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EUCALYPTUS STUDY GROUP NEWSLETTER No. 26 JUNE 1992

Group Leader
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Dear Members,

I have just finished typing (for Study Group files) an updated list (including author, publication date, synonymy, common name & distribution) of 12 *Angophora* and 716 *Eucalyptus* species, with 66 more taxa at subspecific rank. (This total includes the species covered in Brooker & Kleinig (1990) Field Guide to Eucalypts Vol 2 that are still 'ined.'; and the species described by D. & S. Carr (1987) in their book Eucalyptus II although some are considered by various taxonomists to require more evaluation).

This is not the end of the story, of course. More revisions are no doubt in progress. 19 species treated in Brooker & Kleinig as *E.* sp. A, B, C etc. have not yet had names formally published, with a further 18 species & 6 subspecies listed in the Appendix yet to be described.

We each of us can't hope to grow them all. But we can consider ourselves as a group with a very large 'garden' — the whole country — and start to take a firm interest in what is growing in our own backyards. Become familiar with your local *Eucalyptus* and *Angophora*; find out why they grow there, how endangered; collect and store seed. Your local species might not seem very ornamental or desirable, but if it's rare there'll be someone somewhere who'll want to grow it and want to know all about how to!

Along the same tack, how cautious do we need to be in our plantings of non-local eucalypt species? An article by Tim Low (extracted from "Urban Ecologist" by the Wildflower Society of WA MAY 92 Newsletter) highlights Australian natives that have become troublesome weed species out of their natural range (some of the *Acacia, Leptospermum & Pittosporum* for example). "So far, exotic natives are not behaving as atrociously as certain overseas shrubs such as lantana, blackberry, bitou bush, groundsel & gorse. But they are more likely to become a greater problem as more gardeners plant native species which are then spread about the country. Inevitably a share of these will become weeds...Hakeas, kangaroo apples (*Solanum*), native willow and cadaga (*Eucalyptus torelliana*) are risky. On the other hand, the banksias, melaleucas, kunzeas, angophoras, kangaroo paws and others appear to be benign."

A final editorial note on the process of producing a newsletter. All work is done on a humble typewriter, with numerous trips to the local library to photoreduce bits (a 20 cent per copy expense which I carry rather than try to keep track of). Final bulk photocopying means trips to Macquarie Uni library to check out the quality vagiaries of what copy machines are in working order. The charge is 9 cents per copy. So an 8 page newsletter currently costs $1.17 including postage (within Australia). I can reprint short articles from newspapers (and many thanks to Keith Ingram, Kevin Penny and David Jenkinson for forwarding such), and magazines that members might not have seen (with usual requirements of obtaining permission & sending a complimentary finished newsletter). My other source of content is summarising papers from technical journals. It helps to have contributions from members.

NEW MEMBERS We extend a special welcome to:

Philip Hartstein	14E Dudley St, Randwick NSW 2031
David Kleinig	PO BOX 221, Walkamin QLD 4872

CHANGES OF ADDRESS

Rod Anderson	RMB 20, Bingley Way, Wamboin NSW 2620
Rohan Hutchinson	1 Roseneath Rd, Watsons Creek NSW 2355
Hugh Seeds	53 Panmure Rd, York WA 6302

MEMBERSHIP of Study Groups follows the financial year. If a renewal reminder does not accompany your newsletter, *you are financial* for the coming year JUL 92 to JUN 93.

SGAP NEWS

The next meeting of NSW Region on Friday 17 JULY 1992 (7.30pm at Ermington Community Hall, River Road, Ermington) will feature a talk by Lance Cockburn on "Eucalypts". ESG members in Sydney are encouraged to attend — it seems a good opportunity to have a local ESG get-together. *[Contact me on (02) 869 7775.]*

Our Study Group currently receives copies of newsletters of all State Regions (except SA). Anyone wishing to borrow some of these please let me know.

The Australian Cultivar Registration Authority (ACRA) based at the National Botanic Garden, Canberra, has resolved that for 12 months, leaders of all ASGAP Study Groups, Regions and District Groups be eligible for free registration of any new cultivars with exceptional horticultural qualities. Are there members with worthy specimens of *Angophora* or *Eucalyptus* to make most of this opportunity? ACRA is also asking for colour photos and propagating material of such cultivars.

Your gutless Study Group Leader requests that any members with a flair for slide-shows or public talking please consider being guest speakers for various Group meetings. Blue Mountains SGAP meet in a native plant nursery reserve at Glenbrook and would be very interested to hear a lecture on the culture of eucalypts. They wish us to consider a talk on Friday 4th September 1992 at 8pm, or a subsequent occasion.

SEED BANK

Apologies to members who got late delivery of seed requests. Seeds are stored at 4°C in airtight containers 5 to 100 ml in volume. They are not doled out into seed envelopes until the need to fill a seed request. It would be helpful if not too many species are asked for at any one time since it becomes a somewhat daunting chore. (Because of different bottle sizes they cannot be stored in alphabetical order.) Thanks to Hugh Seeds for supply of *E. preissiana & rhodantha*, and garden cultivated *pyriformis* (pinkish red) & *youngiana* (strong yellow).

Many stocks have become exhausted. Could members please pass on to me details of good seed suppliers that you think I might not know about. (ESG will purchase stocks if everyone considers this a worthwhile expense.) Has anyone had dealings with CSIRO Division of Forest Research in Canberra? And how about all you experienced seed collectors out there sharing with us you methods (rifle, bow & arrow, stone on a rope...)?

Tony Cox (Durack, Qld) MAR 92:

Newsletter No. 25, what a bonanza, our patience rewarded — congratulations on the super effort.

You ask for opinions on a number of questions concerning operation of the ESG. It would be wonderful if all ESG members could assemble together at some time, but obviously that is not a practicability in this continent. Except for the possibility of small local gatherings we are therefore dependent upon the conventional newsletter as our means of communication. I regard the newsletters (as they must do for all Study Groups) as primarily a means of bringing to the attention of fellow members the experiences (successes and failures) of individual members in growing or observing eucalypts. The newsletter, I think also, could be a medium for members to ask specific questions about eucalypt problems — I doubt that this has been availed of much in the past.

I don't think anyone would doubt that the production of a newsletter is an onerous task, no matter how committed the leader. I would think 3 newsletters a year would be a sensible level of communication.

The maintaining of an herbarium collection or plantation are ideas way beyond our means and facilities and I think not the province of our Study Group. The various State Herbaria, Botanic Gardens, and various reserves throughout the country cater for this need adequately.

Likewise I wonder whether it is necessary for the ESG leader to be loaded with a seed bank. The SGAP Regions all seem to carry extensive seed banks including eucalypts. Is it desirable (extra work and expense) for ESG to duplicate these?
As an alternative I suggest that once a year ESG lists in an appendix to one of the newsletters, a list of eucalypt seed held by every SGAP Regional seed bank.

As you have done in Newsletter 25 I think it is useful to add photocopies of items from other publications containing eucalypt news or information of special interest. Finally, you make a good point, if ESG is regarded as the repository & fount of all wisdom on eucalypts then members should be making more noise about it, such as at flower shows! What about more audio-visual slide collections — the 3 ESG already has are excellent! — and contributions to Australian Plants (a problem here for the average ESG member like myself is the photography, so often desired by the Editor).

Now to the nitty-gritty. To keep the record straight, the *E. torquata* referred to in my last letter, which I planted in the garden strip adjacent to my unit at Forest Place Retirement Village in OCT 89 has succumbed. After a healthy beginning and production of some flower buds, it became badly infected (about OCT 90) with rice bubble scale. According to F.D. Hockings this is a sure indication the eucalypt is in the wrong environment — an experience also confirmed by a member in Rosewood. So the *torquata* was yanked out and about Easter 91 was replaced with a very young *E. eximia nana* (Dwarf Yellow Bloodwood) from Fairhill Nursery. Now 12 months later it is flourishing and is over 3 metres tall.

