

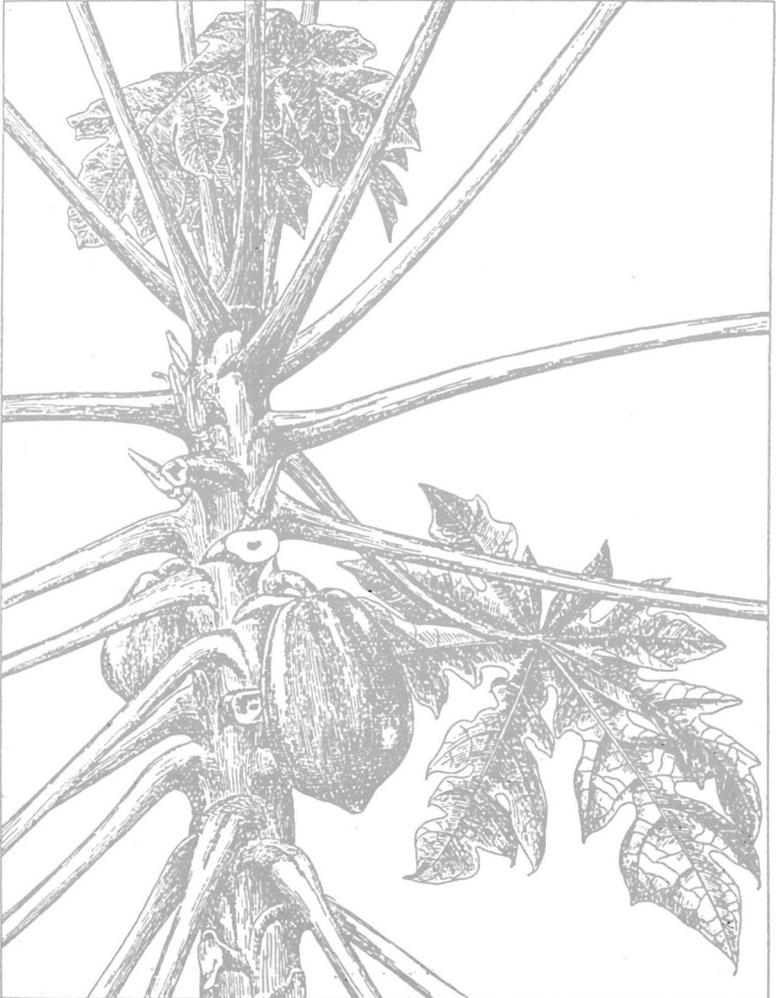


# Quandong

magazine of the  
West Australian Nut & Tree Crop Association (Inc)

**First Quarter 1998 • Vol 24 No 1**

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The Papaya or Pawpaw (*Carica papaya*) (See: About the Cover, p. 2)

Quandong • First Quarter 1998 • Vol 24 No 1

## NEXT MEETING: Tuesday February 17: 7.30 pm

We have WANATCA's own **Neville Shorter** giving a presentation, on:

### Developments in WA Fruitgrowing

Neville Shorter, one of WANATCA's longest-standing members, was a mainstay of the old Division of Horticulture of WA's Department of Agriculture, before his retirement some years ago, and was particularly valued for his practical, hands-on extension work with fruit and nut growers. He wrote many of the Department's technical notes, on topics such as cherries, pecans, and almonds.

Since those days, there have been major changes in the way such services are provided (or not provided), plus some basic technical changes in areas such as varieties, new crops, and the use of chemicals. Come and get an update on what's new.

*Venue: Kings Park Theatre Room. Full details on attached leaflet.*

*No charge to attend. Visitors welcome. Queries to Tree Crops Centre, 9388 1965.*

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## About the Cover

The cover illustration shows the Papaya, *Carica papaya*, from J. J. Ochse's classic 1926 book *Indische Vruchten* (See article p. 16). Often called Pawpaws in Australia, these short-lived plants from South America produce fruits which are not only good for eating, but have a range of medicinal and pickling uses.

*Material appearing in Quandong is the views of the authors. It is offered in good faith, but neither WANATCA nor Quandong take any responsibility for any use of this material.*

[WA Horticulture / 1997 Nov]

## Quality WA avocados have high cost inputs

An avocado is on the tree for 12 months, and that, in part, explains its relatively high cost, according to a leading WA grower.

Alan Blight manages Avowest in Carrabooda, north of Wanneroo, with owner Nola Washer, and firmly believes the workload needed to produce quality avocados warrants the high price.

“When you realise that an avocado is on the tree for a much longer time than, for example, a peach, you begin to understand its price structure,” he said as he showed a group of media representatives through his property last month.

“And you need to keep in mind that during those 365 days the weather is often very inhospitable.”

Peak production of trees also took a relatively long time — nine years — although some harvest was available after three years.

But the good news is in the longevity of the trees — many productive trees throughout the world are recorded as being more than 90 years of age.

Some Hass variety trees on the Washer property were planted in 1932 and only pulled out when jarrah dieback [Phytophthora] — a common problem for avocado growers — was detected on them.



*Happy grower: A proud Nola Washer with some of her premium produce. Picture: Ken Maley.*

### 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 and phone numbers, also fax, e-mail, and web page details where available.

Quandong: Atcros ref. <A1466>.

## AVOCADOS AT A GLANCE

**Production:** Australia produces 20,000 tonnes of avocados a year, 7 per cent from WA.

**Consumption:** WA consumes 600 g of avocado per head a year.

**Harvest:** Avocado trees produce after three years and reach their peak at nine years.

**Ripening:** Avocados mature on the tree but will not ripen until they are picked.

**Export:** Less than 1 per cent of the total Australian crop is exported.

**Growing area:** WA's broad climatic conditions allow avocados to be produced in a range of geographic conditions, from Carnarvon in the north to Pemberton in the south.

**Varieties:** **Fuerte:** a pear-shaped fruit with a smooth, dark green, glossy skin. **Sharwil:** oval shaped and does not have the neck of the Fuerte. **Hass:** smaller and rounder and the skin, which is quite rough, turns purple-black on ripening.

"Really, you only pull out the trees when they are superseded by a new variety," said Nola Washer. "But this has not yet happened, nothing appears to be superior to the Hass variety."

Picking, packing, and transport methods originally used by the Washer family have been slowly changed to meet the needs of Safe Quality Food (SQF 2000) production.

As WA Avocado Growers Association president Ron Hansen explained, food safety was becoming a real issue in 1997 —the Garibaldi salami poisoning and the Kraft peanut paste scare contributing to the push towards quality assurance.

An integral part of the Agriculture WA-developed SQF 2000 program was food safety,

and prominent WA avocado growers were keen to adopt the system, he said.

In association with eastern States growers, WA avocado producers were developing a generic manual for those who wanted to develop a QA system.

Rob Cavallaro, fruit and vegetable buyer with retail chain Woolworths, said indications were that soon retailers would only accept QA produce. Woolworths, like all retailers, wanted not only a guarantee of quality but also food safety, he said.

-----  
Nola Washer, Avowest: Atcros <A1269>

WA Avocado Growers Association:  
Atcros <A1070>.

### Harvest seasons for avocados

Variety	Area	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Fuerte	Carnarvon	XX	XX	XX	XX								
	Metro			XX	XX	XX							
	Pemberton												
Hass	Carnarvon			XX	XX	XX	XX						
	Metro					XX	XX	XX	XX	XX			
	Pemberton									XX	XX	XX	XX

[*The Orchardist* (New Zealand) / 1997 Nov]

## Aussie apple 'a winner'

**Nurseryman Andy McGrath, of Cambridge, New Zealand, is releasing worldwide a new Australian apple which he believes is a winner.**

But it has been a battle of David and Goliath proportions to get Plant Variety Rights for Pink Kiss™ (Pink Rose), a mutation of Cripps Pink.

Andy says Pink Kiss™ is sweeter, pinker and earlier maturing than Pink Lady™ (Cripps Pink), with growing characteristics which mean cheaper tree management and greater returns to growers.

"It's an excellent mutant in so many ways. I would say it's as big an advance from Cripps Pink as Royal Gala was from Gala. It is so improved it will make Pink Lady™ into the Old Lady."

