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West Australian Nut & Tree Crop Association (Inc)

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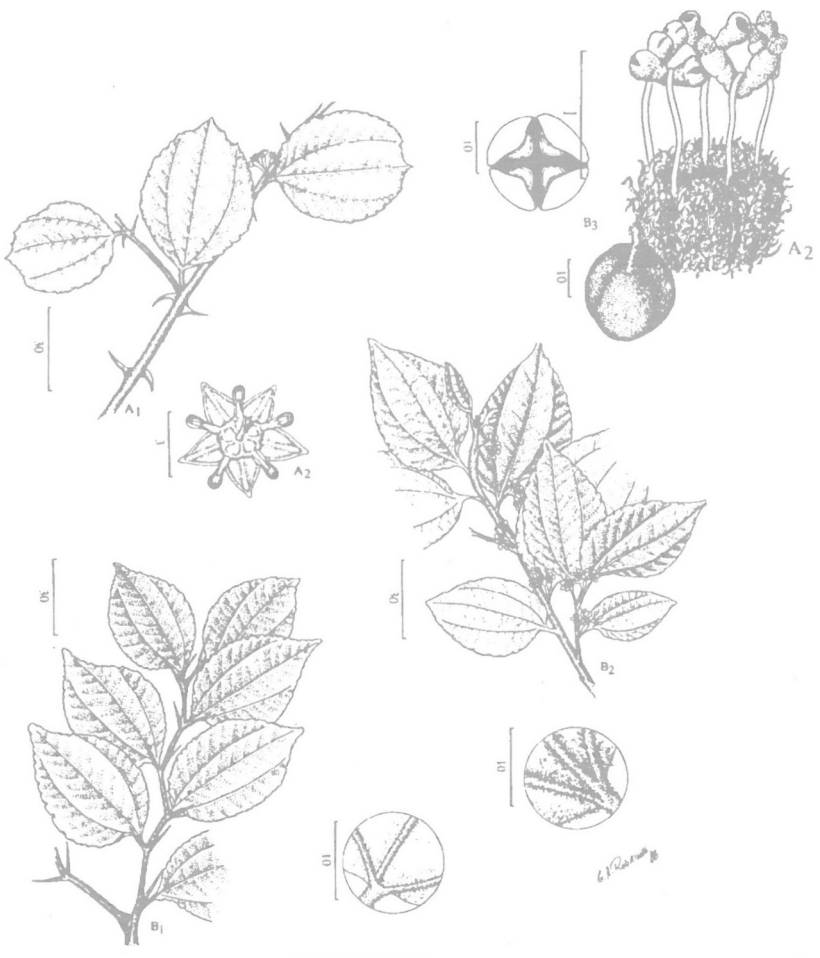


Native and Indian Jujubes *(Ziziphus species)* (See: About the Cover, p. 2)

Quandong • First Quarter 1999 • Vol 25 No 1

NEXT MEETING: Tuesday Feb 16: 7.30 pm

At our next General Meeting, we are looking forward to a lively session with Dr Zora Singh of Curtin University, discussing

Jujube/Ber: Valuable fruit tree or weed?

Zora is expected to not only bring us up to date on Chinese Jujube (*Ziziphus zizyphus*) and Indian Jujube or Ber (*Ziziphus mauritiana*), but also to comment on a disturbing trend whereby the State Government's APB is effectively restricting the development of some potentially very valuable tree crops by classifying them as weeds.

These restrictions come over as being applied insidiously and without reference to the industry, Decisions appear to have been made arbitrarily and not to be open to any appeal mechanism or arbitration route. A representative of the APB is expected to attend.

Full details on attached leaflet.

Visitors welcome. Queries to Tree Crops Centre, 9388 1965.

In This Issue

About the Cover

The cover illustration shows WA examples of Jujube species, *Ziziphus quadrilocularis* (native) and *Z. mauritiana* (said to be introduced), from *Flora of the Kimberley Region*, edited by J R Wheeler (see article page 6). Key: A, mauritiana; B, quadrilocularis.

[West Australian / 1998 Nov 4]

Peachy idea gets an early start

Stone fruit lovers are enjoying an early surprise. New, early maturing varieties of peach have hit the markets four to six weeks before traditional varieties.

Nectarines will also be available earlier than usual as trials by WA orchardists and Agriculture WA begin bearing fruit.

Growers refer to the early ripening fruit as low-chill varieties. They do not need very cold temperatures to set fruit buds and produce well in warmer areas, sometimes close to the coast.

Veteran High Wycombe orchardist Frank Taddei is one of several WA fruitgrowers producing the new varieties.

He has a 12 ha orchard at High Wycombe and another 20 ha orchard at Gingin. The new varieties are growing well in both areas.

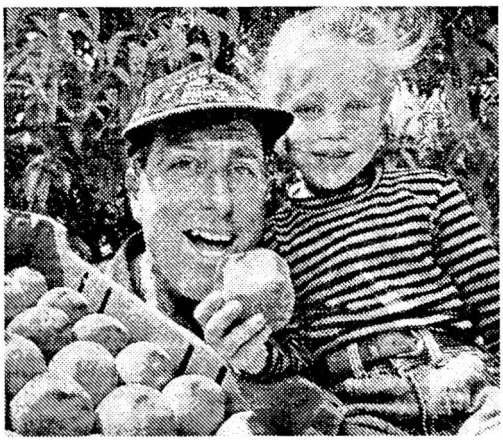
The High Wycombe property is one of the few orchards close to the city producing the low-chill varieties.

The family business is run by Mr Taddei, his sons Ned and Robert and son-in-law Carlo Scamuffo.

Mr Scamuffo said yesterday that selecting the right low-chill varieties had been a matter of trial and error, and had been difficult this season, with hail and frost affecting the trees. But the peach crop was reasonably good.

Ric Owen, president of the WA Fruitgrowers Association, said stone fruit was now available from mid-September through to May, when the last of the plums were marketed. The season began with the first fruit from Carnarvon.

Glynn Ward, a research officer with Agriculture WA's summer fruit project, said that about 250 low-chill stone fruit varieties had been tested in WA and the list



Taste testers: Orchardist Carlo Scamuffo and his daughter Julia, 4, enjoy a freshly picked peach from the first of the early variety at the High Wycombe property. Picture: Guy Magowan

Quandong Links to ATCROS

Many of the articles, advertisements, and news items in Quandong refer to organizations and people who are listed in the Directory section of the ATCROS Web Site, which is at:

http://www.AOI.com.au/atcros

In this issue, items underlined in the text have Atcros reference numbers listed at the end of an article or elsewhere close by. This is so that readers can get more contact details.

ATCROS usually lists name, address, and phone numbers, also fax, e-mail, and web page details where available.

Quandong: Atcros ref. <A1466>.

recommended to growers had been narrowed to about six peach and nectarine varieties.

Trials with plums had not been as successful.

Most of the trial stock had come from Florida, where Agriculture WA had been in close contact with plant breeders for some years.

Agriculture WA was conducting its own plant breeding program and was in contact with plant breeders in Queensland.

New nectarine and plum varieties to be released in WA in the next two years would be firmer, bigger and tastier than current low-chill varieties.

— George Boylen

[HRDC: Hort Report / 1998]

Custard apple has major trade potential

Custard apple (Annona spp. hybrid) has the potential to become a major fruit on domestic and export markets.

Exports of custard apples to Hong Kong and Singapore have been increasing steadily for the past five years and about 25 000 trays were exported in 1998. Most of this export fruit is Pinks Mammoth/Hillary White types but there may be unrealised potential for the other major variety African Pride. Through varietal selection currently in progress at the Queensland Department of Primary Industries Maroochy Research Station at Nambour and implementation of desirable management strategies productivity can be significantly improved.

This project developed a growth and flowering model which is now the basis for correctly timing management practices. It identified excessive tree vigour and shoot growth as a primary cause of poor fruit set, low yields, and internal fruit quality problems such as woodiness and brown pulp.

Researchers found excessive tree vigour could be controlled through using dwarfing interstocks, light summer pruning, and trunk-injection of the growth retardant paclobutrazol.

Mild water stress also controlled growth and improved floral initiation and flowering. However fruit size was slightly reduced. Because of this adverse response, water stress is considered a less effective technique for controlling growth. Dwarfing interstocks used with new training systems such as the Tatura trellis may improve light penetration yield and fruit quality.

In warm climates postharvest cooling is essential. It is recommended that storage on-farm before transport and normal packing be limited to 3-4 days maximum at 10°C.

Postharvest research concentrated on evaluating the best storage conditions for harvested fruit and assessing the viability of controlled atmosphere storage. Controlled atmosphere storage is not recommended because it encourages high levels of fungal activity and internal quality defects.

A decision support manual will soon be available to Australian custard apple growers, at industry request, which assists growers to improve fruit quality and productivity. ¥

WANATCA has new President and leadership

Congratulations to Stanley Parkinson, elected to the position of President of WANATCA at the recent Executive Committee meeting.

Stanley replaces David Noël, who has served some 17 years in the position and was anxious to pass on the baton to a new and enthusiastic younger member. Stanley is not so sure about the last bit, but does feel he can bring a combination of enthusiasm and ignorance (=bliss?) to the position.

We are also fortunate in having Collet McDouall taking on the position of Secretary, and John Foote taking on Vice-President — almost a clean sweep, although Bill Napier and David Noël will still be there on the Committee, and David will still be acting as the Association's 'front man' and fielding queries in his position as Director of the Tree Crops Centre, the administrative focus for WANATCA. We also extend a warm welcome to new Exec Member David McCormick.