Tim Hayes (Goulburn, NSW) MAR 92:

Some thoughts on what I would like from our Study Group.
First, the newsletter. I believe the current format and contents are generally excellent. We need to get info on the most recently-proclaimed species as well as other articles related to eucalypts. The more frequent the newsletters, the better. A very important function of the Group should be the sharing of experiences on the growing of eucalypts. Ideally, this should be through the medium of the newsletter; the difficulty is getting people to write on their experience. I do not know the solution to that one. We need active members; we can tolerate some passive members but if there is not a strong flow of information about the sharing of growing experiences, the ideal is not being attained. I am not sure what you can do to promote 'active' members; I imagine you cannot make 'active' membership more attractive in a pecuniary or other way.

I do not think there should be any effort put into starting an arboretum or similar project. Getting through the red tape to get started would be horrendous; it would sap the energy of those who are probably already heavily committed. You know the old saying about getting somebody to help you - select the person who is already very busy; that person will be the one to find the time. Again, members of this group are very highly scattered. In any event we already have gardens; the Botanic gardens have collections and Mt Annan, I believe, is aiming for the biggest representation in the country.

It would be great if the Study Group were a network. It would be excellent if visits to members' gardens were possible. I believe that first, members should be asked if they would agree to visits from others. This would establish a climate in which one could feel free to ask another member if a visit were possible on a particular occasion etc. I for one, would be reluctant to ask to visit unless I knew the other member was in general, agreeable to the idea. Lists of what different members were growing would be ideal to ensure the value of visits, given the variety of interests that might exist among members. We have probably 'WA eucalypt' freaks, 'tall eucalypt' freaks etc.
To get back to the feedback from members. To get members to describe their euc plantings, soil type, site aspect, weather and climatic variables, pests, nutrient deficiencies etc. would be great for those who wish to try particular species and are willing and able to modify as many of their local conditions to help ensure success. One of the difficulties with this of course, is that, the lack of objectivity that there might be in soil descriptions. We can possibly all distinguish bad drainage from good but beyond that how would we go?. Would the average member know their soil pH, any nutrient deficiencies etc.? To me this is the big unknown.

A herbarium collection is a good idea but difficulty of access to it may put a damper on it. A central location might be best but lots would not be able to visit. Identifying eucalypts is a favourite activity (and sometimes a source of agony). There are plenty of keys around but I get frustrated when I look at some keys and they list subspecies which seem to have few differences to separate them and then you can look in your own area and you get the impression that there is lots of variation but you still have only one name to cover all the variations. For example, I notice in the Flora of New South Wales Vol 2 (Harden) two subspecies of E. radiata listed and the only difference between them is the shape of the juvenile leaves (and perhaps size). Yet if one compares gumnut shape of say E. camphora in Costermans' 'Native Trees and Shrubs of Southeast Australia' and those illustrated in Harden's book they look quite different. I notice also that a number of subspecies of E. rubida have been proclaimed; in this area there seem to be differences among E. rubida populations that are not covered. For this reason, I do not prefer any one key in preference to another. I know that I could send material to the National Herbarium for identification; is there any other way?
I think that anything at all about eucalypts has a place in the newsletter. I think that information about growing eucalypts (whether as specific articles or members' letters etc.) and news about eucalypts should dominate. Other articles, e.g book reviews could be put in on occasion. If the amount on cultivation can be increased, the present format is fine.

With regard to a seedbank, again there are advantages and disadvantages. The cost of seed from commercial suppliers is relatively cheap (e.g Nindethana) although it cannot be said that getting seed commercially is an infallible guarantee that it is either viable or correctly identified. There is a place for members who are keen enough to be supply some seed that may be difficult to get otherwise.

Are there members who would be keen to research the best growing conditions for 'highly desirable' or difficult-to-grow species? There is no doubt that many members are growing 'desirable' species but a lot of what they learn possibly never sees the light of day. Again, the motivation to keep records etc. would be greater if they felt part of a team working towards a specific goal.
I often think that it would be very beneficial if there were some opportunity to associate with professionals in the field of eucalypt research, be it in botany or whatever field. Is there any role that the great body of Group members could play in such research?

Some eucalypt 'news'. A flowering specimen of E. macrocarpa in Goulburn was recently brought to my attention. It is about eight years old and about 1.5 metres tall with two main stems (heavily staked). It is growing in well-drained sandy soil in the higher part of this city. Being eight years old, it would have survived frosts to -9 in 1986 and '87. This is the first flowering with six flowers. The plant was given by a neighbour who has since moved from the area. In fact, the owner of this property is moving to another house a few blocks and has asked one of the City Council's horticultural experts to attempt a transplant. Judging by the leaf size, this plant is ssp. macrocarpa. Diameter of the flowers approaches 10 cm.
In my own garden at the moment, E. saligna, leptopoda, rossii are flowering . E. foecunda, sieberi, kruseana, sturgissiana are in bud and should flower for the first time perhaps next spring but I am looking forward most to E. caesia ssp caesia which is budding up very nicely at the moment.
One problem that I have had with several eucs is a problem of fruit drop not long after flowering. Last year, E. leptopoda lost all its fruits; E. saligna lost probably 95%; there was some loss from E. pulverulenta and a few months ago, E. curtisii, flowering for the first time lost all its gumnuts while still green. Even heavily-fruiting E. leucoxylon dropped a lot of green gumnuts last spring. All my searching through the literature to find a cause has been in vain and this included a visit to the CSIRO Division of Forest Research library in the A.C.T. I wonder if any members know the reason for this and whether they have experienced anything similar. I note that one book cites a copper deficiency as a cause of bud-drop but I have never come across a mention of premature fruit-drop.

Jim McLeod (Oldina, TAS) MAR 92:

Congratulations on your superb newsletters. If you ask me, you are doing all the right things. I'll have to try and find an interesting topic and send it to you for inclusion.

Being in a very windy, cold area I was very interested in Gwen Calnan's article from England. I grow all Tasmania's alpine eucalypts here on our farm, and am very interested in trying others especially *E. parvifolia*.

Jane McLean (Alligator Creek, QLD) MAY 92:

I enjoyed your ESG Newsletter No.25 very much. Because I was not sure what ESG members did, it was really interesting to read your questions and to read so many members reports.

Being a very casual — nearly passive — member, I can only say that I grow whatever eucalypts come my way — either as seedlings that I buy or seeds that I grow.

I joined the group when living in Mt. Isa because I felt that *E. pachyphylla* which we had admired so much along the Barkly Highway (NT) had great potential for north Qld gardens. So I was particularly interested to read that it had been tried in Vic (Elspeth Jacobs, Wangaratta) and SA (Kaye Bartlett, Jervois). I'm still trying to grow it and have just had a lovely little crop of about 12 germinations (each 1 cm high) eaten by grasshoppers. I have one moderately happy plant, 35cm, growing in pure sand and another not so happy, 20cm, in a mound of topsoil. These two plants are both approximately 1 year old.

Hugh Seeds (York, WA) APR 92:

I've just returned from a day trip to Kalannie near Dalwallinu north of here to see *E. salicola* growing at the edge of a salt lake. Most attractive trees with pink bark like salmon gums. I wanted to see them growing wild as I raised a few last year and more this year and wanted to be sure I could recommend them. Also I wanted to see young ones as they change their leaves twice; at the second stage they are bushy with leaves very like *E. albida*, and I wondered whether I had the right seed.