Trading and developing new varieties is nothing new for Andy McGrath, who regards it as an integral part of McGrath Nurseries Ltd.

The application for a Plant Variety Right for Pink Kiss™ led to long and controversial legal action from the Australian originators of Cripps Pink — the West Australian Department of Agriculture (WADA) — who saw their royalty income threatened by Pink Kiss™.

Cripps Pink was bred in West Australian desert regions and required growing conditions out of the range of many of the world's major apple growing areas. It has been grown commercially in New Zealand for about five years.

As a late maturing apple, it can't be successfully grown in the north of the Northern Hemisphere or too far south in the Southern Hemisphere or in high altitude apple growing regions..

"In New Zealand Cripps Pink can be grown in Hawkes Bay but it won't mature in Canterbury. In USA, it can be grown in California but it won't mature in Washington. It is so late that I believe one year in 10 it may not mature at all, even in apparently safe regions.

"Pink Kiss™ matures 10-17 days earlier and that makes a big difference. It can be grown in Canterbury, or Washington or the major apple-growing areas of France and Italy.

"Pink Kiss™ fixes all the faults of Cripps Pink. It has the same acid level, same starches and same storage life but it is sweeter due to higher sugar content at maturity. This makes it a much tastier apple from a consumer's point of view and is therefore more saleable at retail."

From a grower's perspective, the Pink Kiss™ tree has a different leaf shape, flatter branch angles and a slightly weaker growth habit which makes for easier management. In addition Pink Kiss™ has a bright pink colour and will even colour in the shade - unlike Cripps Pink.

"With Cripps Pink, 50 percent of the fruit has more than 50 percent colour. With Pink Kiss™ more than 85-90 percent of the fruit has 50 percent colour or more. This means much more fruit is packed which translates to higher profits for growers."

The Pink Kiss™ mutation was discovered in Batlow, Australia by New South Wales orchardist Johnson Bowden. Sensing the potential, he immediately started testing the

mutant variety and contacted Andy McGrath about world distribution rights in 1993. Neither had any idea of the challenges they would face from WADA, a Government department.

"It has been a long battle to obtain plant variety rights and extraordinarily controversial," Andy says.

WADA feared that Pink Kiss™ would replace Cripps Pink. Applications for Australian plant breeders rights and PVR protection were stalled for more than three years by on-going legal action.

"They tried everything, including using blocking trademarks worldwide. They could have won very easily but for the determination of Johnson Bowden to see his superior variety on the market.

"Pink Kiss™ was sufficiently different for it to have its own patent. In addition to the trademark war, it needed to be proved that Pink Kiss™ was distinct, homogenous and stable. Now the battle is finally over and the variety has Australian Plant Breeders Right number 894.

"The whole process has taken nearly four-and-a-half years and a huge financial commitment from Johnson Bowden. A small grower just could not have funded this sort of legal fight. A Plant Variety Right should not take this length of time or expenditure to obtain," he says.

In the meantime, Andy gained provisional protection for Pink Kiss™ in New Zealand, and will be selling the tree with a \$1.50 royalty, which he says is fairer than some of the new higher royalties that are appearing in New Zealand.

"We want to improve the profitability of our orchard clients with this variety and we don't believe a higher royalty would achieve

that or be in their best interests."

Overseas the variety will be released in Europe, USA, Chile and South Africa. Licensees have been appointed and marketing strategies already arranged for Pink Kiss™ production.

Export opportunities for the fruit also look good because northern countries like England, Belgium, the Netherlands, Germany and Scandinavia do not have the right climate for late maturing fruit but the flavour is very much to their taste.

"In terms of potential to create plantings and profit for growers worldwide, I would say that Pink Kiss™ is the most rare and significant find for some years," Andy says.

— Alison Kay

The Orchardist : Atcros ref <A1759>.

Andy McGrath, McGrath Nurseries Ltd:  
Atcros ref <A2929>.

## Gourmet Fruit & Nut Trees

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**<A3092>**

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NSW 2569

[*Countryman* / 1997 Nov 27]

## Waroona ideal as an olive growing region

As an expert on olives, Luigi Bazzani knows what factors ensure a successful crop of his favourite food.

Mr Bazzani, who says his every meal — apart from breakfast — includes olive oil, believes the Peel region [80 km south of Perth] is ideally suited to his favourite crop.

Although well known as the proprietor of Olea Nursery at Manjimup, Mr Bazzani also has an outlet at Waroona run by his daughter Linda and son-in-law Chris Reeves.

He said Waroona was particularly suited to olives. "Waroona is warmer than Manjimup and is on sand — olives love sand," he said.

Trees grown at Waroona are predominantly new varieties, although Mr Bazzani is not yet convinced Australia has the most suitable options available. The trees at Waroona are grown mainly for propagation.

Trials are also an integral part of the nursery and new varieties are sourced from throughout the world by Mr Bazzani. "I believe the best varieties are still in quarantine," he said.

Mr Bazzani's observations about the area are shared by Agriculture WA and the Peel Development Commission which both believe in the viability of olive farming in the area.

The two agencies have produced information sheets on the potential of the Peel region to develop an olive industry. Their investigation was prompted after several expressions of interest from farmers within the region looking at the possibility of diversifying into the crop.

In October, Agriculture WA advertised for expressions of interest from people interested in joining a Peel region olive growers group.

It was proposed the group would be the manager of a feasibility study into assessing



*Luigi Bazzani: big future for olives in Peel region.*

the Peel olive potential and would be part of a study group which would undertake field trips, study tours and sell the Peel as a new olive region.

On October 20 the Peel Region Olive Growers Group was formed at a public meeting in Mundijong, after a series of presentations by experts in the olive industry, including Dr Stan Kailis (horticulture faculty, UWA), Ian Rowe (vice-president Australian Olive Association), and Richard Taylor (new industries program, Agriculture WA).

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 Atcros references: Countryman, A1151; Olea Nursery, A1430; Peel Region Olive Growers Group, A3141; Stan Kailis, A2877; Australian Olive Association, A2759; Richard Taylor, A1481.

### Honeybee Pollination Increases crop yields

Contact the W.A. Pollination Association Inc  
 (A1940) for Beekeeper pollinators  
 Ph (09) 450 2912 or (09) 276 7847

[Olive notes (Uni California-Tulare County Coop extension) / 1997 Jan]

## Tips on managing olives

### Manage Pruning

Pruning removes flowers/fruit. Delay your pruning this year until the bloom can be readily observed, then prune accordingly; that is, if bloom is light, prune lightly to preserve as much of it as possible. If a heavy bloom occurs, prune more to accomplish some thinning. If you prune before bloom can be observed, you may unwittingly remove what little crop was there.

Note: To minimize alternate bearing, do your heavy pruning prior to the "on" year. This thins fruit and stimulates shoot growth that will bear fruit in the "off" year. On the other hand, pruning heavy prior to the "off" year, with the thought that fruit removal will be minimal, is a mistake; although fruit removal is certainly less, shoot growth is greatly stimulated, further increasing potential for an overcrop in the on year. Such a strategy aggravates alternate bearing.

### Manage Bloom Development

Flower development begins 2 months

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before bloom, mid-February.

Any stress (e.g. lack of nitrogen, water stress, black scale, etc.) that occurs during the 2 month developmental period, prior to full bloom, will affect flower cluster development and increase the percentage of imperfect (male) flowers in the inflorescence, reducing crop potential. Fertilize and ensure trees have available water throughout flower development and bloom period.

### Manage Pollination

In light crop years we need to set every flower possible. Manzanillo flowers demonstrate a degree of self-incompatibility; that is, normal fruit set can be limited and excessive shot berries produced if the only source of pollen is its own i.e. Manzanillo.

Sevillano is the preferred pollen source for Manzanillo. (Ascolano and Mission pollen are poor sources of pollen.) The best situation is to have Sevillano trees as pollinizer in a Manzanillo orchard (approximately 200' apart). Often, however, such pollinators don't exist; the Manzanillos are planted in solid blocks.

When this situation occurs, supplemental pollen application has been shown to increase normal fruit set and reduce shot berries. This practice should be considered, especially when there has been a history of poor fruit set and heavy shot berry crops (30 g of Sevillano pollen applied 4 times during the Manzanillo bloom in our experiments produced successful results).