In another positive move, responsibility for various sections of WANATCA's operations has been devolved into four new Sub-Committees, with names and leaders as follows: Services & Publicity (Stanley Parkinson); Events (Bob Cook); Publications (David Noël); and Finance (Trevor Best).

We would welcome comments, offers, and suggestions from members on these and other changes which might be desirable in the future.

Weeds and new tree crops: a decision point for WA

Development of new crops in WA is being hindered by classification of some of the useful species as 'weeds'. In WA, these classifications are applied by the Agriculture Protection Board, a part of the State Government's department, Agriculture Western Australia.

In a recent case, Perth growers were prohibited from growing a fruit species because it was believed that the plant had become a weed in Hawaii.

The following items set the background for the current situation. At the next WANATCA General Meeting on February 16, APB have promised to send a representative to discuss the situation, and it is hoped this will lead to an improvement.

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[Countryman /1998 Sep 10]

Prohibited plant shipment seized

A shipment of a prohibited plant, destined for a WA nursery, has been seized by quarantine officers in Perth.

The plant, *Rhodomyrtus tomentosa*, is a target species of the National Australian Quarantine Strategy (AQS) because of its potential to flourish in the north of the State.

The AQS was developed to exclude plant species which posed a new weed threat to the State's agricultural sector and environment.

Agriculture WA spokesman Mark Stuart said the detection of the shipment indicated the new system was working well.

Mr Stuart said the public, plant importers and plant nurseries should report to AgWA

any unusual weed or plant.

The seized plant has several common names including hill gooseberry, ceylon hill cherry and downy rose myrtle.

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Letter to the APB

To: Sandy Lloyd (Exotic Weeds), Agricultural Protection Board, AgWA.

Dear Sandy,

1. *"The most useful service we can render a culture is to add a new plant to its agriculture" — Thomas Jefferson.*

This is to confirm and follow up with our phone conversation. We act as the headquarters of the West Australian Nut & Tree Crop Association Inc (WANATCA), which has the aim of, inter alia, the introduction and development of useful perennial plants (ie tree crops and the like). We are most concerned with the increasing restrictions on our activities in this direction because of official decisions that many of the plants we are interested in 'could become weeds'.

At the February 16, 1999, WANATCA meeting we have Dr Zora Singh of the Department of Horticulture, Curtin University, talking on 'Jujube/ Ber: Fruit Tree or Weed?'. Dr Singh is among those of our members who have encountered problems with introduction of *Ziziphus* species. We would welcome the attendance of you or another informed representative of your Board who would be willing to respond to points raised at this meeting and those contained in this letter.

I should emphasize that, although the consideration of the treatment of particular species is of current concern to us, the long-term worry is that ad hoc decisions made today to satisfy a particular pressure group or interest will be to the long-term detriment of the State's economy and ecology. To give some background to the position, I enclose copies of (a) an article from the 4th Quarter 1995 issue of the WANATCA magazine *Quandong*, "Banning the Jujube — and shooting yourself in the foot?"; (b) an extract from the CALM book *Flora of the Kimberleys*, showing that *Zizyphus mauritiana* appears virtually identical to a native WA species, *Ziziphus quadrilocularis*; [Q Ed: See cover of this issue] ;(c) a recent news item concerning banning *Rhodomyrtus tomentosa* in Perth apparently because it could become a weed in Northern Australia [Q Ed: reproduced above]; and (d) a comprehensive article on the cultivation and ecology of this latter plant [Q Ed: reproduced following].

I appreciate that some decisions on these matters are made at a federal rather than a State level. Nevertheless, I would suppose that the APB is familiar with the federal positions, and may be in a position to influence such decisions in the future.

This letter is not a complaint, instead it is an offer to work with you to improve the system so that it better meets the future needs of Australian agriculture, rather than just satisfying the demands of established current producers. A number of brief points of every type follow. If the validity and logic of these points is examined and established, it should lead to changes in government procedures and policies which would be good for Australia's future. The first point is the quotation at the head

of the letter. The others:

2. One hundred percent of the useful plants figuring in this State's agriculture have been introduced from outside it. There is no logic to calling a halt to this process.

3. Only one Australian plant species, the Macadamia, has achieved significant commercial production in this country. Every other commercial agricultural species is an introduction.

4. Around the beginning of this century, the United States government set up a separate department, the Bureau of Plant Introduction, specifically to enrich the biological and commercial resources of that country. Large amounts of public funds were invested in this, and over a period of some 20 years, over 140,000 introductions were made. These introductions led to a significant improvement in plant resources which have been called on continuously to expand the US economy, right up to the present day.

5. A weed is said to be 'a plant which is in the wrong place'. More exactly, it is an unwanted plant entering an ecological niche, usually created by human activity.

6. The feared 'weediness' of a species in the Kimberley has no relevance to its behaviour in the Southwest of WA. If WA was divided north to south into three States, each with its own quarantine arrangements, there might well be no perceived threat of weediness in 'Southwestia' from a tropical species. The fact that such man-made boundaries do not currently exist does not justify the practice of applying tropical restrictions to temperate WA.

7. Australia is a huge and varied country with a range of ecological niches, one of which can usually be found to match any given niche in an overseas country. The fact that a plant may be perceived as a weed in an overseas country is not a sufficient justification for its exclusion from all of Australia, as logically this would lead to a complete ban on introductions, and if applied in the past would have eliminated virtually all of Australia's horticulture.

8. Consideration of weed potential should include the conditions under which it is to be grown. Useful horticultural plant introduction is difficult and often unsuccessful, even when great care and attention is employed. Not a single instance comes to mind of a horticultural tree crop which has been introduced to Australia and has become regarded as a weed here. The nurturing needed for such a crop is usually great enough to rule out its ability to have a significant impact as an escaped plant.

9. Designation of a plant as a 'Weed' is very subjective. Every cultivated plant once formed part of a natural ecology, where it could not be designated as a weed. Only the unplanned provision of a suitable ecological niche outside its natural area makes it a 'weed'. The fact that a plant grows well under difficult conditions, or has spines, does not automatically make it a weed.

10. Any successful plant can be classed as a weed if 'unwanted', and what makes it 'unwanted' is at the whim of individuals or conditions of the time and place. The native WA wattle, *Acacia saligna*, is called a weed in South Africa and Victoria. In Chile it is regarded as a valuable forage plant.

11. AQIS, the Australian Quarantine and Inspection Service, conduct a formal 'Import Risk Analysis' on proposals to import horticultural goods, such as Ya Apples from China. These IRAs are carried out by a panel which includes industry representatives. Interested parties ('stakeholders') are kept informed at every stage, and can appeal

not only panel decisions, but also proposed panel membership. WA's APB decisions on horticultural species as weeds would be improved in substance through prior input by local stakeholders such as WANATCA.

12. All established organizations resist change, and may be expected to push for the exclusion or banning of introductions which might affect their current operations or viability. Such bans will admittedly 'protect' their operations in the short term. But they may also detract from the longer-term benefits to the wider community, or even themselves.

13. As an example, introduction of new citrus varieties into Australia was prohibited for a spell of around 30 years. According to the Australian Government's Industry Commission Report on Horticulture, this ban was responsible for Australia's effective elimination from the world citrus juice market, as during the 30 years, other countries had developed and invested in varieties which were 30% more efficient for this market. Australian fears of introduction of diseases or pests to an established citrus industry 'protected' that industry in the short term, but led to its later collapse when pitted against overseas producers who had become more efficient.

14. Some of the conflicts present in the present system could be eliminated if would-be introducers had available a 'public liability' category of introduction, under which they could introduce whatever they desired to their own property, if they undertook to fund the reversal of harmful escapes. Such introducers would necessarily conduct their own and very stringent Import Risk Analysis!

— ***David Noël***, Director, Tree Crops Centre

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[Edible Fruits and Nuts (PROSEA series)]

Rhodomyrtus tomentosa

Myrtaceae; 2n = unknown

Synonyms. *Myrtus tomentosa.*

Vernacular names. Downy myrtle, rose myrtle (En). Indonesia: kemunting (Malay), harendong sabrang (Sundanese). Malaysia: kemunting (Peninsular Malaysia), karamunting (Sabah, Sarawak). Cambodia: puech, sragan. Thailand: thoh (Peninsular), phruat (Trat), phruat-kinluk (Prachin Buri). Vietnam: sim.

Origin and geographic distribution. Downy myrtle is growing wild and cultivated South-East Asia, India, Sri Lanka, and southern China. Occasionally it is grown outside this area.

Uses. Children compete with birds for the sweet, edible fruit. In some areas jam or jelly used to be made from the fruit, but it is only incidentally available in quantity. Old sources in Malaysia mention the use of the fruits as a cure for dysentery and diarrhoea. A decoction of the roots or leaves is drunk for diarrhoea and stomach ache, and as a protective medicine after birth. In Indonesia, the crushed leaves are used to dress wounds. The wood-tar can serve as a black dye and has been used to blacken teeth and eyebrows. In Java and in Florida, where the downy myrtle is cultivated in gardens, the ornamental value of the shrub and its flowers is prized.

Properties. The whole fruit is edible. It contains sugars, vitamins and minerals. The purple pulp is juicy and sweet when fully ripe, otherwise slightly astringent.