Max & Angela Waters (PO Kalannie WA 6468) showed me trees at all stages, as they are raising them in large quantities for local farmers. Their nursery and seed business is a model of efficiency. Around the walls of a former billiard room they have a display of many local trees and shrubs as dried pressed specimens on white paper covered with clear plastic. They took time off to show me and my friend the trees growing beside the salt lake and self-sown specimens coming up in the middle of a gypsum mine! One of those had leaves on it at all stages — most helpful. Their local land care district committee is so keen, carrying out surveys of soil, tree cover and understorey & birds in the district. No wonder they won a national award!

This year I'm raising 600 gums for a farmer (via Men of the Trees) (200 each of York gum, wandoo and river red gum) and 1000 for the York River Conservation Society (a mixed lot including *salicola, sargentii, grossa, spathulata, wandoo, rudis, parramattensis, platypus, talyuberlup)*. For the farmer I will also supply a few *salicola* for his salt patch. We plant out in May or June after the rains. For the River Group I'm using plastic root-trainers (Plix Pots of NZ).

February's newsletter was indeed interesting. I must try eucalyptus cider!

Kevin Penny (Stratford, VIC) May 92:

The trees at my place have grown well this year due to fairly good rains. Perhaps the most interesting tree at the moment is a hybrid of *E. crenulata x E. saligna*. I have about six of these hybrids which show various degrees of intermediate characteristics. Two of them however which tend towards the *saligna* side have dark green foliage with a fairly strong odor of peaches.

An *E. morrisbyi* from Tasmania is putting on good growth — very tall and thin. I finally got some *E. subcrenulata* established but I lost my *E. vernicosas*. The article on Eucs. in England was interesting.

It would be beneficial to expand the seed bank but how would you go about it? I wonder how you actually study in a Study Group. Probably members sharing their experiences is the most important thing. Also the seed bank is spreading the species and protecting them with the advantage of trying them in new environments.

I just finished a course in nursery management and I wonder if you could ask members to share any experiences they have had with grafting eucalypts. I have an idea for a business along these lines as my future with Telecom is looking decidedly untenable. I am going to the USA this year and will try to make more observances on eucs in California.

Bill Butler (Parkes, NSW) reported in 1990 a marvellous list of over 55 species of *Eucalyptus* growing on 14 hectares of ex-farmland in the Goobang Creek valley (deep loam, no rocks but a few sandy loam patches) despite being in an area that gets "very severe frosts and hot summers with fairly long dry spells, and these two things account for most problems, particularly if frosts come late as they sometimes do even to mid October. Some of my failures have been inappropriate for this area but I find it hard to resist trying different species so must expect problems".

An original aim was to grow plants indigenous to the area. "This was no problem for trees since they are still in evidence (*E. conica, camaldulensis, melliodora, microcarpa*) but virtually the whole valley has been grazed and it is difficult to find out what was originally here." He is currently keen on rare & endangered species.

NEW EUCALYPTS

Kevin Rule has published a new species for Victoria, *Eucalyptus strzeleckii* (Muelleria 7(4):497-505, 1992). Occurring in the western Strzelecki Ranges (Gippsland), it is a medium tall forest swamp gum previously considered to be a high altitude ecotype of *E. ovata*, and confused with *E. brookeriana*. All three species are similar in having dark green undulating adult leaves and small somewhat obconical fruits.

- Bark white with red-brown mottling, smooth throughout except for loose basal strips;
- juvenile leaves longer than wide, sub-lustrous with only slight discolor, relatively long petioles and moderately crenulate margins;
- waxy growth tips giving foliage a bluish tinge;
- spring flowering period

} help distinguish *E. strzeleckii* from *E. brookeriana* (which regularly has a stocking on the trunk of tesselated finely fibrous bark; shortly petiolate strongly crenulate, lustrous, markedly discolorous juvenile leaves as wide as long; and summer to autumn flowering).

- Tallish erect habit (to 30m) & smooth white bark;
- seedling features such as regular early development of square stems, juvenile leaves green with some lustre & abundant oil glands and regular sub-crenulation of margins;
- waxy growth tips on foliage, and spring flowering

} help distinguish *E. strzeleckii* from *E. ovata* (which has persistent loose basal bark on a small to medium spreading tree; stems round in section; juvenile leaves dull blue-green with entire margins; adult & juvenile leaves sparsely glandular; and autumn flowering).

In the same paper, Kevin Rule has also raised a subspecies to specific rank: *E. petiolaris*. Formerly *E. leucoxylon* subsp. *petiolaris* with a disjunct population on Eyre Peninsula SA, it is markedly different from the other subspecies in both adult & juvenile characters, and should be considered a separate species. It differs from *E. leucoxylon* in not possessing opposite & sessile juvenile leaves — features which bind the various subspecies of *leucoxylon* together.

Five recent papers provide a total of 54 new species and 25 new subspecies for Western Australia.

1) MIH Brooker & SD Hopper, Nuytsia 8(1):1-189, 1991
2) PM Grayling & MIH Brooker, Nuytsia 8(2):209-218, 1992
3) CR Dunlop & CC Done, Nuytsia 8(2):195-199, 1992
4) LAS Johnson & KD Hill, Telopea 4(2):201-222, 1991
5) KD Hill & LAS Johnson, Telopea 4(4):561-634, 1992

Many of these new species were treated informally and illustrated in Brooker & Kleinig, Field Guide to Eucalypts 2 (1990).

Dunlop & Done (1992) have published the name *E. ordiana* for a species first discovered in 1981 on the Ord River, and known from only 6 populations all within 90km range of Kununurra. A tree to 6m, it retains broad foliage through to the adult stage, with new growth claret-coloured becoming glaucous.

Grayling & Brooker (1992) identify 4 new species: *absita, annuliformis, argutifolia & balanites.*

Brooker & Hopper (1991) revised the Series *Levispermae*, which is now recognised to contain a remarkable array of newly described taxa that had been previously attributed to only 5 species (*redunca, wandoo, gardneri, desmondensis & xanthonema*). A number of the rarer undescribed taxa needed names to facilitate conservation initiaves, including their placement on the WA list of Declared Endangered Flora.

Raised to specific rank: *arachnaea* (formerly *E. redunca* var. *melanophloia*)
flavida (formerly *E. redunca* var. *oxymitra*)
subangusta (formerly *E. redunca* var. *subangusta*)

Newly described: *abdita, capillosa, clivicola, crispata, densa, hebetifolia, histophylla, livida, luteola, medialis, melanophitra, microschema, nigrifunda, phaenophylla, pluricaulis, praetermissa, sparsicoma, subtilis, tumida & varia*

Additional subspecies:
arrachnaea subsp. *arrecta*
capillosa subsp. *polyclada*
densa subsp. *improcera*
gardneri subsp. *ravensthorpensis*
phaenophylla subsp. *interjacens*
pluricaulis subsp. *porphyrea*
subangusta subspp. *cerina, pusilla & virescens*
varia subsp. *salsuginosa*
wandoo subsp. *pulverea*
xanthonema subsp. *apposita*

Johnson & Hill (1991) revised the gimlets in Series *Salubres* and the related Series *Annulatae*. To the group (*salubris, campaspe, diptera, ravida, effusa & annulata*) have been added: *jimberlanica, tortilis, terebra, creta, extensa & protensa*. *E. effusa* has a new subspecies *exsul*.