Ultimately, it will be important to put in permanent pollinizer trees to maximize production.

**Manage Harvest**

Light crops mature and “colour up” earlier than heavy ones. This past year, general maturity was late in those heavier cropped orchards providing flexibility in harvest timing. If a light crop develops this next season, such flexibility won't exist.

Considering the above “tips” will ensure maximum cropping.

—*G. Steven Sibbett*, Farm Advisor, (209) 733-6486.

[Steve Sibbett will be speaking at the Olive Conference mentioned below].

-----  
[*Australian Olive Grower / 1997 Nov*]

## Australian Olive Conference

Plans are coming together for an exciting two day conference designed specifically for olive growers with trees less than four years of age. To keep costs at a minimum, the conference is being sponsored by Olives Australia and the theme is “Orchard Management for Early Yield and Maximum Quality”.

The International speakers who have been invited are Steve Sibbett (Olive Farming Consultant, University of California USA), David Goldhamer (Olive Orchard Irrigation Specialist, University of California - USA) & Sjef Lamers (Soil Analyst for Sustainable Nutrition - NZ).

There will also be a panel of Australian speakers discussing topics such as site selection, land preparation, weed control, pruning, fertilising, irrigation, pest management and other elements crucial to maximising orchard growth, health and crops.

Machinery and equipment companies from across Australia and overseas will be invited

to display their products throughout the conference.

**The conference is planned for the weekend of May 3rd and 4th 1998.**

Don't miss this once in a long time opportunity to hear respected International speakers, rub shoulders with hundreds of olive growers from across the country and taste some great Australian and Mediterranean cuisine.

Due to the expected large attendance, the exact location of the conference (somewhere in NSW), and other logistics are still being finalised. Location details will be published in the January 1998 journal and personalised invitations with other important details will be sent to growers, processors and marketers across Australia.

(Contact Olives Australia on phone 07-5466 1333 or via Atcros as below).

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Australian Olive Grower; <A3140>;  
Olives Australia; <A2771>.

### First Time Offered in Australia **TOCTE TREES**

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Contact Nola Washer <A1269> at  
**Avowest Nursery, Carabooda**  
Phone: 08-9407 5100 • Fax: 9407 5070

## The lucky membership lottery winners

In the last issue of Quandong, it was announced that all WANATCA members who had paid their subscriptions for 1998 or later by January 1 would go into a ballot to receive free subscriptions. The winners would receive the benefit for as many additional years as they were paid up for.

The winners were **Colin McQueen**, of Lismore, New South Wales, and **G W McShane**, of Boddington, WA. Both members had paid for one year in advance, and so will receive one year's subscription free. They have the choice of adding a year onto their own subscription, or giving away a year's subscription to a friend or colleague.

The winners were chosen by the WANATCA membership computer, using a random-number generator to select among the eligible members.

## Welcome to the Executive

WANATCA extends a very warm welcome to **Stanley Parkinson** and **Zora Singh** as new members of the Executive Committee. Both were elected at the AGM last November.

Stanley has recently retired from practice as a surgeon, we will call upon him for tips on grafting. He is developing a coastal property at Binninup, and has raised many trees using his own innovative methods. Like Exec member John Foote, Stanley comes from New Zealand — but we have promised not to hold this against him.

Dr Zora Singh is on the staff of the Horticulture Department of Curtin University, and brings with him professional expertise in the tree crops area, gained in Asia. He has promised to give WANATCA a talk sometime on Jujubes and Ber (Indian Jujube), just one of his areas of knowledge.

## WANATCA to participate in MOTT's Festival of the Trees

We would like to invite WANATCA to take a central role in promoting fruit and nut trees at our **FESTIVAL OF THE TREES** on Saturday 28 March.

The event takes place at St Barbe Grove, corner of Amherst Road and Stirling Crescent, Hazelmere from 10.30am until 4.30pm.

Our 'orchard' is quite nicely established now. There are about ten varieties of fruit and nut trees there.

Trees include: Olive, Avocado, Cherry, Macadamia, Pistachio, Date Palm, Carob, Mulberry, Sweet Chestnut, Kaffir Plum, Hungarian and English Oaks, and Honey Locust.

— *Barrie Oldfield*, President, Men of the Trees <A1344>.

## Pistachio Nut Trees

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*[The Orchardist (New Zealand) / 1997 Nov]*

*Here are details of an innovative approach to frost protection, noted by a New Zealander in Uruguay. We get closer each day to a 'global village'!*

## Moving air, Uruguayan style

**Ah, the mysteries of the ancient mandarin. In Kerikeri you can see all those little easy peelers rising up from the silver foil with tiny miniskirts on their skinny legs and it all looks rather surreal.**

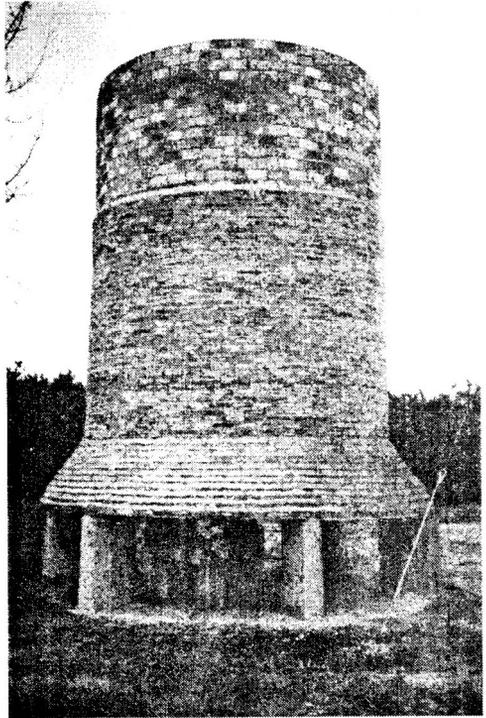
But at San Jose, Uruguay, they are sprouting nuclear reactors among their Ellendales, or so it appears.

Further investigation is required; the brickwork is absolutely brilliant, whoever built this is a craftsman and it was built to last. Inside is a massive, solid-mounted right-angle drive gearbox topped with a very large propeller, out below the flared skirt protrudes a very ordinary heavy duty PTO shaft. This is about shifting air.

Frost is an age-old enemy of many of our crops. Many growers can attest to the heartbreak of crop loss from even a solitary frost. Here in New Zealand we use wind machines and helicopters to combat the problem, in both cases the principle employed is to drive warm air down or to mix warm and cold air.

This concept is quite different and is aimed at collecting the cold air from the floor of the orchard and blasting it in a column skyward, the theory being that cold air is easier and more efficient to deal with than warm air and that by removing the cold air directly, warm air will be dragged down to replace it.

Of course ground contour is vital and the placement of the unit in frost drainage basins is critical. These units are definitely not portable. This particular orchard was gently rolling so charting the frost drainage pattern was relatively easy. How the concept would work on a flat plane may not be so clear. major benefit over other methods of frost control.



*Frost fighting installation in bricks and mortar. Photos: Colleen Becroft*

Brickies, even good ones, are not expensive in Uruguay and there is plenty of mud for the bricks. PTO shafts and right-angle gearboxes are commonplace, so it is a very basic response to a complex and potentially expensive problem. I could picture the whole thing being portable and made up from steel and fibreglass but, as the man said, "the mud is free".

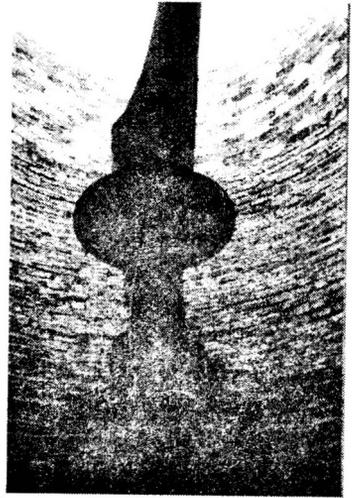
The orchard manager is more than happy

with the result, he claims a well-placed unit will control an area of up to 15 hectares, it only ties up a big tractor for a short time and is far less of a nuisance to neighbours sensitive to the noise of wind machines or helicopters interrupting their early morning slumber.