Botany. Evergreen shrub or small tree, up to 4 m tall; twigs, young leaves and inflorescences densely white or yellowish tomentose. Leaves elliptic to oblong-elliptic, 4.5-8 cm x 2.3-4 cm, opposite, coriaceous, with 3 conspicuous longitudinal veins, upper surface glossy, glabrous, lower surface white or yellowish tomentose with raised nerves; petiole 3-5 mm long. Flowers solitary or in 3-flowered dichasia in upper axils; peduncles up to 1 cm, pedicels 0.5-2.5 cm long; bracts

Rhodomyrtus tomentosa (Aiton) Hassk. flowering and fruiting branch.

elliptic, leaf-like, 6 12 mm long, bracteoles elliptic or ovate, 2 3 mm long, persistent; calyx campanulate, 5- 7 mm long, tomentose, 5 10-ribbed, 5-lobed, persistent; petals 5, broadly obovate, 15 18 mm x 9 13 mm, red or pink; stamens numerous, 10-15 mm long, filaments pink; style 13 15 mm long; ovary 3(-4)-locuXXX lar. Fruit an oblongoid berry, 10 -15 mm x 8-10 mm, purplish-black, crowned by the calyx lobes, tomentose; wall 1 mm thick, pulp sweet. Seeds many in 6(-8) pseudo-locules, divided by thin false septa, compressed-reniform, 1.5 mm in diameter.

Two varieties are distinguished:

• var. *tomentosa* (synonym *Myrtus canescens*), occurring in South-East Asia, southern China and Indochina; with white-tomentose leaves, lateral nerves 2 6 mm inside the margin, less than one-third of the distance from the leaf margin to the central nerve, apex not apiculate, veins not reticulate, pedicels 1-2.5 cm long;

• var. *parviflora* (synonym *Rhodomyrtus parviflora*) occurring in India and Sri Lanka; with cream or yellowish tomentose leaves, lateral nerves 3-7 mm inside the margin, over one-third of the distance from the leaf margin to the central nerve, apex apiculate, veins reticulate, pedicels less than 1 cm long. Fruit of cultivated plants is said to be far superior to that of wild plants. In Java, where downy myrtle is known only as a garden plant, it flowers in July-August and fruits in September-October. Fresh seed germinates within a week. The growth rhythm has not been studied.

Ecology. Downy myrtle thrives in open, often degraded sandy sites, along the shore and on river banks. Where it grows, other plants seem not to be able to compete with it, hence almost pure stands exist. It tolerates full sun and flooding. Var. *tomentosa* is generally found in such harsh environments, up to elevations of 300 m, rarely up to 1300 m. On the other hand, var. *parviflora* occurs in montane woodlands and grassland at altitudes of 1800- 2700 m. Moist, somewhat acid soils are preferred; the plant is not well adapted to limestone soils.

Agronomy. In cultivation the shrub is normally propagated through cuttings. Plants raised in this way will bear fruit in about 2 years. Downy myrtle is easy to grow and no serious pests and diseases have been reported. The growth rate is moderate and if enhanced by heavy fertilization, flowering and fruiting suffer. There is no information on yield.

Prospects. Downy myrtle is a very showy shrub when in bloom and it would seem that the prospects for its use as an ornamental plant are better than for its role as a fruit crop.

Literature

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3. Scott, A.J., 1978. A revision of Rhodomyrtus (Myrtaceae). Kew Bulletin 33(2): 311-329.

— A.M. Latiff

[HRDC: Hort Report / 1998]

Developing better almonds

Better-yielding and more efficient pollinating almond varieties and planting material are being tested and introduced into Australia to boost marketing opportunities for local growers.

Two research projects are trialling potential new almond cultivars and plant material such as rootstocks and, if successful, the industry will benefit through improved yields and an increased capability to meet market requirements.

World-wide almond shortage

World demand for almonds outstrips supply and this situation is expected to continue for at least 10 to 15 years.

The Australian almond industry is expanding and many older orchards require replanting. However, replanting orchards with higher producing trees has been hampered by a scarcity of new and improved plant material.

Most of Australia's almond production is based on Californian cultivars developed more than 100 years ago. Improved cultivars adapted to local conditions and consumer demands are needed. With an increasing emphasis on Nonpareil as the main cultivar, local seedlings have become less relevant as they bloom too early and the kernels have a dark skin colour.

All commercial almond cultivars are self-infertile, so that at least two cultivars are needed to ensure crop production. The pollinators for Nonpareil have serious faults, such as poor kernel quality, late maturity or suitability for in-shell market only.

New cultivars being introduced are: Butte (a roasting type with heavy yields and late blooming characteristics), Padre (roasting type, good yields, late-blooming), Livingston (blanching type, good yields, late-blooming) and Monterey (blanching type, good yields, early blooming).

These cultivars will provide alternative pollinators for Nonpareil and for the late blooming cultivar Mission. Livingston has been released from quarantine and the others are expected to follow in March.

Improved planting material

A second almond improvement project led by the University of Adelaide is focusing on breeding and evaluation of local cultivars, cloning and storing tissue culture, and

detecting and eliminating viruses (prunus necrotic ringspot virus and prune dwarf virus) to ensure growers receive only the best planting material.

These projects contribute to the achievement of the industry's vision of better adapted varieties, increased productivity and a significant increase in the quality of product for domestic and export markets.

Contacts: **Professor Margaret Sedgley**, Ph. 08-8303 7242, Fax 08-8303 7116, email: hvo@waite.adelaide.edu.au; **Frank Gathercole**, Ph. 08-8595 9122, Fax: 08-8595 9199, email: gathercole frank@pi.sa.gov.au

[Countryman / 1998 Nov 26]

Growing interest in production of olives

The Peel Olive Association (Inc) is the latest of 26 regional olive associations to be formed in Australia.

The association was formed in May after many requests to Agriculture WA for information on olives and how to grow them in the Peel region.

The association is headed by Paul Fitzpatrick, who has planted olives at Waroona and recently returned from the Australian Olive Association's national conference in Queensland.

The association was formed with the assistance of the Peel Development Commission and AgWA to provide a support group for the development of an alternative sustainable agricultural industry.

The association is conducting a major study into the potential of the industry in the Peel region, examining the issues of growing, marketing, value-adding, employment, diversification and economic returns.

The study will produce a report containing maps and details of the potential of the Peel olive industry. The report will help existing and potential farmers, processors and investors to decide whether to enter the olive industry in the Peel region.

The association has created an Internet web site (www.peelfarmnet.org.au/olive), which is hosted by the Peel Rural Technology Centre. The site will contain details of coming events for members, field trips, training and workshops.

The web site will also provide an opportunity for on-line communications between the association, its members and others through its E-mail address (olive@peelfarmnet.org.au).

Peel Olive Association: <A3141>

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We are all Frankenstein's Monsters

Everyone is familiar with the idea of symbiosis, where two or more creatures live together, simultaneously helping, and drawing from, the rest.

A common example is the lichens, the greenish growths found on rocks; these are a symbiotic grouping of algae and bacteria. When trees are looked at, almost all turn out to be living in symbiosis with fungi and other soil-dwelling organisms.

Sometimes the symbiosis is very close, as with fungi living partly within the roots of trees, partly outside. With 'obligatory symbiotes', although the different creatures involved can still be distinguished, the symbiotic pair can scarcely live or exist unless all the parts are present.

And even closer relationships can occur. Relatively recently, it has been realized that all of us, all animals, plants, and fungi, are each a composite creature, made up from simpler creatures which came together in the distant past.

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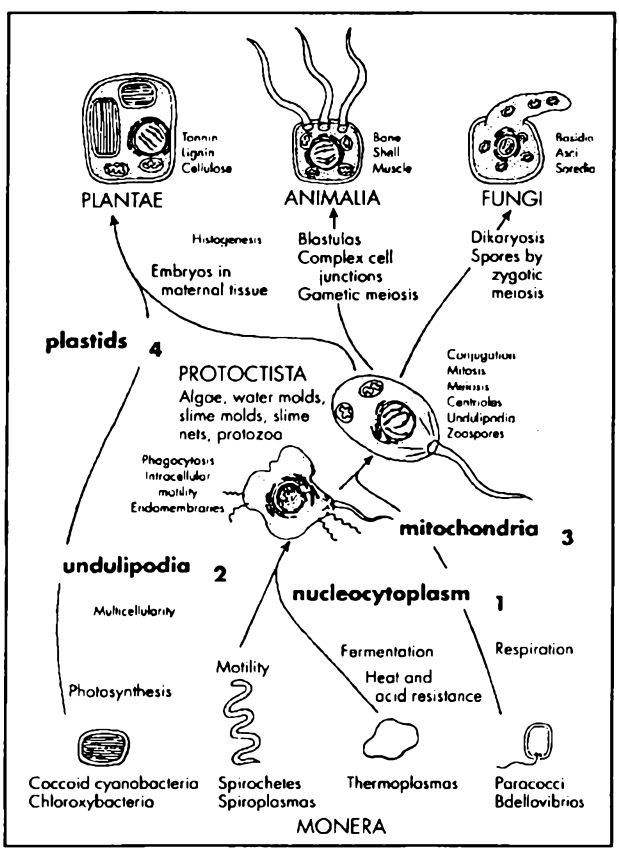
The fascinating story of these discoveries is described in the book *Slanted Truths: Essays on Gaia, Symbiosis, and Evolution*, by Lynn Margulis and Dorion Sagan (Springer, 1997). Margulis, a scientist who had a large part in bringing out the story, was the first wife of noted cosmologist Carl Sagan, and Dorion is their son.

The concept that creatures are what they are because of the DNA contained in the genes and chromosomes within the nuclei of their cells, is a little over 40 years old. The whole science of genetics revolves around the idea of parents each contributing part of their own DNA to the DNA of their offspring, with the individual character of the offspring dependent on just what genes they inherited from each parent. These concepts form the basis of conventional plant breeding.

But there are other sorts of DNA. Every animal contains at least two types, and every plant at least three. Both always have 'mitochondrial DNA' — this is DNA which exists in packages called mitochondria within



the cell, but outside the nucleus. It is the mitochondria which are the 'power-houses' of the cells, they are responsible for energy delivery and transfer.