Hill & Johnson (1992) have published a lot of new WA taxa arising out of their revisionary studies:

Raised to specific rank: *aspratilis* (formerly *E. occidentalis* var. *stenantha*)
gratiae (formerly *E. loxophleba* subsp. *gratiae*)
semiglobosa (formerly *E. goniantha* subsp. *semiglobosa*)

Newly described: *balanopelex, educta, foliosa, goniocarpa, lata, recta, rosacea* [*E. elachyphylla* Brooker & Kleinig, Field Guide Eucalypts 2:419 (1990); nom. illegit.], *suggrandis, tenera, tephroclada, vegrandis*

angustissima subsp. *quaerenda*
balladoniensis subsp. *sedens*
goniantha subsp. *notactites* (subsp. "sessile fruit" in Brooker & Kleinig (1990:218)
kessellii subsp. *eugnosta*
leptopoda subspp. *arctata, elevata & subluta*
loxophleba subsp. *lissophloia* (subsp. "smooth bark" in Brooker & Kleinig (1990:204)
loxophleba subsp. *supralaevis*
mannensis subsp. *vespertina*
sargentii subsp. *fallens*
websteriana subsp. *norsemanica*
suggrandis subsp. *alipes*

argyphea [*E.* sp. J in Brooker & Kleinig (1990:220)]
blaxellii [*E.* sp. I in Brooker & Kleinig (1990:202)]
depauperata [*E.* sp. E in Brooker & Kleinig (1990:147)]
misella [*E.* sp. L in Brooker & Kleinig (1990:226)]
phylacis [*E.* sp. K in Brooker & Kleinig (1990:224)]
pruiniramis [*E.* sp. D in Brooker & Kleinig (1990:126)]

Note: *E. goniocarpa* "has been referred to *E. eremophila* subsp. *pterocarpa* (in Brooker & Kleinig 1990:146). The latter is, however, said to occur in rocky sites, with no mention of the 'mallet' habit. This represents another possibly distinct species related to *E. eremophila*, and has not been rediscovered to date."

MEMBERS LETTERS CONT.

Dr Max McDowall (Bulleen, Vic) reported (Sept 90) growing small eucalypts in raised garden beds with 50% sand or scoria incorporated for drainage.

E. latiuscula	Full sun 7 yrs 6m, attractive trunk
E. flindersii	full shade most of year — straggly
E. roycei	rather crowded by other shrubs until recently — may coppice from below
E. vernicosa	1m x 1.2m 6-7 yrs still no flowers
E. pyriformis	recently lopped and coppicing vigorously from ground level 13 yrs
E. oldfieldii	10 yrs top dead, but base coppicing
E. erythrocorys	15 yrs in part sun — straggly coppicing spontaneously from base after top dies back.

Brian O'Brien (Neutral Bay, NSW) has tried most of the popular WA species without much success, some notable exceptions being *erythrocorys* which flowered profusely Oct 90 *[best year for mine, too — Ed]*, *preissiana* and *formanii*. Tasmanian species grown include *pulchella, risdonii, cordata & urnigera.* Others that have done well include *gillii [also does OK on Epping clay — Ed], elata, scoparia, curtisii, radiata & viridis. E. pulverulenta* has not done so well.

Tim Hayes (Goulburn, NSW) in an earlier letter, mentioned a personal project to grow a "potted" arboretum of all the local species within 60km of Goulburn. He lives on a standard 1/4 acre block, so is growing eucalypts "on the understanding that I will later remove them when they become too large or the space is needed. I believe that if something is worth growing, it is worth having for a period that may be less than its natural lifespan." *[A lovely philosophy! Oh, the eucs I have known briefly... Ed]* The size restrictions on his garden has led to an interest in small mallees, and deliberate cutting of larger species for coppice growth.

Keith Ingram (Mt Tomah, NSW) has over the years been collecting with such notables as LAS Johnson, D. Blaxell, WF Blakely, Rev EN McKie, Rev C Burgess, ST Blake, Norman Hall & Lindsay Smith, and still does field work with Peter Hind from the NSW Herbarium. He now has a private herbarium of over 32,000 sheets (including a goodly body of *Eucalyptus*). Native to his 6.05 ha (15 acre) property on basalt at 1000m in the Blue Mts, are *E. fastigata & E. blaxlandii.* Cultivated, and native to surrounding areas are *radiata, cypellocarpa, sieberi, stricta, oreades, burgessiana, sclerophylla, notabilis, globoidea & stellulata. E. burgessiana* is interesting: a local endemic with the disjunct northern population at South Points (on the end of Mt Tomah, where at Caley's Camp at Station Rock in 1804 that explorer was so close to crossing the Blue Mountains). Also cultivated, from a little further afield are *deanei [from lower altitudes — the Blue Gum Forest in the Grose Valley is a pure stand of E. deanei — Ed], gregsoniana, laophila, macarthurii, moorei, pulverulenta, viminalis, elata, eximia, parramattensis & mannifera.*

Other successful species include: *cinerea, parvula, glaucescens, nitens, niphophila, olsenii, maidenii, obliqua, bicostata, dwyeri, nortonii, pauciflora, polyanthemos, rubida, nova-anglica, amplifolia, nicholii, acaciiformis, cordata, gunnii, subcrenulata & urnigera.* Losses include *macrocarpa, cunninghamii* (crowded out) and *ovata* (ripped apart by wind!). And a 2m *leucoxylon* has made no progress over 20 years!

FARM TREES ON THE NORTHERN TABLELANDS — THE NEXT DECADE

David Curtis — Regional Organiser, Greening Australia, Armidale, New South Wales

Australian Journal of Soil and Water Conservation Vol. 4 No. 4, November, 1991

Extracts with permission of the author.

Abstract

Over the next ten years it is likely that over three million trees and shrubs will be planted on farmland of the Northern Tablelands. This paper suggests that the bulk of these trees and shrubs should be the indigenous species of the area, because these species retain the landscape values, and can fulfil most on-farm uses for trees. Many of the native species are becoming rare and need active management to prevent their loss from grazing systems. They provide a habitat for a host of important wildlife species such as birds and other predators and parasites of insect pests in pastures, crops and trees.

Three possible scenarios are given for the native vegetation of the intensively managed parts of the Northern Tablelands. Where there is no active tree establishment, it is likely that tree decline will continue at an accelerated rate. In the second scenario the plantings would be mainly introduced exotic and native species. While such an approach would reverse 'tree decline' it would not stop 'eucalypt dieback' and would indeed contribute to the continued decline of the indigenous species. A third scenario is advocated in which most plantings use virtually only the indigenous species, for, it is argued, only in this way will dieback be reversed and populations of native species maintained.

There are some who argue that exotic trees and shrubs can provide a habitat for many birds and other animals. It is true that some exotic plants can provide a habitat for various species, however, some of the animals so attracted can be detrimental. For example the most common form of on-farm planting on the tablelands up until fairly recently, was a windbreak consisting of *Pinus radiata* and berry-bearing plants such as *Pyracantha* and *Cotoneaster* species. Some species of birds use *Pinus* for shelter, and even (on occasion) nest in them, and a woodlot consisting of *P. radiata* will have more birds than open pasture. However, it will never support the richness of the bird population in a eucalypt woodland and many of the important insectivorous birds will not use *P. radiata.* Further, some bird ecologists have reported that *P. radiata* and other conifers actually encourage undesirable wildlife, in particular starlings. These birds compete with native birds for nesting sites in eucalyptus and drive them away. They use conifers extensively to roost in.

A similar complex story is true for the berry plants. At first sight they are good for birds, attracting many types of parrot. Unfortunately berry plants also attract currawongs. These aggressive native birds rob the nests of many insectivorous birds and lead directly to their decline. Some farmers are now planting grevilleas instead of pyracanthas. Grevilleas are good in that they attract honey-eaters. However in simple habitats too many grevilleas will simply favour noisy miners — an aggressive native bird which drives away many more useful species. Habitat fragmentation and dieback also lead to the build-up of noisy miners.