Yet I have to wonder if today's transitory orchard is a worthy home for such timeless symmetry in bricks and mortar.

— Ron Becroft, President, New Zealand Fruitgrowers Federation

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The Orchardist: <A1759>; New Zealand Fruitgrowers Federation: <A1380>.



[Land Management Society Newsletter / 1997 Nov]

## Sandalwood nuts — gourmet food

### Summary

**Increasing interest is being shown by Australian gourmet food producers in the potential commercial value of growing the WA sandalwood (*Santalum spicatum*) on farms.**

Ecotypes of sandalwood are distributed over a large geographic area in WA to which they could be planted. Sandalwood is a useful indigenous commercial tree species for catchment protection in saline areas, in partially cleared areas, or for regenerating remnant vegetation sites. Many remnant sites have suitable host species of varying ages growing, that would provide ideal planting sites for sandalwood.

The sandalwood nut has long been a minor source of food to people living and working in the bush. Kernels of the fruit can substitute for more traditional nut ingredients as a nutritious and acceptable substitute for a range of products. Two aspects of the use of the nut have been considered. The nut was used on its own as a snack food, and also as an ingredient

in prepared food. Kernels can be dry roasted and made acceptable as a snack food. Further studies on the preparation of the nut should aim at improving their subtle flavour.

### Introduction

All present day commercial nuts originate from small wild fruits that were improved by selection of outstanding specimens and by breeding. Along with the outer coat of quandong (*Santalum acuminatum*) fruits the kernel of the WA sandalwood (*Santalum spicatum*) nut has been considered attractive by many people. Natural selection within sandalwood may have resulted in trees with large nuts having been favoured by adaptive forces.

Sandalwood nuts have long been eaten by both country people and Aborigines. Both

groups have a range of products to choose from and may be considered the gourmets of the bush. A number of individuals appear partial to this naturally occurring product as a dietary item. The hard-shelled nut is usually cracked between rocks, or with a hammer or pliers. The kernel is eaten plain or more rarely, toasted on an open fire.

Nutritional values are very similar to other commercially available nuts. They have high levels of fat (61%) and are rich in protein (18%) The combined effects of earlier sandalwood harvesting and of land clearing for agriculture have led to a scarcity of the species. Formally widespread in the Wheatbelt, now sandalwood is currently harvested from the Eastern Goldfields, Murchison, North Eastern Goldfields and Central Desert, regions of the state.

It has been demonstrated that sandalwood seeds germinate well in the field after direct sowing in February - March with no pre-treatment necessary. Well grown experimental specimens are available for observation at

Curtin University, Bentley. The Department of Conservation and Land Management has established demonstration plantings in several areas. Field establishment is hindered by the need for seedlings to attach to hosts, by grazing damage from both domestic and feral animals, and by susceptibility to fire. The most suitable host is jam wattle (*Acacia acuminata*), preferably 2-3 years of age at the time of sowing sandalwood seed. Fencing is necessary if rabbits are present in the areas selected. Sheep must be excluded until plants are more than 2 m tall.

The potential market in the speciality nut trade for sandalwood is a stimulus encouraging the development of sandalwood plantations by landowners. Landowners in South Australia have commenced substantial plantings. Cultivation of sandalwood provides a source of edible nuts within 5-6 years of establishment. A valuable resource for later harvesting will accrue, adding value annually to those farm areas set aside from cropping and grazing.

#### **Sandalwood kernel composition (per 100 g) compared with other nuts**

Nut	Mois- ture (9)	Prot- ein (9)	Fat (9)	Ash (9)	Carbo- hydrate (9)	Calcium (mg)	Pota- ssium (mg)	Sod- ium (mg)	Kilo joules
Sandalwood	3.5	17.7	60.7	1.7	16.4	36	309	10	2945
Walnut	4.1	14.8	63.7	-	14.9	84	491	3	2713
Pinenut	4.3	22.0	53.9	-	16.0	12	-	-	2491
Peanut	5.4	26.5	47.9	-	17.5	57	700	4	2374
Brazil	6.6	14.0	64.5	-	11.1	181	697	1	2663
Almond	4.8	19.5	53.8	-	18.9	245	773	4	2504
Macadamia	1.9	9.0	70.5	1.5	17.2	-	-	-	-

*From Flanagan & Barrett, 1993. Data for other nuts are taken from Thomas and Corden (1977) and departmental research analyses, Home and Consumer Studies, Curtin University. Macadamia results are not strictly comparable as the nuts were commercially prepared by frying in fat.*

Growing sandalwood trees using local seed will conserve Wheatbelt genotypes and is a legitimate and value-enhancing option for management of remnant vegetation. Property owners would be provided with a source of supplementary income in the nut market and in the long term these owners would have a profitable tree crop for harvesting in the future. Individual property owners may not benefit from the sale of the wood in their lifetimes, but the value of their land will increase annually due to the presence of sandalwood trees on their property. They will leave increased assets or the next generation.

*Santalum spicatum* will grow in semi arid as well as better watered areas. This is particularly important as water for irrigation becomes scarcer and of lower quality due to salinity. As with most species, growth is slower in lower rainfall areas. The production of a fruit without irrigation in dry areas could become very important. Observations have been made of healthy individuals growing on the edges of saline areas. Many remnant sites have suitable host species of varying ages growing, which would provide ideal planting sites for sandalwood.

### Growth and yields

There is a large amount of variation in characteristics observed between the different ecotypes found within the species. These include tree form and shape, leaf shape and colour and maximum attainable height. The time of flowering and fruiting ability vary between and within different populations. The number of fruit produced and total yield of fruit per tree varies. The average nut and kernel size also varies between the different ecotypes with a general trend for larger seed to be produced in cooler, less arid areas. There is considerable scope for selection and breeding of superior genotypes.

On the Bentley Campus of Curtin University, trees have been monitored for fruit production as they come into bearing. This area was once part of a pine plantation and consists of Bassendean sand, with both poor moisture retention properties and negligible nutrient levels. In order to grow trees here it has been necessary to irrigate in the summer months. The sandalwood trees have developed well, despite the infertile nature of the soil. Sandalwood seeds were planted amongst mulga (*Acacia aneura*) trees, which serve as the main hosts. The oldest mulga trees were planted 1978-1980 and the first sandalwood trees were planted in 1981.

In a series of edibility tests, the roasted sandalwood kernel was considered to have a good to very good flavour when consumed as a snack by a quarter of the respondents. Flanagan & Barrett (1993) indicate that it was suggested by respondents that the rather subtle flavour of sandalwood nuts could be improved by curing e. g. adding spices, coating in honey or by smoking, by further preparation such as roasting then salting or by devilling. Many people showed an interest in consuming a local nut. This initial positive response and

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interest is encouraging.

### Conclusions

The use of sandalwood as an ingredient, a local alternative to more traditional nuts in cooking, is presently limited by the availability of sufficient quantities of nuts. This suggests that gourmet products will be first up. Trials with sandalwood kernels in cooking have presented few problems. Sandalwood can replace equal quantities of peanuts with little, if any, discernible alteration of flavour or nuttiness. The advantages with sandalwood lie in its uniqueness, historical connections and that it is a local, natural product. The

rather mild taste of the sandalwood kernel may require subtlety in preparation for the kernel flavour to be discerned. There are opportunities for people to develop packaged products similar to a range of other "bush tucker" fruits already available to tourists.

[Adapted from an article by Prof J. E. D. Fox, School of Environmental Biology, Curtin University of Technology].

Land Management Society: <A1314>; Curtin University, <A3047>; Department of Conservation and Land Management, <A1117>.

[Connected (Western Power) / 1998 Jan-Feb]

## Prehistoric tree discovered

**Scientists based at Kings Park & Botanic Gardens have discovered what is possibly Australia's oldest, rarest and largest gum tree in the State's Southwest.**

The tree, named the Meelup Mallee, is thought to be 6,300 years old.