Plants also have another sort of DNA, in different packages called chloroplasts, again freely floating within the cell, but outside the nucleus. The chloroplasts convert light energy and store it in a chemical form, normally using the green substance chlorophyll within them.

What Margulis was able to show, was that each of these DNA types came from that of a simpler creature, a one-celled creature lacking a nucleus. The presumed modern forms of each of them still exist. A long time ago, perhaps two billion years ago, these creatures joined together to form composite entities, the nuclear cells which are the basis of all higher forms of life (see diagram).

So the DNAs of the nucleus, the mitochondria, and (in plants) the chloroplast, each came from that of a different one-celled creature. The DNA of a fourth one-celled creature, a spiroplasma, is believed to have been also incorporated, mostly within the nucleus (where it forms structures called telomeres, active in cell division, and other structures showing up in specialist cells such as taste buds).

So we are all Frankenstein's Monsters, composite creatures made up bits of simpler ones. Margulis also gives examples of other composite creatures, of which perhaps the most exotic is one called Kefir.

Kefir is a substance, grown in vats in Georgia in the Caucasus as the source of a nourishing food, in which each individual 'curd' grows and reproduces as with any conventional creature. But each is made up of at least 25 types of bacteria and fungi, inextricably combined.

All very interesting, perhaps, but does it have any relevance to tree crops? The answer is Yes. The whole point is that in conventional plant breeding and production, only characteristics which stem from the nuclear DNA are derived from a mix of both parents' DNA. In an offspring, its other types of DNA come only from the female parent, unchanged.

A very visible example of this is when a plant has undergone a mutation causing its chloroplasts to become yellow or white instead of green. Pollinating such a plant with pollen from a green variety will not give any offspring with green leaves. The offspring chloroplasts are genetically identical to that of the mother plant.

In normal sexual reproduction of a plant, pollen from a superior male parent may endow the hybrid offspring with the desired superior characteristic, but not if this characteristic lies within the non-nuclear DNA. Subtle characteristics such as rate of growth or ability to cope with difficult light conditions may stem from the mitochondria or the chloroplasts, and in such cases cannot be transferred from the male parent.

— David Noel

[Countryman Horticulture / 1998 Nov 5]

WA truffles established on hazelnut and oak

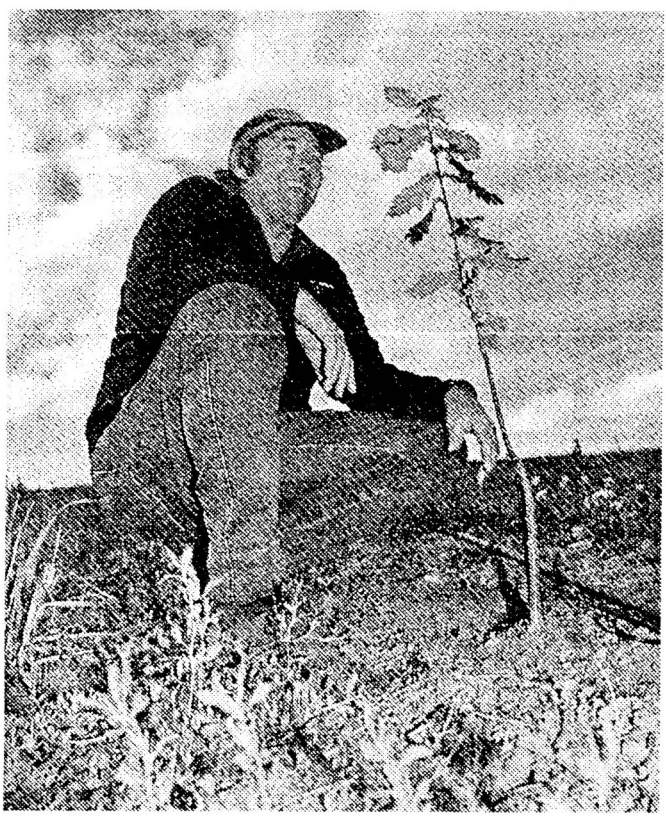
Manjimup nurseryman Al Blakers hopes to grow truffles on his property similar to a successful New Zealand venture.

Truffles are highly prized by gourmet chefs and command huge prices. They grow in the root system of certain forest trees in a symbiotic relationship, one that benefits the host and the parasite.

But they first have to be inoculated with a suitable mycorrhizal and that is the tricky part which requires plenty of experimentation, not to mention knowledge and cash for development.

Mr Blakers believes there could be a lucrative future for local farmers if his hopes for the production of truffles become a reality. But he was the first to admit that the successful production of truffles was still speculative.

Truffles are grown in New Zealand, and after inspecting the sites last year when in the country for a conference on the subject, Mr Blakers came back even more convinced of their potential in Manjimup. "The area here is typical of the Bordeaux region in France where truffles are grown," he said.



Al Blakers checks the progress of a tree inoculated with a mycorrhizal

Mr Blakers was careful not to give away too many trade secrets. But he has been interested in the symbiosis between mycorrhiza and trees for the past 12 years. It was after talking with an overseas expert that his interest in truffles started.

His planting is one of three in WA. A lot of interest in truffles has been attributed to the high prices the edible fungi has attracted — an average $US 2000 a kilogram this year, although figures as high as $7000 have been reported.

Mr Blakers was hoping his planting of 1300 hazelnut and oak trees would initially produce about 500 g each, after their first year of production at four to five years of age.

By year 10 they were expected to reach full production and remain viable for about 100 years. Another 5000 trees were being planted next year.

Truffles grew on the root system of the inoculated tree, and had a symbiotic relationship with it, he said. Mr Blakers used the inoculant on both hazelnut and oak trees with an upper and lower storey structure because these branch structures produce better ground conditions for truffles.

But despite having sourced the inoculant from a reliable supplier overseas, Mr Blakers said he was still dealing with a lot of unknown factors. If the truffles did eventually form, obtaining plentiful supplies could bring about a new set of problems — how to find them.

"The French use pigs to find the supplies, while the New Zealanders have used dogs," he said. "You need an experienced truffler to find the source and then dig it out carefully because you do not want to disturb the root system, as that could affect the future production of the mycorrhizal.

"What you are actually doing is picking the fruit of the fungus—and everything needs to be exactly right for it to produce it in the first place and then continue to produce. An experienced truffler can pick up signs of it on the ground and determine the best way of obtaining it."

Mr Blakers said that while the pigs — favoured by the French — were known to eat the truffles, dogs did not eat the delicacy. The pheromone the truffles gave off was the same as a male pig on heat, so the French used a sow to find the edible fungi.

Mr Blakers joked he would have to use a dog to find his crop because he would be too embarrassed to be seen walking around his property with a pig.

His nursery — Five Acre Nursery — was started by his parents Lionel and Mary about 20 years ago. His father, with the help of well known nursery man George Gay, set up probably the first container nursery outside the metropolitan area.

Five Acre Nursery had continued to strive for excellence in that pioneering spirit and today was one of the most technologically advanced nurseries in WA. Fully accredited, the nursery employed the latest in greenhouse technology direct from world leaders in Israel.

The move into tree production started about 16 years ago when Bunnings asked Lionel Blakers to grow trees for them. In his first year of contract growing, Mr Blakers produced 32,000 trees for the company.The trees grown were all Eucalypts, predominately salt tolerant and timber varieties.

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[The Australian / 1998 Dec 12]

France laments truffle demise

The south of France is lamenting the disappearance of its famous gastronomic delight.

The southern French truffle, a jewel of gastronomy since Roman times, is now almost extinct, according to truffle-gatherers who say the aromatic fungus has become so rare and expensive that it is barely worth looking for.

At the annual Saint-Alvere market in the Dordogne this week, just 12.7 kg of knobbly Perigord truffles were on sale and prices soared to an astonishing $1180 a kilo for the best specimens.

"In mourning for the truffle", declared a headline in the newspaper France-Soir, which

announced, "There are no more truffles, or practically none" in the parts of the Lot and Dordogne regions where truffle hunting was once an important industry and a popular pastime.

Many rural people who used to collect truffles to supplement agricultural incomes have now abandoned the hunt altogether, since soaring prices have shrunk the market. To make matters worse, the French truffle industry is facing a major challenge from Italian and Chinese truffles which are both plentiful and far cheaper, if less tasty.

At the turn of the century, the southern plateau, known as Le Causse, was producing 500 tonnes of the "black diamonds" that played such a key role in the development of French cuisine. And even in 1960, 80 tonnes were still being shipped annually. The 1998-1999 truffle season is expected to produce a haul of barely 30 kg.

The poor production this year has been blamed on an abnormally cool summer, but one of the principal difficulties with truffle production is that scientists remain uncertain what makes the Perigord truffle thrive or fail.

"One year, they say there is too much summer rain — the next, that there is too much sun," complained Jean Duvigneaud at the end-of-year fair in Quercy. "The fact is, nobody really has a clue."

Truffle-hunters normally use pigs or dogs to locate and grub out the fungi. Rural depopulation has meant much land has returned to scrub woodland, including oak, which ought to have encouraged the return of fungi, but has not.

Truffle-hunters are now calling on the French Government to launch a thorough scientific investigation into the reasons behind the truffle's disappearance.

"The experts at the National Research Institute don't even know how truffles grow," Mr Duvigneaud said. "Here ... one could always hope that they would turn up under the oak tree in the garden. But today you cannot say that any more."

Black truffles are to the Perigord region what wine is to Bordeaux or mustard is to Dijon, and many in the region fear that their identity is vanishing along with the coveted fungus. "We are being made to look like fools in the eyes of Parisians and we don't like it," Mr Duvigneaud said.