Establishing trees in communities, reflecting their natural associations and including the indigenous shrubs, is the only simple, logical, way of providing the spread in flowering times and range in habitats necessary to support the diversity of beneficial birds and other animals which are native to the tablelands and invaluable to the farmer in so many different ways.

Early Establishment Phase

Ten years ago it was true that many people had difficulties in establishing native trees on farms. Indeed some people still do. The reasons for these failures were (and are) usually due to poor site preparation and weed control, no tree guards, damage by stock, poor seedling quality, or inappropriate species choice. Over the last decade, however, there have been very encouraging developments which now make it invalid to say that native trees cannot be established on farms.

There is the suggestion that there are some sites where native species just cannot be established because the environment has changed too much (Parker, 1990). There is little to no evidence to justify this claim on the tablelands, indeed the opposite is true — indigenous species have been successfully re-established on some very harsh sites on the tablelands. Even in waterlogged, frosty flats of the Walcha and Glen Innes districts it has been possible to re-establish the local native species.

In the trials of the Eucalyptus Regeneration Program (ERP) from 1983 to 1988 some 12 000 (mostly local) native trees and shrubs were monitored. These were planted on many sites in dieback-affected country ranging from upper slope positions to low frosty flats from Guyra to Walcha. Survival 1-5 years after planting was about 70-80 per cent overall. In the first years of the trials survival rates were unacceptably low, usually due to poor techniques: seedlings too small or unguarded, poor species selection, or sheep getting into the planting. As the techniques were refined survival correspondingly improved, to the extent that some plantings had over 90 per cent survival a few years after establishment — a survival rate no different from what could be expected anywhere else in Australia. In addition about 4000 wattles and eucalypts were established by direct seeding and 7000 eucalypts and 17 000 shrubs were established by natural regeneration with high survival rates and generally good growth (Curtis, 1989).

The success of these trials has been extended since by the Armidale Tree Group which has planted over 40 000 native seedlings from 1983 to 1991 in addition to the trees monitored as part of the ERP. Large plantings by the Northern Tablelands Tree Establishment Program (run by Trees on Farms and funded by the National Afforestation Program) and by many others have confirmed that planted native trees can be successfully established in most seasons on most sites if certain, relatively easy steps are followed. Seedlings should be healthy and not too small (not less than 10 cm) or pot-bound, the species should match the site to be planted (taking into account the natural occurrence of the species); the seedlings should be grown from local seed, should be hardened off and grown in a good pot (square native tubes seem to be better than round 'zip' tubes); the tree should be guarded from frosts and hares (milk cartons will usually do this adequately); weed growth should be controlled and the ground should be ripped well before planting.

'The local species have been in place for a very long time — they sorted out what soil types, positions on the slope and aspects they will grow on, thousands of years ago.'

Adolescence and Maturity Phase

It is one thing to get native trees established, but once they have grown won't they just get 'dieback' and die? However, it is encouraging to frequently find native eucalypts which were planted many years ago growing well despite years of heavy insect defoliation.

Although there are few planted native eucalypts there are millions of naturally grown ones in dieback areas still left. Sometimes they look unhealthy, but huge numbers are still healthy and are continuing to flower and set seed. In addition there are many examples of healthy regeneration 10-20 years of age on the tablelands, even in bad dieback areas.

It is also important to remember that there are many local native tree and shrub species which are not affected by dieback at all. The wattles and she-oaks are particularly good examples. There are also many parts on the Northern Tablelands which have very little dieback.

The fact that some parts of the tablelands are subject to seasons where there is heavy defoliation of eucalypts by insects as well as severe climatic conditions from time to time, means that no one can be blasé in terms of their planting programs. It will not be an easy task revegetating this area, whichever scenario is chosen, but knowing the problems, steps can be taken to counter them. For example establishing eucalypts in large blocks (as some people are now doing with their pines) and providing buffers of fast-growing wattles around the edges of plantations will provide improved microclimate. Re-introduction of understorey shrubs into all plantings and natural stands of trees will encourage the beneficial insect-eating birds which will hopefully make the stands more resilient to dieback. Linking windbreak plantings together with remnant bush in whole-farm and regional plans will facilitate the movement of insect-eating birds and mammals.

Conclusion

It is not argued here that people should not plant exotic trees, for there are many attractive and useful exotic species, but that the revegetation efforts on farms of the Northern Tablelands should emphasise the local native species to ensure that the broad sweep of the landscape remains dominated by eucalypts and the associated local native shrubs. This paper has tried to show why this is desirable, and that it is achievable. It is to be hoped that in 50 years time exotics remain as they are today: patches of 'colour' in an overwhelmingly Australian landscape, and not the reverse.

In planting programs elsewhere in the country there has been an evolution over the last 10-15 years from using exotic species and native plants introduced from outside the region, to adopting the use of indigenous natives. There are indications that on the Northern Tablelands and slopes the same evolution is occurring. Landholders are gradually coming to appreciate the local native species, and more to the point, are learning how to collect the seeds, propagate them and grow them more effectively. As this knowledge spreads it is likely that people will switch more and more to local natives for rural plantings.

Understanding frost

Rural Research 152: 29-30, Spring 1991

Rural Research, produced every 3 months by CSIRO, is available on subscription for $18 a year from Rural Research Subscriptions, PO Box 1386, Collingwood, Vic. It is also distributed as an insert in the March, June, September and December issues of *Australian Farm Journal*.

Frost is one of the great limiting factors in agriculture. Throughout our rural areas its frequency and severity dictate what can be planted and when, and even then early and late frosts can still upset the best-laid plans.

Most frost damage is caused by 'radiation frost', when the net loss of their heat through radiation to the cooler night sky cools the plants. In southern Australia this is most common after cold air masses from the Antarctic have intruded into the region and the following nights are clear and calm. On such nights leaf temperatures can drop to as low as –30°C.

While the general physical processes that determine freezing leaf and soil temperatures are well understood, it's surprising that little is known about the influence of the soil and plant architecture on the phenomenon. Over the years Mr Kurt Cremer of the CSIRO Division of Forestry and Dr Ray Leuning, now with the Centre for Environmental Mechanics, have worked towards such an understanding. While their work has focused on the effects of frost on young eucalypts, their findings have a general application in agriculture, especially given the current widespread interest in tree-planting.

One of their more interesting findings was the way soil moisture can actually work to protect young plants during the most severely cold winter nights. In field experiments, where they closely monitored events on a moist, undisturbed soil, they found that on cold nights the exposed soil surface would come close to –1°C, but then quickly rise back up to 0°C and remain there for hours. At the same time, on an adjacent dry soil the temperature dropped and continued dropping — down to –3°C and lower.

The basis of the difference between these two soils is the soil moisture's access to the surface because, as water freezes, it releases heat; freezing also dries the soil, encouraging water lower in the profile to move to the surface. As this fresh water moves in some of it can freeze also, releasing heat and maintaining the surface temperature around 0°C. Furthermore, the temperature can drop below 0°C only after nearly all the surface water has frozen, and in a moist soil this can be slow to happen.

In a dry soil the water simply isn't available, while in cultivated soil the network of pores that allows water movement has been disrupted, making the deeper water inaccessible and removing its insulating effect. In both cases the temperature of the cooling surface will move inexorably down on a frosty night and many seedlings, while they can tolerate a temperature around freezing, are killed when it falls just a few degrees lower.