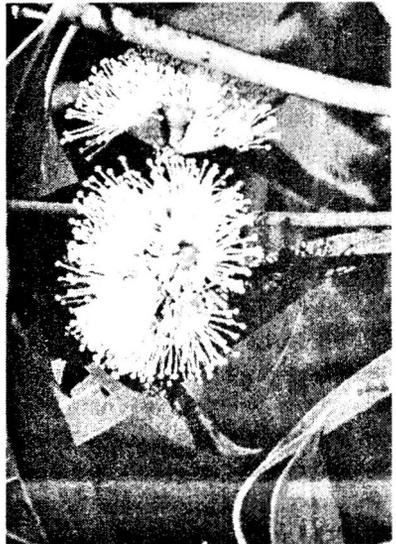
Using methods similar to forensic botanists, the scientists have extracted DNA samples from the tree, in a location near Busselton.

Efforts are now underway at the Kings Park laboratory to conserve the plant by using the latest in tissue culture technology for cloning.

The first successful tissue cultures have been obtained and researchers are attempting to regenerate whole plants as well as freezing samples in liquid nitrogen to ensure the long term protection of the species.

Scientists originally thought the tree was a collection of individual plants, but discovered they were looking at 77 stems of the same plant, measuring in total nearly 30 metres in diameter.

The discovery of the Meelup Mallee came as a result of the Western Power Endangered



Species Rescue Program. The program, supported by Western Power since 1995, aims to reintroduce endangered plants into protected sites.

To date six rare orchids, two wetland plants and two shrubs from the Perth metropolitan area have been rescued. Four endangered eucalypts in the program come from country locations.

## Papayas in Perth: Too much of a good thing?

The fruits called pawpaws in Australia, but Papayas (*Carica papaya*) in most of the world, are not hard to grow in Perth, with a few precautions.

They are most easily grown from seed, and the seedlings are usually a mix of males and females. Snails will attack small seedlings. The most important precaution, however, is good drainage; this is not usually a problem in Perth sand, but if in doubt, grow in a raised sandy bed. Adding dolomite or lime is said to promote growth. The plants can fruit early (18 months), but do not have a long life, 3-5 years usually. They prefer a sunny spot, with some wind shelter.

I had a plant in my yard which grew and flowered quite well, but set very little fruit. I had another plant, a male, about 20 metres away, and decided to try hand-pollinating the female, just pulling off a few male flowers and touching them to the females.

Results were dramatic. Virtually all hand-pollinated flowers set and developed into big fruits (see photo), which ripened well in warmer weather to give tasty products. I had it made.

That was, until I came out one morning, and the whole plant had fallen over on the ground — papayas have only small shallow roots, and the weight of fruit was just too much for them.

I propped the plant back up again and



secured it to a pole, and most of the fruit already formed did ripen. But it was the end for the plant — the new leaves were very small, and after a while it just gave up.

— David Noël

[Permaculture West / 1997 July]

### Animal repellent for protecting young trees

This recipe was in a "Greening Australia" pamphlet many moons ago. It has worked most effectively for us on our 300 *Acacia melanoxylon* (Tasmanian Blackwood) which are a part of a mixed plantation down in Denmark.

**Beat 5 eggs; mix together with: 600ml water and 150ml acrylic paint.**

Although the recipe said spray on, we merely painted the trunks which had been badly barkstripped by roos. The trees, as far as we could tell, were never touched again by the kangaroos and continue to grow with great resilience.

— Margaret Leslie

[HRDC Research Report 1996-97]

## Improving almond varieties

**The Australian Almond Grower's Association is embarking on an innovative research program using genetic fingerprint techniques to identify desirable characteristics for improved varieties of almonds to grow in Australia.**

Currently, the world almond industry depends on the almond variety, 'Non Pareil' and its close relatives 'I X L' and 'Ne Plus Ultra', bred in California almost 120 years ago. These varieties produce attractive, high-quality almond kernels of the desired golden brown colour.

However, these varieties are self-sterile and need to be planted with less desirable pollinating varieties to produce commercial crops. This means up to half the trees grown in an orchard are of an inferior type and will fetch lower prices than the desired varieties.

The second problem this project addresses is the difficulty rootstocks have tolerating Australia's shallow alkaline soils, saline water and soil-borne diseases. Research is in collaboration with the Australian Research Council, Adelaide University and the South Australian Research and Development Institute.

### Boosting Australia's almond industry

California and Spain dominate the competitive world market for almonds, which is a high value product that stores and transports easily. Australia produces 0.8% of the world production worth an estimated \$40m a year, but could boost production by 40% with the development of a self-fertile high-quality variety of almond. The elimination of mixed variety planting would increase orchard efficiency and reduce production costs by reducing the need to spray and harvest each variety separately. The Australian almond industry would also possess the most advanced

plant material available, worth millions of dollars in royalties on the world market.

### Tailor-made almond trees

Researchers are seeking to insert genes into desirable almond varieties that will produce self-fertility, increase disease resistance, and improve the range of rootstocks suitable to Australia's variable soils and climatic conditions. It may even be possible to tailor-make almond trees to suit the growing conditions of each individual property.

Further information: Contact Prof Margaret Sedgley, Ph (08) 8303 7248, Fax (08) 8303 7116, email msedgley@waite.adelaide.edu.au (Project No. NT603).

HRDC: Horticultural Research & Development Corporation, <A1252>.



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[*Countryman* / 1998 Jan 15]

## New essential oil source in WA Melaleucas

Landcare advocate Ian Pulbrook, of Morawa, has discovered a salt tolerant Melaleuca tree which could provide a return for growers harvesting the oil in its leaves.

Working with Agriculture WA and Murdoch University, Mr Pulbrook plans to trial a variety of Melaleucas for growth rates and salt tolerance to identify the best Melaleuca variety for tolerance, vigour and oil production.

Surviving trees would be tested for their oil content. A local Melaleuca tree stand discovered by Mr Pulbrook produces high-quality oil with a three per cent oil-to-leaf content, which compares very favourably with the oil mallee which has an accepted average of about 2.8 per cent.

"Melaleuca, as a native plant, grows abundantly naturally in drainage lines, on valley floors and in waterlogged areas," he said. "It is often the last tree surviving when ground is affected by salinity.

Mr Pulbrook said the Melaleuca was suited to a far wider range of saline areas than the oil mallee. "We have found that oil mallees are growing well on fresh water but not going so well when they tap into the saline water tables," he said. "They do not grow particularly well on saline ground, which is where we desperately need a commercial tree option."

As a farmer he had always been interested in growing trees for conservation and started a small nursery on his farm to culture his own seedlings. It was not long before he was providing seedlings for his neighbours. When demand really started to pick up in 1995 he moved to Morawa to establish the Green Oil Nursery which now produces 600,000 tree



*Ian Pulbrook (centre) with some of the Green Oil Nursery staff. Picture: Jenne Mannion*

seedlings annually. Since then the business has planted more than 1.7 million trees in the area and Mr Pulbrook won the Greening WA 1995 Earth 2000 Readers Award.

Another area in which Mr Pulbrook is leading is in Jojoba plantings. He said a 20 hectare trial will be planted this year at Morawa in conjunction with Wagin farmer Greg Ball, who owns plant variety rights for this species.

Mr Pulbrook said there was a lot of interest in this tree, which has the potential to yield at least \$8000 a hectare from its oil, used in cosmetics as a replacement for whale oil.

"These are not tolerant to waterlogging and must be planted on the mound but the idea here is to use water from seepages in other areas to irrigate these trees," Mr Pulbrook said.

— *Jenne Mannion*

Atcrossrefs: Countryman, <A1151>; Green Oil Nursery, <A3152>.

## Growing Chestnuts in Western Australia

**Before I begin, let me say that my wife Janice and I, while we are registered chestnut growers, are not what you would call experts.**

When we planted our first 50 chestnut trees on our little property in tall timber country back in 1988, we had never even tasted a chestnut. And apart from being keen suburban backyard growers of vegetables, flowers and the odd lemon or almond tree, neither of us had any orchard experience.

We bought our first 5.5 acres near the tiny timber town of Dwellingup, because it was so beautiful there, and also Janice was actually born there. And while we were building our house there, in the middle of state forest, we started to wonder what to grow on about an acre and a half of semi-cleared land.