The truffles have become so rare and prices so high, that competition to find what few fungi remain has become increasingly fierce. A good truffle-dog is a passport to considerable wealth, and last year saw a rash of dog thefts.

*— **Ben McIntyre***

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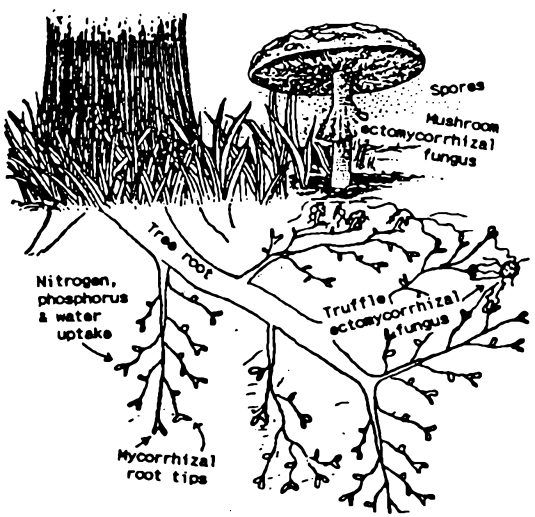
[The Nut Kernel (Pennsylvania Nut Growers Association) / 1998 Sep]

Myco What? Mycorrhizae!

Root systems of plants must interact with a broad range of soil fungi. The tiny filaments of fungi (called hyphae) in a gram of soil can be measured in miles!

Fungus spores can number in the tens of thousands per gram of soil! Most fungi are "good" in some way, for example decomposition and recycling, and the freeing up of plant nutrients. Very few fungi are pathogens (disease causing organisms). One group of fungi which associate with roots and are beneficial to plants are the mycorrhizal fungi or mycorrhizae: "myco" for fungus and "rhizae" for roots.

Mycorrhizae might be difficult to pronounce (my-ko-RYE-zee), but the concept is not hard to understand. Mycorrhizal fungi form mycorrhizae with roots of compatible plants. Most plants form mycorrhizae, including nut trees and shrubs. The mycorrhizal relationship is a symbiosis, which means organisms living together for mutual benefit. Mycorrhizal fungi are mostly nonspecific, that is, many different mycorrhizal fungi can associate with and benefit a range of plants. It is estimated that 85-90% of all land plants form mycorrhizae,



and that nearly all woody plants are mycorrhizal.

In their relationship with the plant, the fungus hyphae function as the plant's root hairs, absorbing and conducting nutrients and water into the plant. Plants are primarily dependent on mycorrhizal fungi for the uptake of phosphorus, but also nitrogen and other minerals. In some forms of mycorrhizae the fungus completely covers the root tips, and all contact with soil is through the fungus. Mycorrhizal fungi can also protect roots from drought and disease causing organisms, thus they are extremely important to overall plant health.

In return, what the fungus gets from the plant in this relationship is food in the form of simple sugars transported in the sapstream from the leaves down to the roots. In order to keep its mycorrhizal partner, a plant may give up from 10% to 25% of the food it photosynthesizes to the fungus. This may sound costly, but the health and nutrition benefits to the plant are worth it. Good mycorrhizal development of seedlings can often improve the chances of survival when outplanting in the field.

There are two general types of mycorrhizae, or mycorrhizal fungi, based on their structure on or in the root. These are the ectomycorrhizae and the endomycorrhizae, however both perform similar functions for the plant. The ectomycorrhizae form a complete covering over the root-tips, which is visible to the naked eye. The endomycorrhizae have tiny filaments which penetrate individual root cells, and are not visible to the naked eye.

Endomycorrhizae are the most common type of mycorrhizae, since nearly all nonwoody plants associate with these fungi. Most endomycorrhizae form microscopic spores in soil. Woody plants usually form ectomycorrhizae, but can also have endomycorrhizae. Some trees, such as oaks, walnuts, pecans and hickories, can have both types of mycorrhizae depending on soil conditions or other factors not yet fully understood.

Ectomycorrhizal fungi are familiar as many of our beautiful mushrooms on the forest floor. Truffles are also a kind of ectomycorrhizal fungus, which is essentially

a round, underground mushroom. Oaks and hazels can form ectomycorrhizae with truffle fungi, and much research has been conducted on this relationship to promote truffle production. Ectomycorrhizae have also been observed by the author on the roots of hazels growing in northern Michigan.

There is almost never a lack of mycorrhizae in natural soils. Seedlings planted in healthy soils containing plenty of humus, organic matter and other roots will always develop sufficient mycorrhizae on their own. However a deficiency of mycorrhizal fungi can sometimes occur, which can in turn inhibit plant development.

Soils which have been abused by fumigation or fungicides can have their mycorrhizal fungi killed off. Also, soils of mine spoils or old fields where herbaceous crops have grown for years may lack the mycorrhizal fungi needed for woody plants. In these cases it has been shown that inoculation of soils with spores of mycorrhizal fungi can benefit young trees.

— Dana L. Richter

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[Trees and Natural Resources / 1998 Mar]

Vital role of mycorrhizal fungi in woodlands

A CSIRO study in remnant woodlands in WA has shown that fungi play a key role in nutrient cycling there as well as in native forests around Australia. The findings suggest that the presence of appropriate fungi can be critical to the success of farm revegetation efforts.

The research by Inez Tommerup and Neale Bougher of CSIRO Forestry and Forest Products showed that fungal diversity can be as great in the dry woodlands as in wetter eucalypt forests, with the soil harbouring more than 100 species in some areas studied. These include many ectomycorrhizal fungi, with mushroom, toadstool, puffball and truffle-like fruiting bodies which form symbiotic relationships with the roots of trees and understorey shrub species, and perform a vital role in supplying soil nutrients to the plants. The native soil is low in phosphorus, nitrogen and trace elements, and if we did not have these fungi the trees would have much less capacity to obtain vital nutrients and the types of vegetation might be very different.

The scientists found that tree roots were sparsely distributed in the woodland soil, but mycelium from mycorrhizal fungi was widespread. Different fungi are associated with different plants, and each fungus has distinct physiology and functions optimally with particular environmental conditions.

The scientists are developing a method for introducing suitable sets of fungi when local trees and shrubs are planted on farmlands. The technique involves raising seedlings with a wide diversity of ectomycorrhizal fungi from woodlands where the chosen plants species grow naturally. When the seedlings are subsequently planted in the area being revegetated, they bring the fungi with them.

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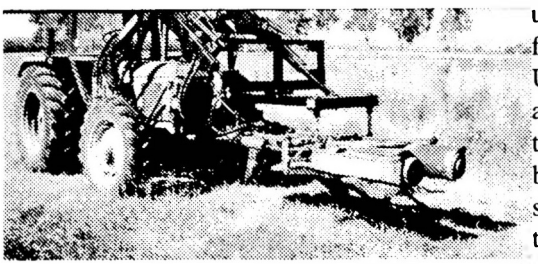
Budget tree shakers for pecan, macadamia

Several Pecan Growers with increasing production on their orchards have recently had to look at Tree Shakers for their orchards.

Shown is an alternative one grower used which didn't blow the budget. The grower had the John Deere tractor with a Front End Loader



attachment so it was a relatively simple operation to make a frame to adapt the shaker head.

The Shaker head itself was an older style OMC head which was completely reconditioned. All the hydraulic fittings were quick release so the shaker attachment could be removed quickly.

A PTO mounted gearbox driving a hydraulic pump and oil reservoir at the rear of the tractor completed the installation. All of these were also quickly disconnected. Other possibilities in mounting the shaker head included a boom off the 3 point linkage of a tractor. The shake pattern and amount of shake is variable dependent on the weight configuration, and the motor speed on the head itself. Trials were conducted last season on Macadamia trees with promising results. Earlier trials on the evergreen Macadamia usually resulted in the tree being plucked from the ground or at least being ringbarked. Using a high frequency low amplitude shake and correct clamping procedure showed that shaking in Macadamia orchards could be feasible. Catching frames or ground sheets are often used in conjunction with these shakers.

— Jeff Dodd

[Australian Food Plants Study Group Newsletter / 1998 Jun]

Cheese Fruit (Morinda citrifolia)

If ever there was a more maligned and misunderstood tree than the Cheese Fruit, I have yet to come across it. Cheese Fruit is an attractive shade tree with large glossy leaves and is well suited to the Townsville environment.

It is found in coastal Queensland, Northern Territory and extends through to Papua New Guinea, Vietnam and India. Perhaps its other common names give some hint as to why it is not more popular in horticulture: "Rotten Cheese Fruit" or "Vomit Fruit". There can be no doubt that the odour of the fruit is pretty unpleasant.

The fruit is actually a compound structure which is particularly evident when you see it flowering. Each individual segment of the fruit has its own small white flower. The fruit are a lumpy warty mass, green initially and then turning a translucent green-white when fully ripe. It is at this stage the fruit smell particularly strong. The reason for its strong smell is to attract Fruit Bats to disperse the fruit. Along the windswept beach fronts in which it grows, a very strong scent is needed to attract the attention of the bats. One critic has described the smell as being reminiscent of a strong Roquefort cheese after soaking in a urinal.

Not surprisingly, the smell general discourages most people from sampling the perfectly edible fruit. Since the senses of smell and taste are closely linked in the mind, smelling the fruit first actually makes the fruit taste worse. The best thing to do is to just hold your nose and take a big bite! The taste is actually something like a strong blue-veined cheese mixed with hot mustard. I am continuously amazed at the number of people who actually like the fruit and I have had many requests for seeds and plants. The last time I was in Darwin, I saw advertised a salad dressing made by blending Cheese Fruit and Macadamia Nuts. It was selling like hot cakes to the tourists!