Another major influence on seedling survival during frost is what's on that soil surface. As outlined above, a bare, moist, undisturbed soil is best able to maintain the temperature of its surface — and the air above it — at around 0°C. Any insulating material on the surface, such as mulch, weeds, or litter, prevents the heat stored in the ground or released by the freezing of water reaching the nearby air. On one cold night the scientists found that leaves 25 mm above the tips of short grass were 3–6°C cooler than leaves held 25 mm above bare moist soil.

How those leaves are oriented also helps determine how severe frost damage may be. Essentially, during a radiation frost an exposed leaf is cooled by radiation to the much colder sky and warmed by conduction from adjacent air and by radiation from warmer surfaces, such as the soil below or other leaves. The balance of these influences dictates the leaf temperature, but differences in the size, position, and orientation of the individual leaves mean they can experience markedly different temperatures.

An important consideration is just how much of the night sky the leaf 'sees', since this determines how much heat radiates out from it. Furthermore, heat from the air flows most readily to small leaves and to the tips and margins of any leaf. The centres of larger leaves thus tend to be colder, especially when the leaves are held horizontally. In one study leaves of a eucalypt held horizontally were 0·5–1·5°C colder than vertically oriented leaves.

However, near the ground vertical leaves are subjected to very steep temperature gradients. In some cases the gradient can be as steep as 40°C per metre; this helps explain why small plants are most vulnerable and why tip temperatures can differ markedly from those at the base and centre of the vertical leaf. In general, leaves sheltered from the sky have temperatures similar to that of the adjacent air.

Because of all these considerations, leaves that are, to the untrained eye, in almost equivalent positions may differ in temperature by as much as 10°C. This helps explain the sometimes uneven distribution of frost damage observed in a single plant.

Mr Cremer and Dr Leuning also found that the influence of plant architecture and topographic effects (such as the way that cold air settles into hollows) make the standard measure of frost severity, the minimum screen temperature, unreliable; indeed, it may be as much as 5–10°C above what the plant is actually experiencing. Instead the scientists suggest that terrestrial minimum thermometers (TMTs), with their spherical bulbs, give more reliable readings. Because they are roughly similar to leaves in size and hence their rate of heat exchange, placing one adjacent to a leaf gives a more accurate indication of the leaf temperatures reached during a frost.

The scientists suggest that, when considering planting trees in a frost-prone area, farmers can minimise frost damage by selecting well-hardened suitable specimens and avoiding planting in frost hollows. They can also adopt practices that allow cool air to drain away from the plant; for example, they should avoid leaving a deep dish-like hollow around the plant as this may serve as a mini frost hollow. Mulch is useful for initial establishment over spring and summer, but it should be removed the following winter (if the plants are frost-sensitive and less than half a metre tall) and pushed to the uphill side so that cold air drains around it.

As noted above, bare soil is best. If it has been weeded, the soil should be mildly compacted afterwards, and ensuring that plants are well-watered should allow them to take advantage of the insulating effects of freezing water.

Wayne Ralph

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gumtree debate

By GRAEME LEECH THE AUSTRALIAN 31/7/91

IN some countries, Australia's transplanted gumtrees are regarded as weeds. In others they are seen as saviours of forests for their ability to grow quickly and as a steady source of wood for fuel.

Those who argue against the gumtree say it takes over from native vegetation, lowers the water table, poisons the soil and consumes more than its "fair" share of nutrients. This is not just some academic debate; for many it's a serious and passionate argument.

In Spain, for example, there is a society of farmers which promotes the anti-eucalyptus cause. It is called the Phorocantha Club after the bark beetle which infects and kills gumtrees.

And in India, where common sense would suggest a pressing need for reforestation in many areas, farmers have attacked plant nurseries, ripped out seedlings and established a Save the Soil movement.

It has taken a group of scientists from the Forestry Institute of Hydrology at Oxford University in England to put some rationality into a worldwide debate sometimes referred to as "the great gumtree controversy".

Dr Anne-Maria Brennan, of Kent University's Durrell Institute of Conservation and Ecology, says the Oxford scientists have uncovered complex details of the relationship between water and eucalypts.

"In nature, all plants are engineered to lose water. They have to do so because they obtain a continuous supply of soluble nutrients from the soil, taking them up in water through their roots," she says.

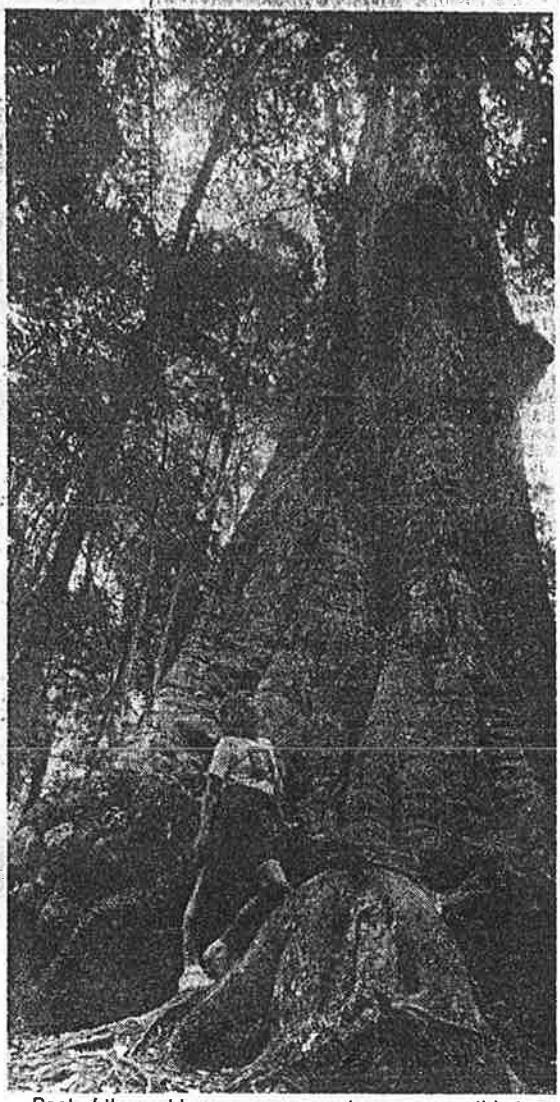
"Added to this, they have to take in carbon dioxide through specialised pores known as stomata, which can be opened and closed as required.

"Sunlight provides the energy which then enables the plant to 'fix' the carbon dioxide into sugars, which are in turn used to build more complex compounds required by the living plants."

A team of researchers from Oxford has set up an open-air laboratory at a plantation at Karnataka in India to test the various accusations levelled at eucalypts. While gumtrees seem to be particularly thirsty plants, some species appear to have inefficient control over water consumption, the team has found.

But some have quite good control: they have concluded that eucalypts *maculata*, *risinifera* and *saligna* are all economical with water and are suitable as plantation specimens.

As for being greedy consumers of nutrients, the Karnataka project has found some elements of truth in the allegation but that other factors may be responsible.



Root of the problem . . . some gumtrees are very thirsty

"It is obvious that a fast-growing species such as eucalyptus consumes more nutrients and does so at a rate which corresponds to its growth," Dr Brennan says.

"When compared with slower growing vegetation, for example other trees or grassland, eucalypts are observed to have a greater nutritional requirement. Plantations therefore have much in common with agricultural crops in their dependence on a ready supply of nutrients."

Ignorance a key factor

There are two ways of avoiding nutrient loss: either by managing plantations as a crop and using fertilisers to maintain a balanced soil; or by coppicing – that is, taking timber from the regrowth of cut stumps.

Coppicing, properly managed, allows leaf litter and twigs to accumulate, thus returning nutrients to the soil.