Let me explain that Western Australia is an area of approximately a million square miles, almost half of the Australian continent. Weather conditions range from hot monsoons in the north, through vast expanses of desert, to grazing and wheat lands. In the South West, south of the State capital of Perth, there is a cool, high winter rainfall area, ideally suited to cool weather horticulture. At Dwellingup, we can get down as low as minus eight Centigrade, which is about 13 Fahrenheit, and the winter rainfall is about 60 to 70 inches. So it's cold and wet in winter, hot and dry in summer.

Why chestnuts? We decided against the faster-money crops of the day, cherries and nectarines, for a number of reasons. Foremost was the great number of native birds in the surrounding forests. We've identified more than 50 bird species on our block. A number of these are fruit eaters, including several colourful parrots. Other orchardists shoot parrots by the thousand.

Being bird lovers we were looking for something that would defy parrots beaks - and the spiky chestnut burrs have certainly been the answer - so far. But we were also encouraged by the fact that Western Australia's supposedly oldest chestnut tree was growing near Dwellingup, and at the time was producing an average of \$1000 of chestnuts each year - even though the nuts were quite small.

Back in 1988, large chestnuts were not plentiful in Western Australia, and the Southern European folk who seemed to like them so much, were paying up to \$20 a kilogram - 2.2 pounds to the kilogram - for good sized nuts. We figured we were going to make our fortune - three hundred trees, 10 kilos per tree after 10 years, 3 metric tonnes of nuts, \$60,000 a year - plenty to retire on. And that was our plan.

Well, this year, eight years after we planted the first 50 of our 300 chestnut trees, we harvested 70 kg of nuts, and we sold our first 50 kilos, at an average of \$5.50 a kilo. And we were delighted. We read somewhere in "The Nutshell", the nutgrowers' motto is, "Well, there's always next year."

Fortunately, there's always other growers too, and it was always encouraging to catch up with them, and to learn from their successes and mistakes, and to find out, often the hard way, that every person's patch of dirt is different, and that you have to work out your own dirt and what grows there, often through blood, sweat and tears. Janice and I have both had full time city jobs, so our farm labouring has been mostly on weekends and holidays.

Compared with the flourishing industry

over in Victoria, on the east of Australia, Western Australia's chestnut growing is on a much smaller scale. In the West we have about 14 or 15 commercial-size chestnut growers in Western Australia, and I'm talking about people with 100 or more trees. Between us, we produce about 50 tonnes of nuts a year, all of which is consumed by local markets, though one canny friend of ours on our south coast grows organic chestnuts, and sends them to the eastern Gold Coast, to feed the Japanese tourists. At one time, he was getting a dollar a nut.

One of our inspirations has been Tony Fontinini's chestnut orchard at Manjimup, in the State's deep south, where Italian settlers brought their chestnut stock with them at the beginning of the century. Manjimup has an annual chestnut festival, at which Italian, Spanish and Portuguese families arrive by the

busload - the wisdom being they don't have to drive home, as the favourite wash-down for roast chestnuts is a raunchy red wine, mostly home-made.

Tony Fontanini's chestnut orchard is set up with big parking bays for the cars and buses, a huge gazebo with a dozen or so fireplaces, and benches and lawns. The people wander through hillsides of chestnut trees with buckets and stout shoes. They pick up what they want, pay for them, roast them and eat a lot of them right there, with much singing, and squeezing of accordions.

Tony told me later the chestnut orchard was only a tiny part of his family's huge fruit and vegetable growing business. The chestnuts had never been marketed in the normal way. That year Tony estimated the tourists and visitors had picked up and paid for 20 tonnes of chestnuts, and he reckoned there were still 5 tonnes lying on the ground that were never picked up.

Over the years, other growers have shown us how to graft trees, store nuts, rub them with canola oil to keep the shells shiny, and given us various hints about fertilising, irrigation and diseases. Unfortunately, there was also some misleading information, not so much from the growers, which led us into a few pitfalls.

For example, initially we were told to put nothing in the hole but the bare-rooted tree, and to follow up with only low drip-line surface dressings of superphosphate in the first year. Well, the soil on our cleared acre and a half was so impoverished, the cape-weed flowers were pinhead size instead of two-or three inches across, and the clover was like a fine moss. Drip line dressings were useless, because there was virtually no summer rain to make the trees drip. The soil was so

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poor the trees could not even take up the prescribed trace elements. For two or three years, we wondered if we might have the world's first bonsai chestnuts. Incidentally, now we put a kilogram of superphosphate in the bottom of each new tree hole.

Then, just as our chestnut trees were starting to look good, they caught a winter fungal disease called *Monochaeta*, which we believe originated from our neighbour's border of fir trees. We lost one hundred chestnut trees in our original paddock of 150. Their branches became all pimply, and they just died from the tips down. It was heartbreaking, though by this time we had purchased adjoining land, expanding our holding to 16 acres, and had just planted another 100 trees.

Most of the trees that died were already 10 and 12 feet tall. I had to chainsaw them down and cart them off to be burnt. Shortly before that the house had been badly burgled while we were in Perth. They took \$7000 worth of household and farm equipment - fridge, woodstove, generator, mower, chainsaw, radios. They even pulled the submersible pump out of the bore, our only source of water - right in the middle of a hot, dry summer. Thankfully, we were covered by insurance, and we had some wonderful friends who came to our help.

We thought seriously of quitting, but instead built a large shed - more like a barn with caretaker facilities and a 22 ft caravan alongside, and today our caretaker lives there all the time.

That summer, nearly all the stumps of the dead chestnut trees began sending up suckers. The roots hadn't died. We selected the strongest suckers, trimmed off the rest, and after they had wintered and started to sprout again, we had them professionally grafted

using scion wood we had cut from our best trees during the winter. That was two summers ago.

This autumn, which in Australia occurs in April and May, we collected our first beautiful big nuts off those grafted suckers. And thanks to the experts who showed us how, I now do all our own grafting with better than 90 per cent success.

After those hundred trees died, we noticed a clump of healthy looking trees round the goose pond - a ten-by-ten square of black plastic in a dug-out trough, fed by the automatic irrigation. These trees had not only escaped the disease, but were bigger and healthier than the rest. We figured all that rich duck water was giving those trees what they needed to beat the *Monochaeta*, and so we began searching for a suitable liquid or soluble fertiliser we could feed through our fertigation system - this is actually an old bathtub with a supplementary 1.5 horsepower pump.

We ended up with a water soluble NPK product with trace elements called Polyfeed, produced by Haifa Chemicals in Israel, and our trees haven't looked back. However, to protect against further *Monochaeta*, the State Agriculture Department advised spraying with a nasty fungicide for which I had to dress up like a Martian and lose two stone in sweat every time I sprayed.

But I should tell you about the geese, ducks and turkeys. Our canny friend from the south coast, who grew the dollar-a-nut organic chestnuts, convinced us that our poor forest

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soils would benefit by running poultry in amongst the chestnut trees. We had already erected six-foot chicken-wire fencing on bush poles round three paddocks to keep out the kangaroos, rabbits and wild pigs, so we had some very large, ready-made poultry enclosures. We also wanted the sort of poultry that would save us mowing the grass and clover which by now was knee deep. So we started with muscovy ducks and geese in amongst our first 250 chestnut trees.

They did a wonderful job, except nobody told us geese and muscovy ducks also chew the bark off young chestnuts. We lost about a dozen trees before we woke up to these bad habits, and we had to put protective cylinders round every young tree trunk, using a variety of plastic and wire meshes.

Then an old orchardist in the hills near Perth, who with his son and daughter in law grow a unique strain of magnificent striped chestnuts, gave us two gems of wisdom. First, he said they never had any problems with winter fungal diseases, because they always pre-winter sprayed with Bordeaux, that old European mixture of copper sulphate and lime, which is so harmless to humans that in Australia it's an acceptable spray for organic produce. I threw away my Martian suit.

The other gem of information was that, to beat grasshoppers and bugs, which chew fresh young chestnut leaves in spring, we should run a few turkeys. Now we have wonderful roast turkey dinners.

Today we have five enclosed paddocks, three of them with chestnut trees, and combinations of ducks, turkeys and geese. We run chickens in a separate paddock with our domestic fruit trees - because turkeys get blackhead disease from chickens. Three of those paddocks also run free range guinea pigs or cavies - something like hamsters -

which Janice breeds in her classroom at the school where she teaches. These also do a great job grazing and have a highly nitrogenous manure.

