniques, use modern technology and link to science GIS and land systems where possible.

5. DISCUSSION ON RESEARCH DIRECTIONS

L. McCaw

Introduction

A group forum and discussion.

- Some research detail has been discussed. Need to get points down and confirm priorities.
- SIB/SBU interaction re \$ and resources to be defined.
- Priorities to be set.

Research - Current Status

- album* - AR work
- spicatum* - JB work - Rangeland.
 - P Ryan - Mid-west plots.
 - Wheatbelt trials and plots.

Jon has had input and assisted in the writeup, this will continue. Co-ordinate.

Some of these areas are not research projects, more ad hoc trials. Results valuable, must communicate.

SCARP	- Wheatbelt - Narrogin and Katanning.
SCARP/CURTIN	- Shark Bay
SCARP	- UWA - Trengove oil analysis. <i>Spicatum</i> and <i>album</i> analysis.
OTHER	- Murdoch, <i>album</i> . Carnarvon and Mid-west.

Existing Researchers	1 for <i>Album</i>
	1 for <i>Spicatum</i> rangelands
<u>Needs</u>	Wheatbelt researcher <i>spicatum</i> ?

Research directions identified (discussion)

Album

- Tree breeding
 - High value host selection
 - Weeds (operations)
 - Nutrition and fertilizers (operations)
 - Irrigation (operations)
- AR fully occupied.
 - A link needed into combined ops/SID. Extra research needed in the plantation development aspects.
 - Ord
 - Need operations program
 - Need a dedicated person for plantations and operations
 - Need funding for ops. and plantation
 - \$ yet to be decided for ops/plantation (1997/98 and onwards).
 - Weeds/Irrigation/Tree breeding research to be included. Use SID people.

ACTION: Incrementally, as part of operations, there is research areas to be included and funded as per priorities identified at this meeting. For *album* as per AR recommendations. Involve SID as required (internal).

Spicatum Rangelands work and Wheatbelt work

- Rangelands - Natural resource needed for ongoing (30+ years) therefore JB keep on with existing research and priorities.
- Wheatbelt
 - Need
 - Decision to proceed with planting and plantations
 - \$ + level of research defined and allocated
 - What can it support, i.e.
 - Operations
 - Research
 - Extract existing data and write up as required.
- Existing trials. Wheatbelt and Mid-west need to be maintained (don't lose). Fund and extract data and expand research. Also *Dryandra* is a possibility.

Proposed 1997/98 Research

Spicatum

- Rangelands
 - Goongarrie plots JB
 - Excavation JB
 - Inventory analysis JB
- Induction of heartwood in *spicatum* is a possibility.
- Wheatbelt
 - Suggested that research needs a dedicated officer
 - JB has facilitated co-operation and analysis to date
 - Research needs/possibilities:
 - * Dryandra
 - * Host survival
 - * Growth rates
 - * Host changes/dynamics
 - * Site selection
 - * Host selection (expand)
 - Advisory - How do we plant. Need information and research results in summary form as advisory literature.

ACTION: As JB fully occupied in rangelands on sandalwood ecology research, he should continue with this as a priority.

Other Research

Universities

Three small *album* plots Jen McComb put in as clonal plots. Carnarvon/Kununurra and Northampton. Good data good trials. Clonal trial, tissue culture. Need \$2 000 pa to maintain. SBU need SID advice on status and funding. Issues:

- Tenure
- Ownership
- Information - IPR
- Write up and CALM role

ACTION: McComb/SID to advise. This is considered a high priority for 1997/98 funding once issues are investigated and resolved.

Spicatum

- Gold nugget *spicatum*!
- Genotypes/Phenotypes. Seed collection and link into plantations and planting. J Bartle developing field ID of Euc. oil for mallee program may expand to sandalwood.
- Selection for oil and heartwood. We could test samples through Chem Centre (WA) as part of JB program. JB to check possibilities.
- Need to conserve what we've got in the Wheatbelt. Seed. Germplasm conservation.
- Provenance testing. Plant plus trees in Wheatbelt. This is all a new area of research. There is some capacity to link rangelands and trees research with Wheatbelt plantations.

- More research required in the Wheatbelt plantation area.
- Bioprospecting - N Marchant proposal. SID. \$0.5m. some may come the way of sandalwood.
- Wheatbelt planting and seed. Genotype germplasm. Provenance. Expand the Nick Casson work.

DAY 2 - 12 FEBRUARY

6. INVENTORY, MARKETS AND PRODUCTION

Peter Jones

- Presentation on Inventory method and data.
 - Resource calculations
- Resource increased due to improved inventory cf. 1991 and management plan.

Issues

- Need information on the Wheatbelt resource. 1-2000t green? A guess only.
- Conservation and reserves areas have increased (400 000 ha.).
- Murchison Gascoyne area is of major concern, no reserves. Land use conflicts.