The Oxford team has shown that the success of a plantation ultimately depends on the right choice of tree coupled with good management.

But they have found inconclusive evidence as to whether gumtrees poison the soil they grow in. They say existing research on the question could be seen as another indication of variation among eucalypt species, but that there is no evidence of any long-term effect on sites occupied by the trees.

What can be concluded from the research? Dr Brennan says that as a detailed picture of eucalypt biology is built up, it is becoming clear that many of the problems have been due to a lack of information which has led to mismanagement and conflict.

"It is particularly important that the social factors underlying forestry projects are not overlooked when dealing with science.

"There is a real need for good management, blending forestry and agricultural skills in ways that are sensitive to the needs of the plantation trees, the environment and the land use of the local people."

If you suspect that the large eucalypt in your backyard is suppressing everything else you've planted, believe it. Perhaps the solution is to shred the litter and keep it well watered...

Summary of a paper by F.E. May & J.E. Ash in Aust. J. Bot. 38:245-54 (1990), An Assessment of the Allelopathic Potential of *Eucalyptus*.

Criticism has been levelled at eucalypts for yield reduction in adjacent crops. Sparse understorey vegetation and growth inhibition of *Eucalyptus* seedlings under a parent canopy have often been explained by physical properties such as depth of litter & extent of the root system i.e. resource competition. But one 1988 study found no significant difference in soil nutrient status in suppression zones and surrounding vegetation. And water shortage was rejected by a 1987 study in India (assessing the response of agricultural crops growing near *E. tereticornis*) as an explanation in favour of allelopathy i.e. chemicals released into the environment by plants interfere with other plants in a natural situation. A 1969 study in California found that fog drip from *E. globulus* trees was quite inhibitory.

May & Ash (1990) found that eucalypts can produce chemicals which can suppress understorey vegetation. Whole leaf litter, shed bark and, especially, stemflow yield suppressive leachates. Root exudates appear to play a minor role. When the volume of water channelled down a trunk is typically 8 times that expected from rain falling over the same area, yet a distinctive suppression zone occurs, "evidently the soil at the base of trunks receives relatively large quantities of both water and allelochemicals".

While all *Eucalyptus* species tested *(E. globulus, bicostata, maculata, rubida, rossii, blakelyi, elata, mannifera, melliodora & polyanthemos)* yielded inhibitory leachates, some species were more effective than others (eg. *macrorhyncha*). "Stemflow was apparently the most potent source of allelopathic chemicals. Solutions from fibrous-barked species were the most inhibitory, but such bark absorbed much water; and the volume of stemflow was greater from gum barked species."

"These chemicals are highly soluble and rainfall is likely to leach them out of the surface soil" but they can get concentrated in soil by successive cycles of wetting with leachates and drying – such as low rainfall events insufficient to cause deep drainage.

"Decay was shown to reduce the allelopathic effects of litter leachates, but some inhibit -ory chemicals remained after 5 months." May & Ash report loss of 8% activity per day from coarsely chopped leaf and bark material (activity more persistent in whole materials). "It also appeared that appropriate micro -organism populations may build up in *Eucalyptus* soils more than in grasslands, perhaps as a direct response to leachates." There is reduced microbial activity when soils are dry. "Allelopathy may be most evident with low rainfall, conditions under which competition for soil moisture by plants is most likely to be severe, and the conditions under which suppression zones have been most widely reported."

EUCALYPTUS BUDS AND FLOWERS FOR CUT FLOWER PRODUCTION

(Extract) by **Lance Cockburn**

SGAP Qld.Region BULLETIN, September 1991

From November 1988 to November 1989 the Brookvale Park Foundation undertook market research with a number of Australian eucalypts being grown at Brookvale Park. The aim of the research was to determine florist reaction to the buds and flowers of Australian gums. The survey to market reaction was carried out with florists on the Caloundra to Maryborough, Hervey Bay Coast areas of Queensland.

The eucalyptus species trialled were presented to the market along with all other conventional flowers, eg. carnations, chrysanthemums, alstromeria, proteas, etc. All flowers were carried in liquid solution, not packed in boxes, and were presented from the truck in that manner.

Thirty-five florists were involved in the survey. Unfortunately, no other grower could assist with product and all material trialled came from Brookvale Park. Demand for product from florists far outstripped supply available. This did not give a pricing advantage and no attempt was made to take advantage of that situation. Maximum price charged per bunch was $5.00, with single stem sales at $1.00.

As far as the Brookvale Park Foundation is aware, this was the first market research giving factual details of income potential from species of Australian eucalypts useful to the florist industry. The dollar return per tree is interesting and there is an expanding market for the unique forms of Australian wildflowers in Australia and throughout the world, particularly in the USA, Europe and Japan.

Eucalyptus buds of many species are particularly attractive, long lived and in demand. Lance suggested that one spike of quality eucalyptus buds would retail for $8.00 in Sydney and Melbourne and possibly Brisbane. Apparently the southern market is more receptive to the native flora. There is also an almost limitless demand from overseas, but it is requested that buds are not to be exported until there is an extensive supply available.

The Brookvale Park Foundation had identified five species with marked potential for the cut flower trade. These five species were primarily chosen to provide optimum aesthetic quality, maximum shelf life and to meet changing seasonal demands relative to availability. A number of growers have been organized to develop plantations. Successful marketing was being carried out and demands for material were exceeding supply.

A note on the species used in the trial is important. The trees used were 17 years old, had never been pruned for production. They have never been cultivated among nor artifically watered. Younger trees, properly maintained, would have a much greater production potential.

TOP FIVE SPECIES FOR BUD PRODUCTION

1. Eucalyptus erythrocorys (Red Capped Gum).
   Origin : Dongara, W.A.
   Very slightly frost tender.
   Bud harvest time: November to March.

2. Eucalyptus forrestiana (Fuchsia Gum).
   Origin: Salmon Gums and Grass-patch, W.A.
   Salt tolerant, suitable for low rainfall <225 mm.
   Bud harvest time: November to February.

3. Eucalyptus lesouefii var.pterocarpa (Orange Fluted Gum).
   Origin: Norseman area, W.A.
   Best of the five!!
   Very adaptable to most soils, salt tolerant, will tolerate heavy clay up to pH 9.
   Bud harvest time: when suitable between May and November. Buds have long development period and are attractive at all stages.

4. Eucalyptus tetraptera (Square-fruited Mallee).
   Origin: Israelite Bay and Stirling Range, W.A.
   Adaptable to most soils. Has proved successful on the east coast.
   Bud harvest time: June to Sept.

5. Eucalyptus youngiana (Large-fruited Mallee).
   Origin: NE of Kalgoorlie, W.A. and into similar areas of South Australia.
   Very adaptable to most soils, prefers red loams.
   Bud harvest time: June to Sept.

FINANCIAL ANALYSIS OF BUD PRODUCTION:

1. **Gross value.**
   $4.00 for 500 grams of bud material
   $8.00 for 1 kg.

   Average value per spike. **$4.90**
   ie. average value of $134.26 per tree (average of 27 bunches per tree).

2. **Plantations.**
   Recommended deep ripping of sites along contours. Plant along contours to maximise water conservation.
   Average of 66 trees per acre provides 1,782 bunches per acre per annum, which returns a gross value of $8,900 per acre per annum.

Note: These figures are based on juvenile trees - regular harvest increases quantity and quality. Allow 3-4 years establishment before initial return.

3. **Marketing Expenses.**
   Picking: $8.00 per hour.
   Assume average of 20 bunches picked each hour - average 40¢ per bunch. However, it is usual for good workers to grade and bunch up to 40 bunches per hour.

   Boxing: cost of box $3.00 (10-15 bunches fit to a box).