Finally, I must tell you about our famous bore, which produces 900 gallons an hour, and that's about three times better than any other bore in our valley. Janice was planning her flower garden round the farm house, and I was being very mean and stingy about the amount of water she would be able to use.

"All right," says Janice, "I'll put down my own bore!" As I could see she meant business, I gave in. We called in a drilling contractor, picked a spot next to the main power point outside the main shed. (We don't believe in water divining - we chose the spot and asked for divine help). After 30 foot of gravel and clay he hit the quartz sand of an old stream. And in an old continent like Australia, we would be talking maybe 100 million years. There were broad layers of river sand right down to granite bed rock at 90 feet, and here we're talking thousands of millions of years.

That bore pumped 900 gallons at the start of the winter, and was still going strong when the other bores were conking out in autumn. It now connects with more than a kilometre of one-and-a-half inch black poly pipe running all over the property. It automatically waters chestnuts, fruit trees, a cut flower crop, house gardens, fish ponds, lawn, duck and goose ponds, raspberry patch, vegetable gardens. Whenever I marvel at its abundance, Janice says, "You mean my bore!"

And I just hope I haven't been one. Thank you for listening.

— *Philip Bodeker*

*(Based on a paper presented at the Northern Nut Growers Association Annual Conference, Marion, Indiana, 1997)*

# BOOK REVIEWS

by David Noël

**The Neem Tree, *Azadirachta indica*, and Other Meliaceae Plants: Sources of unique natural products for integrated pest management, medicine, industry and other purposes.** Edited by H. Schmutterer. Published by VCH, Germany, 1995. 696 pages. Hardbound. \*\$217.95.

On rare occasions in human endeavour, a single person completely dominates a topic, and if they come to write a book on that topic, that book may represent most of a lifetime's work, and also may totally dominate.

Such is the case with the book reviewed here. Although Professor Heinrich Schmutterer is modestly noted as the editor, and seven other authors are listed on the title page, the book is virtually a monument to Schmutterer.

Neem has been one of the stellar tree crops of our time. The source of a complex of natural chemicals offering outstanding insect control, but amazingly with virtually no harmful effects on mammals, fish, and even many beneficial insects, it looks to be a dream product. And this is not all — the tree itself possesses many other useful properties, especially in combatting land degradation, and as a source of timber.

No wonder that the US Academy of Sciences

characterized neem in its BOSTID book, recently reprinted in Australia, as 'A Tree for Solving Global Problems'.

Here in one massive, scholarly volume is everything you might want to know not only about Neem, but also about its relatives, such as White Cedar (*Melia azedarach*), which has many of the same useful features. Here in 8 sections and some 86 individual articles is the real goods — everything about the tree and its characteristics, the many biologically active substances it produces, their effects on the many different insect groups, on viruses, fungi, nematodes, bacteria, and vertebrates.

Particular attention is use of neem for pest management in a series of crop groups, including fruit trees. Possibilities of harmful side-effects on vertebrates and beneficial organisms are critically examined, the many uses of neem are described, and neem's place in economic, socioeconomic, and cultural life are dealt with.

The last section deals with neem relatives. As a member of the Meliaceae or mahogany family, it is no surprise that these relatives include some valuable timbers. Nor is it unexpected that many, such as White Cedar (native to Australia and SE Asia) also are sources of valuable chemicals. Another species, *Melia volkensii* from Africa, almost unknown to the world, may have potential for the same sort of starring role in the future which has now been brought out for neem.

This is an expensive book, but considering its nature and contents, must yet be reckoned as value for money. Highly recommended.

## The Neem Tree

Source of Unique Natural Products for  
Integrated Pest Management,  
Medicine, Industry and Other Purposes

Edited by H. Schmutterer

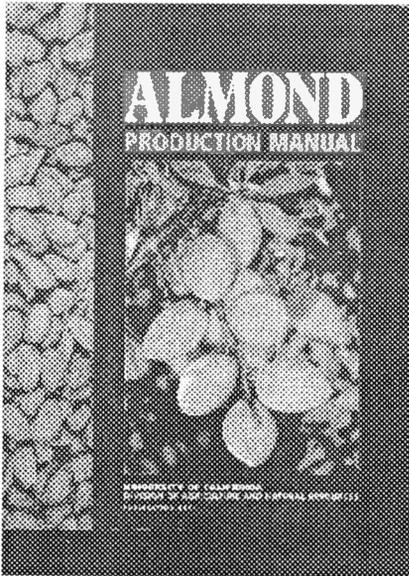


VCH

**Almond Production Manual.** Technical Editor, *Warren C. Micke*. Published by the University of California, 1996. 290 pages. Pb. \*\$59.95

Another first-class manual from the Americans, and one that fills a notable gap — there has been no comprehensive manual on almonds available in English since the same publisher's *Almond Orchard Manual* went out of print perhaps 20 years ago.

Almonds are a crop with great potential for Australia, although not one without problems. At present the Californians are the undisputed masters of the crop, growing some 60% of world production,



and making an even stronger showing in world trade.

Here in 39 chapters is coverage of every aspect of almond culture, propagation, irrigation, pests, trade, harvesting, and history. This book must be regarded as an essential item for anyone interested in this major nut product. Highly recommended.

**The Complete Book of Fruit Growing in Australia.** *Louis Glowinski.* Published by Lothian Books, Melbourne, 1997. 382 pages. Paperback. \*\$39.95.

When the original hardbound edition of this book was published in 1991, it attracted universal praise — my own comment was that it was one of the very few books that I wished I had written!

Over the years that it has been available, this work has consolidated its reputation as the best

available — it sells well even in California. The hardbound edition was not cheap at \$80, but virtually every purchaser I have spoken to agreed it was value for money.

Now, at half the price, this paperback edition would be an irresistible bargain, and no-one in the tree crops area who has not already got a copy of the hardbound edition should hold out any longer. For those who have the pleasure of owning the original edition, although the paperback is marked 'updated', the new text appears identical to the old, only the lists of nurseries and contacts has changed a bit.

**The Palms of Madagascar.** By *John Dransfield and Henk Beentje.* Published by the Royal Botanic Gardens, Kew, and the International Palm Society, 1995. 475 pages. Hardbound. \*\$167.45

This superbly produced book is outstanding for its content, and carries with it some interesting stories of international cooperation.

Madagascar, even today, is both one of the richest and least-known plant areas of the world, and one where species are vanishing at a rapid rate, due to generally unconstrained land clearance.

So it is timely and fortunate to now have this valuable work on Madagascan palms. All the known 171 species are described, of these 70 are

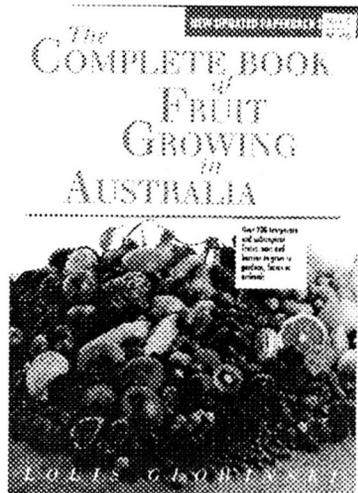
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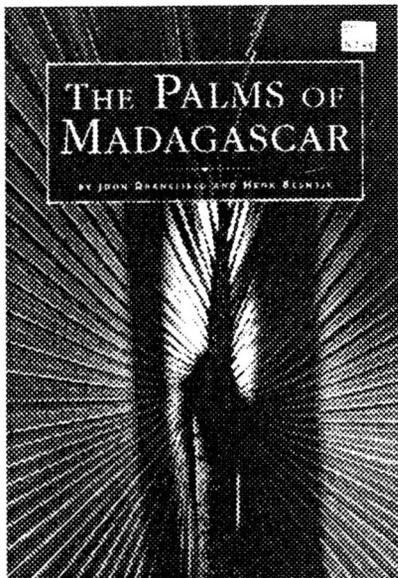
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'new' in the sense that this is their first time of description. Also indicative is the point that all but 5 species are found only in Madagascar.