The fruit is high in Vitamin C but quite average in most other nutrients and minerals. Judging by the number of medicinal uses, I am sure that the fruit actually contains some pharmaceutical properties. One whole fruit, eaten raw, is taken for the common cold, influenza, diarrhoea, asthma, coughs and sore throats. Many times I have heard that this brings almost miraculous cure and have tried it out on a few willing scapegoats with nothing but 100% success! In the Torres Strait, juice from the fruit is mixed with coconut milk or water and given to patients as an effective cure for the painful disease Ciguatera. The fruit may also be taken as a contraceptive (don't kiss me after you've eaten that horrid thing!) or applied externally to sores and wounds. Green fruit may be smashed up and eaten as a green vegetable. One Papuan woman explained to me that fruit are also used as shampoo and she assured me they make your hair quite soft and shiny. Keep one handy in the shower cubicle next time.

If you dislike the fruit, then young leaves are also edible, either raw or cooked. In India, leaves are also applied externally to wounds and ulcers. In Vietnam, fruit are taken to relieve painful urination by apparently clearing obstructions from the urinary tract and is also taken to promote menstrual flow. Some research has been carried out into the medicinal value of Cheese fruit and there is now a commercial drug based on the roots and trunk

of Morinda which is used to treat high blood pressure.

Other obscure used include the extraction of a yellow dye for dying dilly bags. It is one of the best natural dyes to be found in North Queensland. In the Northern Territory, it is regarded as a calendar plant. The timing of fruit ripening and dropping from the tree apparently coincides with the end of the cold dry season and beginning of the new hot and dry season. This doesn't work well in the Townsville are since I have seen trees fruiting all year round. Let's drop the name "rotten Cheese fruit" and use its other complimentary common name: "Great Morinda".

— Greg Calvert

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[PROSEA: Dye and tannin-producing plants]

Morinda citrifolia

(Rubiaceae; 2n = 44)

Synonyms. *Morinda bracteata, Morinda litoralis.*

Vernacular names. Indian mulberry (En). Morinde (Fr). Indonesia: mengkudu (Javanese), bengkudu (Minahasa, Gorontalo), cangkudu (Sundanese). Malaysia: mengkudu besar, mengkudu jantan. Philippines: tumbong-aso (Tagalog), bangkuro (13isaya), apatot-nga-basit (Ilokano). 13urma: al. Cambodia: nhoer srok, nhoer thom'. Laos: nhoo baanz. Thailand: yo ban. Vietnam: nhau.

Origin and geographic distribution. Indian mulberry is a native of Queensland (Australia). It may have been distributed by man and carried westwards into the Indian Ocean by sea currents, reaching the Seychelles. and similarly into the Pacific between 30°N and 30°S latitude, reaching the Marquesas, Hawaii, and Easter Island. It is present throughout South-East Asia both wild and cultivated. It often occurs wild in coastal zones. It is naturalized in the Caribbean region.

Uses. Before the introduction of synthetic dyes

Morinda citrifolia — 1, flowering branch; 2, inflorescence- infructescence.

(e.g. alizarin) the red dye from the rootbark of Indian mulberry was important. In the late 19th Century, there were plantations in coastal areas of northern Java and adjoining islands. Nowadays, single trees are encouraged or cultivated in gardens mainly for medicinal purposes. Cultivation for the dye is restricted to areas where traditional textile dyeing is still important, e.g. in the production of high quality batik on Java.

Most parts of the tree have been widely used medicinally since ancient times. In Vietnam roots serve to treat stiffness and tetanus and have been proven to combat arterial tension. Elsewhere they are used as febrifuges and as a tonic. The bark is used as a tonic and as an antiseptic on skin lesions, ulcers and wounds. The leaves are used to treat dysentery, diarrhoea, colic, nausea and convulsions and as a febrifuge, tonic and antiseptic. The fruits are used as a diuretic, a laxative, an emollient and as an emmenagogue, for asthma and other respiratory problems, as a treatment for arthritic and comparable inflammations, in cases of leucorrhoea and sapraemia and for maladies of inner organs. Roots, leaves and fruits may have anthelmintic properties. In traditional medicine

the parts used are administered raw or as juices and infusions or in ointments and poultices.

Despite the smell of putrid cheese when ripe, the fruits are eaten raw or prepared, as are the leaves. The fruit pulp can be used to cleanse hair, iron and steel. The wood splits excessively in drying and its uses are restricted to fuel and poles. In Malaysia and Thailand the tree is used as a support for pepper plants.

Properties. The basis of the morindone dyeing matter, called Turkish red, is the hydrolysed (red) form of the glycoside molindin. This is the most abundant anthraquinone, is mainly found in the rootbark, which reaches a concentration of 0.25-0.5%, in fresh bark in 3-5 years. It is similar to that found in *Rubia tinctorum* and to synthetic alizarin. The curative properties of the plant parts are ascribed to the presence of medicinally active anthraquinone derivatives. The fruit contains rancid smelling capric acid and unpleasant tasting caprylic acid. It is thought that antibiotically active compounds are present. The nutritional value of the fruit and leaves is considerable. The leaves are a rich source of vitamin A.

Description. An evergreen shrub or small crooked tree with a conical crown, 3-8(-10) m tall, with a deep tap root; bark greyish or yellowish-brown, shallowly fissured, glabrous; branchlets quadrangular. Leaves opposite and simple, elliptic-lanceolate, (10-)15-50 cm x 5-17 cm, entire, acute to shortly acuminate at apex, cuneate at base, pinnately nerved, glabrous; petioles 0.5-2.5 cm long; stipules variable in size and shape, broadly triangular. Inflorescences globose heads, 1 4 cm long peduncled, in axils of stipules opposite normally developed leaves; flowers bisexual, fragrant; corolla funnel-shaped, up to 1.5 cm long, white; stamens inserted on the mouth of the corolla; stigma bilobed. Fruit an ovoid syncarp of red brown, pyramidal, 2-seeded drupes, 3 10 cm x 2 3 cm, yellow-white. Seeds black, with hard albumen and distinct air chamber.

Growth and development. The seed remains viable for at least 6 months. Germination is 3 9 weeks after sowing. Plant growth is 1.2-1.5 m in 6 months. Flowering and fruiting start in the third year and continue throughout the year. Maximum age is at least 25 years.

Other botanical information. *M. citrifolia* is sometimes subdivided into two varieties: var. *citrifolia* and var. *bracteata*. The latter has calyx-limbs with 1-2 leaflike, linear-lanceolate lobes ca. 1-1.5 cm long; the stem is straighter and the leaves are smaller than var. citrifolia.

Ecology. Indian mulberry is commonly found up to altitudes of 1500 m in humid and seasonal climates of the region, with an estimated annual rainfall of 1500-3000 mm or more. In areas where the plant is cultivated, the soil is usually well structured and of volcanic origin (Java), but it may be poor and ferralitic (Cambodia). In the wild the plant also appears on infertile, degenerated soils, sometimes badly drained or with a very low water-retention capacity and a deep water table.

The species occurs in evergreen, (semi-)deciduous to more or less xerophytic formations, often typically littoral vegetations. It also occurs in pioneer and secondary vegetation after cultivation and bush fires (Cambodia), deforestation or volcanic

activity (Krakatau). It is persistent and very tolerant. The ability of the seeds to float explains its wide distribution and occurrence on many seashores. Inland distribution agents are fruit-eating bats and birds.

Propagation and planting. Indian mulberry is propagated by seeds which should be sown in nursery beds. After germination, seedlings are transplanted at ca. 1.2 m x 1.2 m in well-tilled soil.

Husbandry. Weeding is carried out at least twice and starts about 1 month after transplanting. No maintenance is needed after the first year. Intercropping with cereals and perennials is possible (e.g. shade in coffee).

Harvesting. High-yielding bark may be expected after 3 5 years. The roots are dug out, cleaned in water, and the bark removed.

Yield. Yield of bark is reported to be 500-1000 kg/ha, containing about 0.25 % morindin.

Handling after harvest. The bark is ready for use after drying in the sun for several days. In the complex cold-dyeing process of the Java batik, cloth is prepared with an alkalic emulsion, 4 times a day, for 10 days. The bark is pounded with jirak bark (*Symplocos fasciculata*), mashed with water and applied to the cloth by hand. This is repeated for 5 days. The cloth acquires a clear red, wash-fast colour. Elsewhere, the same dyeing principle is used. Jirak bark serves as a mordant. It is rich in aluminium salts.

Genetic resources. The species is diminishing in its natural habitat. It is not very likely to be endangered by serious genetic erosion given its pioneering character, its natural variation and its wide, though small-scale, cultivation. There are no reported germplasm collections.

Prospects. Renewed interest in natural dyes and medicine in Indonesia and elsewhere may revive bark production. Evaluation of fruits and leaves for nutritional purposes is recommended.

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— J.J. Groenendijk

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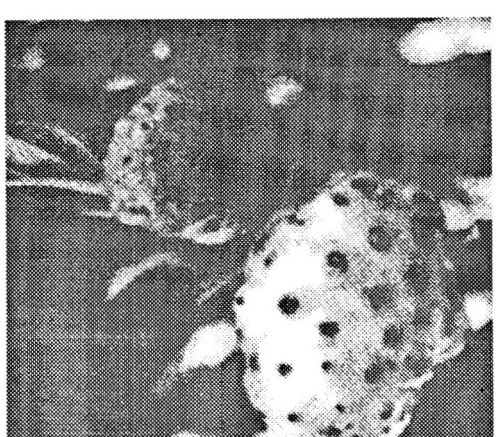
[Extract from an advertisement in: Conscious Living Eco-Catalogue, Summer 1998]

How a centuries old sacred healing fruit from Polynesia is helping thousands of people improve their health

In 1993 a simple plant from French Polynesia was introduced by a friend to two world renowned food scientists, Stephen Story and John Wadsworth. This plant known by the people of the islands of the South Pacific as noni had been used by Polynesians for over 2,000 years because of its amazing healing properties.