   Freight: $2.50 per box (recent increase to $4.00 per box).

   Agent's Fee: 10%

   Incidentals: presentation, ties, packing, etc. 3-10¢ per bunch.

   Promotion: set aside at least 10¢ per bunch.

   Average Total Cost for Harvesting and Marketing: $1.85 per bunch.

Nett Average Return per Bunch: $3.16.

OTHER SUITABLE SPECIES

Eucalyptus anceps - terminal gold buds. Provides 3 crops in 2 years @ $100 per crop. This is a small tree and can be planted at 132 to the acre.

Eucalyptus campaspe - very beautiful fruit, but buds split after packing. Research needed to find solution to the problem.

Eucalyptus gillii - excellent foliage and buds, salt resistent, alkaline soils pH to 9.

Eucalyptus kingsmillii - buds.

Eucalyptus kruseana - excellent, foliage used extensively for flower arrangements. Superb specimen at Cunnamulla in front of Church of England. Can plant 132 to the acre.

Eucalyptus leptophylla - excellent terminal apricot buds in mass. Plant 88 to the acre.

Eucalyptus macrandra - buds and flowers.

Eucalyptus pachyphylla - Buds, flowers and fruit.

Eucalyptus peeneri - mallee form from South Western Australia, good for windbreak, hardy and salt tolerant. Pointed bronze buds.
Bud harvest time: June to October.

Eucalyptus plenissima - mallee form from South Western Australia, good for windbreak, hardy and salt tolerant. Terminal gold to bronze buds. One established tree yielded $600 of buds over a three-month period.
Bud harvest time: July to October.

Eucalyptus rugosa - excellent silver foliage and buds. Tolerant of poor soils, alkaline pH 9, salt resistent. Plant 88 to the acre.

Eucalyptus species - unnamed silver leaf form from Mt. Isa, near Lake Julius. Has marked foliage potential.

Eucalyptus stoatei - endangered species. Has unique pear-shaped buds similar to E.forrestiana.
Bud harvest time: December to Feb.

Eucalyptus tetragona - excellent silvery foliage and white buds, flower and fruit marketed. Plant 132 to the acre.

Eucalyptus transcontinentalis - widely distributed across Australia. Excellent pointed bronze buds.

WORST CASE ANALYSIS

Assume Gross Value of $2.00 per bunch, then marketing costs, etc. would be $1.55. ie. Net value per bunch 45¢. 45¢ x 27 x 66 = $801.90 per acre per annum. "This is still a far better return per hectare in comparison with that for cotton!!"

The Sydney Morning Herald Wednesday, April 15, 1992

Our top-seeded gums put rivals in the shade

By BOB BEALE

Towering above the native forest near Bulahdelah, north of Newcastle, is the State's tallest tree.

The famous giant gum began its life about 400 years ago, is 76.2 metres high and is still growing and producing seeds.

In Canberra, another gum ranks as one of the nation's smallest: it began its life a few years ago in a laboratory, will grow only two metres and will produce little else but seeds.

It is hard to believe both trees are of the same species, *Eucalyptus grandis*, or flooded gum, although both are remarkable.

The massive Bulahdelah gum has survived plundering of Australia's rich natural history and Canberra's mini-gum points to a future where that genetic heritage is tapped sustainably for profit and social benefit.

Flooded gum is in global demand by foresters, especially in Africa and South America, for its speedy growth and its bountiful yield of sawn timber and paper pulp.

Its value is reflected in its seed price.

The Australian Tree Seed Centre says flooded gum seed fetches up to $1,000 a kilogram (that's between 2 million and 6 million seeds), five times the price of silver.

Shining gum, *Eucalyptus nitens*, seed is $2,000 a kilogram.

Exports of native tree seeds are worth about $7 million a year and the market is growing.

Domestic demand is soaring, too, due to regreening campaigns such as the One Billion Trees program.

Tree-breeding is in its infancy in Australia, although collections from the wild over the past 15 years or so have markedly increased and yielded many promising strains.

Collecting seeds from such large trees — many gums grow taller than 20 metres — in the past has required sharpshooters with rifles or costly "cherry pickers" to get at seed-bearing branches.

And there was a long wait for selected strains to grow in "seed orchards" — often seven years until the first seed crop — and the notoriously unreliable nature of gum tree flowering.

That's where the mini-gum comes in. Since 1987, researchers Michael Moncur and Peter Burgess of the CSIRO Division of Forestry, supported by Australian Pulp and Paper Mills, have been developing a cheaper, more manageable seed-orchard tree.

Selected shoots are grafted onto older root stock and dosed with hormones that reduce growth of their leaves and branches.

When they reach about two metres, another hormone, paclobutrazol, is used to stop growth and stimulate budding.

Branches are pruned and tied to espaliers (frames that train vines) to expose more shoots to sunlight and promote bud production.

The research plot looks a bit like a "vineyard" of gums.

Seed output from these trees is spectacular.

Untreated shining gums in the plot produce only four seed capsules each, while each treated one produces 560.

Within three to five years, harvesters can gather seeds from the ground without having to reach higher than head height.

The researchers believe they will eventually be able to take a gum seed and turn it into a seed-producing tree in less than two years.

Its seeds, when planted, will produce full-sized trees.

The CSIRO program leader, Mr Robin Cromer, believes the new technique is likely to work with most normal flowering trees, making it invaluable for commercial forestry and for providing the quantity and quality of seed needed to replant and repair Australia's vast amount of degraded agricultural land.

The team is about to start developing a strain of Tasmanian blue gum that tolerates moderately salty soil.

They hope large-scale plantings will be useful in many areas to halt and reverse the rural scourge of rising soil-salinity, caused by past over clearing.

They will also provide farmers with a valuable long-term timber crop.

And, of course, more precious seed.

APPM develops trellised trees for seed

A tree trellising technique with far-reaching implications, has been developed by APPM Forest Products, in Tasmania.

It is expected to lead to the farming of a wide variety of valuable native trees for "pedigree seeds".

Dr David de Little, the company's forest research manager, described the trellising technique, and its benefits, in a paper titled "Establishing Eucalypt Tree Farms in Cool Temperate Environments".

He said APPM was trellising clones of the best forest trees the company could find. It was aiming at a big advance in cellulose output for paper pulp.

These high-yielding eucalypts were grafted onto root stocks, and the normal upward growth of the tree was diverted onto a trellis at waist and shoulder height for easier harvest of seed.

Dr de Little said a recent breakthrough to increase seed harvest volume was the use of a chemical spray, Paclobutrazol. He said the chemical stunted the growth of the trellised trees.

This made access easier for cross-pollination and initiated copious crops of flowers — and seeds in the resulting nuts.

Sprayed trees produced an average of 784 flower buds, with one producing 3,500. Control trees grew only an average of seven buds.

Dr de Little explained that APPM owned about 128,000 hectares of land in northern Tasmania. It was establishing eucalypt tree farms by planting.

So far about 14,000 hectares of Eucalyptus nitens (Shining Gum) and Eucalyptus globulus (Southern Blue Gum) had been established. The current rate of planting was about 2,500 hectares a year to ensure future supplies of woodpulp.

As a result, the company's tree seed farming using superior genetic stock was most important to its tree-farming investment.

Dr de Little said he was studying a number of siting and silvicultural treatments to further improve tree seed production. They appeared to be critical factors in encouraging flowering and subsequent seed production in cold-climate eucalypts.

From:
SOWING THE SEEDS
DIGEST
A report on
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[I must admit to disliking the thought of yet another chemical in the ecosystem. I'd prefer a seed orchard that the birds and possums can also enjoy — Ed.]