Markets

Market is strong at this stage.

Wescorp. Green harvest and export could be 1250 tpa. Currently 900t.

Album - unlimited demand.

New markets - Oil, wood for furniture and carving, joss sticks. New products potential.

Current Production

- *Spicatum* 2 200t WA
- *Album* 3 000t? World
- Other *Santalum* sp. 1340? in 1990 decreased in 1997 to unknown. Market research needed.

Strategy

Need a plantations package and management and use of natural stands. Giving total harvest.

- *Album* plantation x t
- *Spicatum* plantation x t
- Managed natural resource x t

What are the parameters?

→ *Spicatum*. Economics of plantations.

→ Other benefits.

Spicatum. Current position, issues and work needed.

Meeting obligations for conservation.

Need ecology work.

Economics of plantations.

Revenue is a key aspect.

Scope of plantation development.

Role of CALM vs private enterprise.

Economics (J. McG)

Is driven by plant and species growth rates.

First priority is to establish some good plantations as trials.

Put a title to plantations:

- salinity strategy
- grow trees in Wheatbelt.

Plantations - No? Economics?

Why are we planting?

We will come under increasing pressure over management of natural stands i.e. to use alternatives. Commercial use vs alternatives vs environmental reasons.

7. WHEATBELT RESEARCH AND PLANTATIONS

Jon Brand

The Wheatbelt - where at now?

Northampton, Kwobrup and Beaufort Bridge and Dryandra and Highbury. Trials.

- Northampton. Pat Ryan trials and report done. Seeded. Survival and growth rates. Early. At current growth 127mm in 20 years. Hosts deaths now and growth decreasing. Slides.
- Narrogin trials. Seeding and host species 5% germination (first year) reseed '96. 1-2% germination. Very poor results.
- Kwobrup. 40% germination, 60% of hosts have sandalwood. Direct seeding is viable and reliable on some sites.
- Issues raised by Ken Wallace:
 - Wheatbelt tree planting area e.g. pine > 450mm. Don't forget the remainder.
 - Supplementary planting area best options.
 - NHT? Other funding for 'commercial or forestry planting' is difficult.
 - In relation to research, need to:
 - Maintain existing trials and expertise
 - Research provenance especially for oil content, growth rates and form.
 - Look at regulation of the private property industry, include conservation of resource.
 - Research silviculture of plantations.
 - Research hosts especially commercial products.

Wally Edgecombe

Small sandalwood plots near oil mallees and on Ag.WA land. Slides shown.

Mid west Trials

Pat Ryan

Has done several trials in NE Wheatbelt. Suggesting problems with 'establishment' in remnant vegetation. Research needed also in the area of weed control.

Site selection

- Rainfall higher (4-600mm) = greater growth rate.
- Temperature influences growth
- Aspect - could be critical

- Soils - granite derived. Red sandy loams - need good country for best survival and growth.
- Seed. Superior trees needed. Local provenances first.
- Weeds. Major influence (-ve impact)

Preparation

Host/sandalwood ratio to be decided.

Suggest two years before seeding sandalwood.

Weed control - chemical?

Seed preparation - fresh seed/store.

Fencing - native and introduced herbivores.

Fertilizer - unknown.

- Hosts
- jam, provenance problems
 - mixed acacia planting better
 - use local species
 - need to regenerate and sustain hosts

Jam - has alternative use as fenceposts.

Host configuration to be decided.

- Seed
- selection important.
 - several germinations apparent.

Have enough information ex trials to make recommendations.

ACTION: Need to compile and summarise Pat's work and report. JB circulating results. Prepare a prescription based on this work and earlier work and prescriptions.

Acacia Hosts (B Masilin)

Comments

Acacias highly variable, huge provenance and taxonomic variation. Silvicultural techniques - self regen of hosts. Seed or root suckering. Select hosts with root sucker potential. Large number of relatives to existing hosts.

Paper (Cue conference) on rhizobia. Cut, loses nodules and rebuilds. Use nitrogen fixing plants. Use his expertise.

Discussion

- 300 sph sandalwood. Stocking? What is preferred. Host/sandalwood ratio to be determined.

ACTION: Need to write up all trials. Ryan's, Edgecombe's and other and prepare a summary.

- Sensitivity of haustorial connections *spicatum* vs *album*. Not an issue. Pat's and Owen's and Uni work indicated that planting seedlings is a problem.
- Need to further develop techniques for pot hosts and seedlings planting to increase germination and survival.
- Irrigation vs dry land situation. Can it be irrigated. Trails needed and research.
- Wanna Station trial - attempting to grow sandalwood under irrigation. Ian Wilson. Planted seedlings, many failed. Direct seeded, looking good.
- Potential in the rangelands for establishment and irrigation associated with diversification, changes in land management and research (e.g. Japanese team).
- Seed germination over a number of years, seeds have benefit over seedlings.
- Can reproduce results if sites are right and conditions good.