The two scientists began to experiment



Morinda citrifolia

with the juice from the noni fruit and the results were astounding. Stephen and John then worked for two years to develop a process of harvesting, processing and flavouring the noni juice to make it palatable.

John and Stephen were able to overcome the taste using only a small amount of natural grape and blueberry juices. They also discovered a way of harvesting the fruit at the correct stage to retain its maximum potency. Noni fruit grows organically in volcanic soils and is harvested in the wild.

In July 1996 noni juice was introduced to the United States of America and immediately people began to report amazing health benefits.

[Ed: According to the write-up, the juice has been effective in treating lung lesions, degenerative arthritis, high blood pressure, chemical sensitivity, chronic fatigue syndrome, and chronic pain.]

Dr Ralph Heinicke is credited with discovering the active ingredients that give noni its healing properties. While studying pineapple enzymes, Dr Heinicke found that a certain alkaloid called xeronine may play a key role in encouraging proper cell function and growth in the human body. Xeronine is formed in the large intestine where a chemical reaction occurs between Proxeronine and Proxeronase. Dr Heinicke found that these two substances exist in abundance in the noni fruit.

Morinda Citrifolia is the botanical name for noni fruit which grows abundantly in the volcanic soils of French Polynesia. Noni fruit has become the country's second largest export since the advent of commercial harvesting of noni.

[Ed: More on this is said to be at www.nonihealth.com/doctors.html].

[Fruit Gardener (California Rare Fruit Growers) / 1998 Mar-Apr]

Dwarf Fig and Mulberry Trees? You Bet!

Using renewal pruning techniques, even fig and mulberry trees — vigorous though they are — can be kept no more than about 2.5 metres tall.

Thanks to a tip from Santa Clara Valley chapter member Tony Barbaro, my fig trees have remained fig bushes contentedly producing fruit where I can easily reach it (and nary a fig dropped in the gutter).

The secret is in having a multi-trunked tree with no trunk older than three years. When planting a young tree, allow a few shoots to grow from the base of the tree. The next winter, prune off all but the two best shoots. The tree will be Y-shaped with the crotch very near the ground. The second summer allow one new shoot to grow from the ground, making a total of three trunks.

Each winter prune off the oldest trunk, again leaving a Y-shape. Each summer allow one new shoot to grow into a third young trunk. The result will be a "bush" a bit more than head-height, that is forever no more than three years old. Pretty clever, Tony!

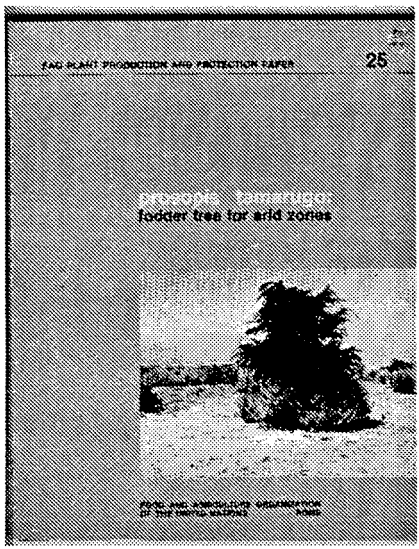
Fig and mulberry trees are particularly adaptable to this type of pruning, as they bear fruit on first-year wood. There are rumours that Bob Cannard in the East Bay uses renewal pruning on ALL his fruit trees. Perhaps that can be investigated at a later date.

— Linda Kincaid

California Rare Fruit Growers: <A1115>

BOOK REVIEW

by David Noël



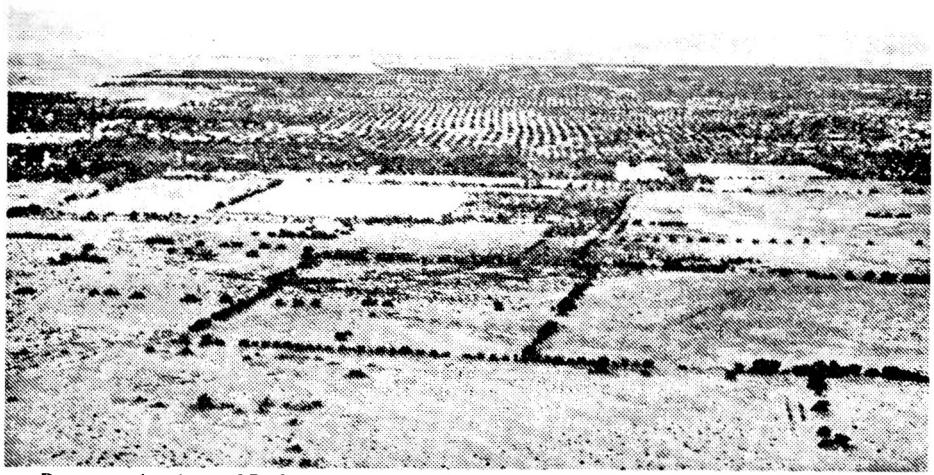
Prosopis tamarugo: fodder tree for arid zones. By *Mario A. Habit*. Published by Food & Agriculture Organization of the United Nations, Rome, 1981. 110p. Pb. *$19.95

There might not seem much point in reviewing a book about a plant which is currently banned in Australia. Particularly so with a relatively old book. So why do it?

First, of course, the *Quandong* magazine in which this review appears is read in many countries outside Australia. People both within and outside Australia should be made aware of the position regarding this plant and have the opportunity of commenting.

Second, it is to be hoped that once the shining virtues of this plant are known, particularly for an area like WA with one of the most serious land salinization problems

Tamarugo, native of the Tamarugal Pampa in the La Tirana area. Notice the height of the tree with respect to the people at the far right.



Panoramic view of Refresco in the Salar de Pintados on the Tamarugal Pampa. Man-made Tamarugo plantation established between 1964 and 1969. Visible in the foreground are sectors bordered by Tamarugos functioning as windbreaks for, and marking the site of, future plantations.

in the world, there can be some review of the current position which will enable us to trial it here.

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Tamarugo, *Prosopis tamarugo*, is a tree native to a desert region of northern Chile. It is almost certainly unique in both its ability to grow and achieve revegetation in highly saline desert areas, and in the range of properties it has developed to be able to do this.

One example of this is Tamarugo's ability to absorb water from the air with its leaves, under certain conditions, and transport this water to its root zone, depositing it in the micro-rhizosphere. Rainfall in the Tamarugal Pampa region is virtually nil, but Tamarugo survives and grows by miraculously extracting water from the air.

Another miraculous Tamarugo ability is to be able to grow and revegetate the landscape when planted in a hole dug through a salt crust, ranging up to 0.6 metres deep.

As the title indicates, this book is particularly concerned with Tamarugo's ability to provide fodder, in this case from its pods. A secondary concern is its use for forestry in arid regions. The book is divided into four parts.

Part One gives general data on the genus *Prosopis*, and on the habitat and prehistoric usage of the Tamarugo species and its modern development as a fodder and reforestation plant. Part Two deals exhaustively with the abundant, high-protein, palatable fodder (over 50% TDM) which Tamarugo produces.

Part Three deals with animal production using Tamarugo fodder, including raising of goats, sheep, and cattle. Part Four looks at the climate, geomorphology, hydrology, and soils of the Tamarugal Pampa.

According to the book, there are 44 known species of *Prosopis*, of which three (*P. glandulosa, P. ruscifolia*, and *P. juliflora*) are aggressive weeds, invading tropical

grasslands. (These three species are apparently the reason why the whole genus is banned in Australia). As well as the three weed species, the book gives details of six other species which can produce fodder and usable wood in areas where other trees fail for want of rain, or poor soils.

According to the Australian Government's *Census of Australian Vascular Plants*, there are presently six species in Australia, of which one (*P. flexuosa* of Queensland) is listed as native — the other are *P. glandulosa, P. juliflora, P. limensis, P.pallida,* and *P. velutina.* These are found in arid northern and inland areas of WA, NT, Queensland, and NSW.

The FAO book is well illustrated. The pictures reproduced here show a single Tamarugo tree, a reforested area of the Chilean desert, and an example of one technique for planting trees through a salt crust.

The possibilities for WA brought out in the book are immense. For anyone here reading it, the question inevitable arises — can WA, with its widespread salt and land degradation problems, justifiably continue to ignore Tamarugo because one of its relatives is a weed?

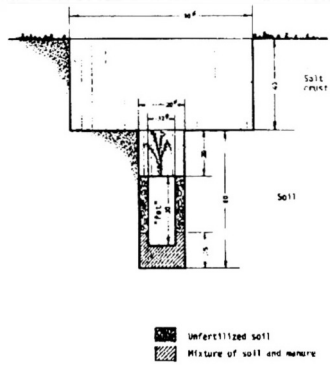

Diagram of a planting hole in salt crust

(*Price at Granny Smith's Bookshop — see ad p 31)

[West Australian / 1998 May 19]

Green promise in gene find

Scientists have discovered two genes which enable plants to make key components in plastics and paints which normally come from fossil material such as oil.

The breakthrough, announced yesterday by CSIRO plant industry researcher Allan Green, could provide a lucrative alternative for Australian farmers to produce raw materials for industrial chemicals without producing waste.