Research Proposal Wheatbelt

Jon Brand - proposal tabled and discussed.

- 2 x 10 ha. trials proposed
- Seedlings of three hosts at Cunderdin and Narrambeen nurseries. Local provenances.
- Funding. Host seedlings \$4 000 ex JB 96/97 budget.
- Location. Kunjin near Corrigin. Tenure to be resolved first.
- Soil survey needed.

ACTION: Proposal and \$ to be finalised by SID/Wheatbelt Region/FFU for 1997/98 as a new initiative.

Overall priority to be determined as part of 97/98 budget process.

Is this research proposal covering the silvicultural and host research needs? Yes.

What is the Narrogin nursery capacity re seedlings and hosts can it be used? To be looked at.

8. SALINITY STRATEGY

J. Bartle

- Interest in Wheatbelt tree planting is enormous.
- Need to put into perspective. It's an Agricultural activity and environment. Remove forestry jargon when working here and during promotion and advisory.
- \$0.5b. NHT for Australia.
- Psychology of how the work will be done is critical. Dispersal. Alley planting. Huge scale. Systematic economic plantings. Tree crops in effective layouts to integrate with agriculture. Linear. Farmers are clever and innovative at this.
e.g. Kununoppin planting. Alley 60m wide. 100 000's trees per annum. Has the potential and will include sandalwood.
- Sandalwood, already there as a concept among smart growers. Build on this.
- Build factors into industry that will make us indispensable. Genetics, high oil, seed, licensing?
- CALM has the:
 - technical expertise
 - marketing expertise
 - can do at scale
 - the ability to encourage production
- Farmers happy to proceed and develop silviculture and techniques.
- Strengths of CALM we have to sell;
 - Know a lot about the plant (genetics) itself
 - Use skills in marketing as a lever to influence development, i.e. we need one big co-ordinated industry.
 - Oil mallee, genetics and selection, see attached example.
 - Can identify the plus trees and qualities and collect seed and sell this.
 - Expertise in establishment/host arrangements.

NOTE *Album* - provisional patent taken out on techniques to keep CALM involved. They (investors) have to come to us.

- Wheatbelt planting - 3b. trees/hosts. Sandalwood in this. Hosts to also return production potential.
- Importance of host work. A higher priority on sandalwood genetics and selection is also needed.

Salinity strategy summary

- Major directive to plant trees therefore trials on sandalwood can be included.
- Education and advisory role to land users. Remember the big picture.
- Identify early the research role and include it.
- \$ to be allocated.
- Identify who and how work and planting to be done.
- this is a long term project, must have strong ongoing component.

ACTION: A set of options for Wheatbelt planting needed. Review options for developing sandalwood planting in the Wheatbelt and present to Corp. Exec. Link to NHT/Salinity strategy to be defined ASAP.

9. OUTCOMES, PLANNING, SUMMARY AND RECOMMENDATIONS

Summary

Summary of the two days discussions given by Ian Kealley covering the eight areas of the seminar.

1. Opening address DK and SS
2. Introduction to the industry, research and issues. IK
3. *S.album* research operations and discussions. AR
4. *S.spicatum* rangeland research and discussions. JB
5. Discussion on research direction
6. Markets, operations and inventory. PJ
7. Wheatbelt research and plantations (*spicatum*). JB and others
8. Salinity strategy and NHT. JB

Also a reminder of:

- sandalwood management plan requirements
- plantation development objectives (*album* and *spicatum*)
- need to use results of research and put into operations

Issues and Actions arising and discussions

9.1 Existing knowledge

Need to collate knowledge and information from existing research and prepare a report. Who? Agreed this role would be co-ordinated by SID. Action items re prescriptions are relevant.

Album - AR - Thesis

Spicatum - JB - reports

9.2 Wheatbelt planting and trials

- Progress to planting and trials
- Research needs
- Existing trials

Issues

- Instructions to plant sandalwood in the Wheatbelt (DK/SS) as supplementary planting.
- J Brand proposal 2 x 10 ha. trials/research.
- Do we acquire a farm to develop trials or use reserves?
- Locations?
- See next item, resolves many of these.

9.2.1 Operational Planting

- Bigger picture, NHT, salinity strategy, J Bartles planting.
- Planting progressing (salinity strategy) including supplementary planting and lots of mixed sp. and Jam.
- Plant sandalwood in year 2.
- 300 ha. June 1997 from Mt Barker to north of Perth associated with *Pinaster*. At 15-20% other sp. = 60 ha. for 1998 planting.
- Some small amount of \$ in 1998 needed to seed in sandalwood.
- Collect seed (superior if possible) and store. Source to be identified. Collect Spring 1997.
- Tenure is farmers land, arrangements re ownership must be made or resolved.
- Areas and details are available.