"We have identified genes which when introduced into plants could see them operating as mini-factories and offering an alternative to petrochemical oils," Dr Green said. "The possibilities are immense. Components of detergents, nylon, glue, paints, lubricants and plastics could all be produced from plants rather than fossil materials."

The advance comes after four years research by an Australian and Swedish team.

Raw materials used to make polymers, such as plastics and speciality chemicals, are modified forms of fatty acids produced from non-renewable petroleum or chemical processing of vegetable oils.

But the team is the first to identify two genes from wild plants which perform these modifications inside the plant, bypassing the need for chemical processing and without producing waste.

Dr Green said Australia would benefit if four international patent applications were approved. There was an extra bonus of farmers reaping export dollars from applying the genes to crops like canola. ¥

[Subtropical Farm Forestry Newsletter / 1998 Oct]

Blue Quandong available as tissue cultures

For the last four years scientists at Vitroplant of Mudgeeraba on the Gold Coast have been undertaking an extensive program of research and development into the selection, tissue culture clonal propagation and use of Blue Quandong (*Elaeocarpus grandis*) for Farm Forestry.

Blue Quandong is known to be one of Australia's fastest growing rainforest timbers.

The tree matures in 16-18 years and provides a comparable yield to hoop pine in half of that tree's growing cycle. Blue Quandong timber is recognized as one of the famous range of banding timbers and is priced similarly to clear grain hoop and radiata pine.

Accordingly, it is a most desirable tree for use in timber plantations. It not only gives a quick return, it also modifies the environment within the plot and enhances the conditions for other slower growing species.

The tree produces an excellent timber. It is used in a wide range of applications including structural and furniture products and is a much sought after timber that has been largely cut out of natural stands.

For some time now, the growth pattern of Blue quandong has attracted the attention of many tree growers and governmental institutions. Trial plantings have been conducted in a number of locations. All have proven its growth characteristics and provided valuable information about its management requirements. Typically, trees in trial plantings in Queensland have reached 8.0 m in two years.

Vitroplant clonally propagated plants provide healthy elite stock that eliminates plantation diversity. A Blue Quandong 10 acre demonstration plantation has been established in the Northern Rivers of New South Wales.

Trial plantings to confirm Quandong suitability for forestry in tropical regions have also been established in both the Solomon Islands and Papua New Guinea. Results to date are positive.

— ***Marek Lubomski***, Vitroplant. Phone 07-5525 3023.

[Q Ed: Blue Quandong is not related to West Australian Quandong, *Santalum acuminatum*, although the pitted seeds are quite similar in appearance].

Subtropical Farm Forestry: <A1920>

18 year old Blue Quandong in Brisbane

Tissue cultured Blue Quandong ready for planting

[Australian Timberman / 1998 May]

Quality timber species found for harsh, saline environment

Historically, it has been a struggle to grow commercial plantations in the southern low-rainfall areas of the Murray-Darling Basin. Revegetation attempts have experienced considerable failure in this drought, salinity and reduced biodiversity-plagued region.

Major commercial species traditionally grown in high rainfall regions are no match for the harsh Murray-Darling district. The terrain, damaged by decades of tree clearing and agricultural activities, provides a severe and often impossible environment for species accustomed to more agreeable conditions.

The imperative of individual landowners, forestry groups and the Landcare movement to revegetate the district has been significant, but the question remained - how could plantations exist in an area vexed by such problematic conditions?

CSIRO researchers appear to have found the answer in the discovery of species able to withstand formidable droughting and dryland salting.

A recent study funded by the Forest and Wood Products Research and Development Corporation in conjunction with the CSIRO established the resilience and durability of three varieties of eucalyptus that fit this description — sugar gum (*E. cladocalyx*), spotted gum (*E. maculata*) and red ironbark (*E. sideroxylon*).

According to research scientist Gary Waugh, the most exciting news for industry lies not only in the fact that they can endure the tough conditions, but that they have the capacity to ultimately produce a high quality wood

"Of the four species we looked at, three surpassed our expectations in terms of quality of wood", he said "When benchmarked against existing major commercial species, these trees were in front in their ability to produce clear wood and to handle existing sawmilling and drying technology."

"The three species were much easier to dry than the ash regrowth resource in Victoria and all provided a higher quality wood on a shorter rotation".

Mr Waugh said the three species would be a step towards assisting the Landcare movement in combating the salinity problem in the district while providing the timber industry with a high calibre wood product.

"We've come up with a species that will provide Landcare values and a product at the end of it", he said "We are confident these species will provide a future resource. What we have to ensure is that the right silvicultural process is put in place. But given the fact that the trees we have done our work on have basically been grown through neglect — put in the ground and let go — we are looking at the worst case scenario and we can only improve.

¥

Australian Timberman: <A1939>

WANATCA Renewal Ballot winners

Congratulations to the two WANATCA members who won free memberships for early renewal of their membership.

The winners are M & A C Selby, of The Nut Grove, Albany (members since 1994), and I & P J Hollings, of Kewdale (members since 1993). Both renewed before January 1 for 1 year, and win a further year of free membership. They have the choice of extending their own subscription or giving a gift membership to someone else.

The winners were chosen by the WANATCA membership computer, using a random number generator function.

[Australian Plants / 1998 Sep]

The tree with the stone on the outside

The Tasmanian tree known locally as the Native Cherry looks nothing like a cherry tree; it has more the appearance of a Cypress or Casuarina but it is not related to these trees either. It is also a partial parasite on other plants but it is not a mistletoe, although it is a distant relative.

Exocarpos cupressiformis is a member of the Santalaceae family, along with Sandalwoods and the Quandong, a tree of arid Australia with edible fruits of some commercial potential. The family is widespread in temperate and tropical regions throughout the world.

There are 10 *Exocarpos* species in Australia and all but one is endemic. Tasmania has 5 species but *E. cupressiformis* is the most widespread and obvious species. It is an understorey tree of open Eucalypt forest and woodland in the eastern two-thirds of the state, often in the drier and better drained situations. If you are fortunate enough to live in a wooded area with existing *Exocarpos* trees, protect and keep them, and value them as they are quite beautiful and ornamental trees. You will be unlikely to reestablish them once they are gone.

In appearance it is very cypress-like, hence the specific name 'cupressiformis'. It has many upright branches but the outer branchlets become pendulous in mature trees giving a soft graceful appearance. The branchlets are usually a yellowish-green often with bronze toning but the actual leaves are reduced to small scales. The cream flowers are minute, in short spikes.

An unusual characteristic is that although the fruit is a globular nut about 0.5 cm in diameter, the stalk of the fruit swells, becomes succulent and turns bright red and this has led to the common name of Native Cherry. It is said to be a tasty little morsel which was much sought after by the local aboriginal tribes and the early settlers and is still eaten by a number of native animals and birds. The generic name Exocarpos means—'exo' outside, and 'carpos' fruit, referring to the nut or stone being outside the fleshy part of the fruit.

Exocarpos is a root parasite, as are many members of the Santalaceae family. The roots develop a specialized organ called a haustorium which grows out from the root and attaches by means of suckers to the roots of nearby host plants. It penetrates the roots of the host without causing damage or injury and obtains nutrients direct from the host. It uses other woody plants as hosts and not non-woody plants such as grasses or lilies.

Exocarpos is not an obvious parasite and does not usually adversely affect the surrounding vegetation that it is using as hosts. This is no doubt due to its wide host range; its roots appear to attach to many trees and shrubs including Eucalypts. If Exocarpos was transplanted along with an accompanying host plant it usually survived, but those

transplanted without a conjoined host plant usually died within a few months.

They have great potential as ornamental plants but problems of propagation have to be overcome. Sowing fresh seed must be done with a suitable host plant. There has been limited success with stem and root cuttings. This is an ideal project for plant propagators. Native Cherry can then be grown as a specimen tree or a multi-trunked copse encouraged by a little root pruning.

— Philip Milner

Australian Plants: <A1059>

How sterile is Vetiver?

Member Jenny Mackintosh sent in some shoots of Vetiver Grass which had flowered and formed seeds in December, 1988. She says:

"My clumps of Vetiver Grass started flowering after slashing [in September].

I have sent one to Penny Hussey at CALM to see if they can determine whether it is sterile or not".

Pat Scott once produced a single Vetiver plant which she had grown from seed of her own plants.

The clone of Vetiver which is widespread in Australia is said to be sterile, but it appears as if "almost sterile" might be a fairer description.

In any event, there have been no reports to date of Vetiver spreading noticeably apart from its natural slow expansion via runners.

Anyone with more information might contact Jenny on 08-9572 1697.

West Australian Nut & Tree Crop Association (Inc)

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CALENDAR OF FORTHCOMING EVENTS

Deadline for next issue: Apr 20

1999		
Feb 16	Tue	General Meeting (Zora Singh - Ber & Jujube/Ber: Fruit Tree or Weed?)
Mar 27	Sat	§Festival of the Trees (Men of The Trees) - Hazelmere
Apr 13	Tue	Executive Committee Meeting
Apr 17	Sat	*Balingup Small Farm Field Day
May 18	Tue	General Meeting (?Kellie-Jane Pritchard - Growing Bush Foods in WA - Where are we at?)
Aug 17	Tue	General Meeting
Nov 16	Tue	General Meeting
2001		
May?		ACOTANC-2001 Conference, Perth

*General Meetings are held starting at 7.30pm. ***Venue: Theatre Room, Kings Park HQ, West Perth.***
These meetings usually include a current magazine display.
• Event with WANATCA participation; § For contact details refer to the Tree Crops Centre.

Current Subscription Rate: $50.00 per year
(includes all publications for the year). Student Rate: $25.00

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