ACTION: 60 ha. of 1998 planting proposals in hand. Some items (above) to be followed up by SID and SBU. Include in 98/99 budgets. Seed collection.

9.2.2 Education and Advisory Role

- Salinity strategy, plantations and sandalwood management plan and policy.

ACTION: Develop an education and advisory role for sandalwood planting linked to a sandalwood conservation plan and the salinity strategy.

9.2.3 Research Needs and Priorities

- Identify needs and priorities.
- SID to prepare a proposal for 1997/98 ex this seminar. Future research and growth proposal ex SID as 1997/98 new initiative.
- J Brand to handle plots.
- Region/Districts to identify locations in conjunction with SID.
- Operational (SBU) input and \$ to be identified and negotiated.

ACTION 1: \$80 - 100 000 as a new initiative proposal in 1997/98 to cover research, liaison and education/advisory with strong links to:

- the salinity strategy
- FFBU
- SBU
- existing research
- education and advisory (whole package concept)

Also link to bioprospecting proposals if possible (ex SID).

To cover:

1st Priority

- Inventory in the Wheatbelt
- Tree breeding work
- Plus tree identification, oil and other attributes
- Seed collection and storage

2nd Priority

- Heartwood formation (at Dryandra?)
- Site evaluation work

ACTION 2: Investigate oil sample testing, trial 10-20 samples ex SBU and J Bartle. Follow up ASAP.

9.3 1997/98 Proposals, priorities and budgets

1. Wheatbelt Reg 4 sites Research
 2. Edgecombe 2 sites Demo
 3. Ryan 4 sites Demo
- J Brand to co-ordinate and report and document.

1. Beaufort	- Maintenance only)	
Kwobrup	- Maintenance and Demonstration)		\$18 000
Highbury	- Maintenance and Provenance		\$13 000
Dryandra	- Maintenance and Provenance		Nil
2. Wally Edgecombe	- Demonstrations		
	- Merredin		No \$ required
	- Newdegate		"
3. Pat Ryan	- 4 sites. All on farms		Same \$ as 96/97
	- Kalannie		Same \$ as 96/97 \$10 000

1997/98 Research

Summary of Budget needs

1. Wheatbelt:		
	Kwobrup	
	Beaufort Bridge	
	Highbury	32 000
2. Newdegate/Merredin Trials		0
3. Midwest trials		6 000
4. <i>Spicatum</i> JB		71 000
5. <i>Album</i> AR		110 000
6. UWA (Tregrove)		30 000
7. Murdoch <i>album</i>		<u>2 000</u>
	TOTAL	257 000
	NEW INITIATIVES	
	Tree Breeding (SID) etc. (see 8.2.3)	100 000
	<i>Spicatum</i> Trials 20 ha (JB)	<u>20 000</u>
		<u>\$377 000</u>

ACTION: \$32 000 proposals (request) for the research in the Wheatbelt to be looked at. Justify the \$, maintenance and extra funds in terms of research and benefits

NOTE SCARP Budget

Need to restructure and rework in 1997/98 in conjunction with regions, SID (above), SBU and directors. Especially in relation to:

- maintenance of stations
- Ord. Fund as a stand alone project.
- *Spicatum* plantations.

10. D KEENE - CLOSING REMARKS

- Thanks.
- Changes in organisation of sandalwood reinforced. SBU manager changing. Thanks to IK.
- Education and Advisory and S Shea Action Plan and Tropical Forestry in Ministers/Government priorities and policies.
- SS Action Plan - CALM has a pre-eminent position in land management agencies. CALM also has great role in influencing activities off CALM land.
- The former tree advisory service will expand substantially.
- The changed debt management strategy will be used to finance these. There is lots \$ to use in the SSAP (salinity strategy).
- Farm Forestry Task Force 1995 received submissions. Recommendations to Government accepted. FF Dev Group set up. Chaired by Alex Campbell (Sharefarmer). This group is under 4 CEOs.
- FF Advisory Service needed to enable consistent and accurate advice to tree planters. Run by? Ag, CALM, SWD Comm.
- FFD Group jointly run by CALM/Ag.WA by appointment of co-ordinator, as a consultant. Appointment due soon.
- Collate information. Develop extensions and advisory information. CALM and Ag.WA staff trained to provide advice. Runs parallel to Maritime Pine and supplementary planting progress.
- Research proposals and outcomes from seminar. Put up through budget process for consideration. In the next ten years the huge tree planting initiative in Wheatbelt must include sandalwood.
- Tropical Forestry. Ord phase 2 and West Kimberley. Options for sandalwood (s.a.) and tropical forestry to be investigated and developed.
- Co-ordinate this approach through the Sandalwood Management Plan (conservation etc.) and business planning.

CLOSE

Ian Kealley

Seminar Chairman

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