Of the groups involved in this international project, perhaps the most unexpected member is McDonalds Restaurants Limited UK, who were the major contributor to the costs of the project and the book. Apart from the publishers' own groups, major practical assistance in the project was obtained from the Missouri Botanic Gardens and government and academic organizations in Madagascar, with additional help from Shell Exploration and from individuals and organizations around the world.

The book itself is a finely-produced, beautifully-illustrated, large-format volume which could qualify as a 'coffee-table' book if it were not for its outstanding intellectual content. For palm aficionados this book is a must, for others it provides a unique entree into a little-known and fast-vanishing flora. Highly recommended.

\*Prices at Granny Smith's Bookshop (see ad p. 31).

## WANATCA at Balingup Balingup Small Farm Field Day Saturday April 18, 1998

*WANATCA will again be present at this field day in 1998. Please contact the Tree Crops Centre if you can help. The following information was supplied by the organizers.*

The Small Farm Field Day attracts wide attention with attendances topping 6000 plus, and illustrates the need for a field day focussed towards the small landholder. Our aim is to provide people with SMALL FARMS and those contemplating the purchase of an acreage with a wealth of information to help them manage and enjoy their landholdings as well as highlighting the opportunities available.

The Field Day atmosphere and theme "Towards Self Sufficiency" is created with Trade and Educational Displays, stalls, demonstrations and property visits focussing on:

Land Development Management ;  
Growing Food; Keeping Animals; Cottage Industries; Alternative Technologies

All of which assists the small landholder become aware of "Who, Where and What"

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## Paulownia in the USA

Two items on Paulownia growing the USA have come to hand.

David Drexler (203 Drexler Lane, Fitzgerald, Georgia 31750) kindly sent us the picture below. He wrote:

"These are my 'elongatas'. They were planted June 1, 1997. I had 100% survival, most made 10-12 ft (3-5 m) this first year."



The following item, also on Paulownias in the USA, was sourced from the Internet.

### Growing Paulownias

By definition, a paulownia plantation may be as few as several dozen trees planted primarily for ornamental purposes to several

thousand acres at a single site. The single largest paulownia plantation in the continental United States known to this writer is in Georgia and exceeds one thousand acres.

Carolina Pacific International, Inc. has ongoing projects with paulownia growers large and small, from the two-or-three acre hobby farmer to world-class timber and pulp producers. The primary mission of CPII at present is to get as many trees in the ground across the U.S. that time and energy will allow. Future missions will likely include joint ventures with landowners.

Site selection is the most important first step. Paulownia is an opportunistic plant, which will thrive with support, but will produce only minimal results when exposed to strong, competitive plants. A well-drained site in full sunlight, with sandy-type soils (such as sandy loam) are best. Paulownia cannot survive flooding, so boggy, swampy sites are out.

Tree spacing is very important. Most plantations are on twelve-foot centres, three hundred trees to the acre. Equidistant spacing assures a round trunk, unequal spacing will produce unequal sunlight, resulting in out-of-round trunks.

Site preparation is another major consideration. Ideally, the site should be prepared as if for tobacco or soybeans; remove all trees, stumps, rake all roots and subsoil to a depth of from 2'6" to 3'. That's the IDEAL environment.

Most growers on large sites, usually on cut-over land, have a simple plan that works... Shear existing stumps and growth just under ground level with a 'dozer blade, wind row debris to provide protection from prevailing winds. Mount single-tine chisel plows on a tool bar twelve feet apart. Most large farm tractors are up to the sup soiling task with this

arrangement. Subsoil lines in one direction, then the other, plant where the "lines" intersect. This method will generally not be supportive of subsequent agroforestry, but it works and it is CHEAP.

The growing of paulownia is not to be confused with conventional forestry or tree farming. A better term is tree CROPPING. These trees are NOT a plant-and-walk-away project. Some care is required for the first 36 months, in the form of competition control (mechanical or chemical), fertilization and periodic pruning.

Sites with irrigation in place are helpful during dry spells. Frequent checking must be done during dry periods, especially during the first season. If the trees become stressed from lack of water, they MUST be watered. We use a tractor and a 1,000-gallon tank wagon for most sites. Think of the trees as LIVESTOCK at this point. If they do not receive water in a timely manner, they will die.

Timing is also important. Throughout most of the USA, planting may be done at any time from the first of April through mid-September. — Fred Wright, Aiken, South Carolina ; moneytree@scscape.net

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## New Pecan, Walnut varieties for Australia

### Navajo Pecans

Following the US release of a new pecan variety, 'Navajo', WANATCA Pecan Action Group leader Bernie Rochester has put in train moves to import this variety into Australia.

The Tree Crops Centre will be importing the trees on Bernie's behalf. They will be sent from the US by Californian WANATCA members Roger and Shirley Meyer, who have now gone full time into the exotic fruit business — thanks Rog.

Once the variety is successfully through quarantine, Bernie Rochester has kindly agreed to make the variety available to WANATCA members for local propagation.

### Tulare Walnuts

ANFIC, the Australian Nurserymen's Fruit Improvement Co. Ltd, is a nurserymen's grouping doing good work in importing new varieties of fruits and nuts. They were asked about the availability of some new walnut and chestnut varieties in Australia. Here is the

reply from ANFIC's General Manager, Bob Wickson <anfic@ix.net.au>.

"I have just found that I did not answer your E-mail to me on the Walnuts. Please accept my humble apology.

ANFIC now has available the new variety Tulare from California. As it is only a new release only small quantities will be available, but those wishing to obtain it should order from one of the following, as trees will only be produced to order:

1. Linmer Nursery, Eugowra Rd, Canowindra NSW 2804. Ph 02 63441597, fax 02 63441746

or:

2. Weares Nursery, PO Box 736, Griffith NSW 2680. Ph 02 69642324, Fax 02 69625979.

Either of these should be able to supply both Chandler or Howard".

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Bernie Rochester, <A3135>; ANFIC, <A3143>; Linmer Nursery, <A1323>; Weares Nursery, <A1668>.

[*Acuminatum* (AQIA) / 1997 Spr]

## The host-parasite relationship in Quandongs

Since the last article I wrote for this newsletter I have learned more about the types of substances that can be passed from host plant to quandong, *Santalum acuminatum*. Slowly we are developing an understanding of the level of dependence quandong has on its host plant.

Firstly I will summarise some of the main findings that I spoke about at the Broken Hill AQIA conference. We have found that quandongs in the field have the ability to draw water from their surrounding hosts at all times of the day and throughout the year. This observation has been supported by anatomical evidence from examination of the quandong haustoria. Microscope sections of the haustorium provided evidence of a direct connection of the water conducting cells between host and quandong, this means that there is low resistance to flow of water and solutes transferred in the water conducting tissue.

A glasshouse experiment designed to compare the growth of quandong with various hosts and without hosts showed that quandong height, basal stem diameter, and shoot dry weight were significantly improved when grown in the presence of a host plant. In particular the host *Myoporum parvifolium* proved to be the most successful host for pot grown quandongs.

The leaves, fruits and roots of all plants contain many different salts, sugars and other compounds. We have found that quandong leaves contain very large amounts of a sugar alcohol known as mannitol. This may play a role in protecting the leaves from water stress.

More recently I have conducted experiments to examine the transfer of carbon

from host to parasite. Carbon is made by the plant during photosynthesis and can be found in the plant as simple sugars such as glucose and sucrose or more complex compounds such as mannitol and sorbitol.

I have measured photosynthetic rates of sample quandong and neighbouring plants in the field and it appears that quandong's daily average photosynthesis is not significantly different from that of neighbouring plants. This suggests that quandong is able to manufacture the majority of its daily carbon requirement so they do not necessarily need to get carbon from their host.

To determine whether quandong can obtain carbon from its host, a radioactive tracer isotope of carbon dioxide was used. A host plant (*M. parvifolium*) was exposed to the radioactive tracer and allowed to photosynthesise, thus taking up the tracer and using it to make its own carbon. Over ten days the quandong leaf tissue was monitored to assess if any of the tracer present in the host was being transferred to the quandong.

It was found that carbon in the form of glucose was being transferred from host to quandong in small amounts (between 2-5% of total available radioactive carbon). When the quandong itself was exposed to the radioactive carbon dioxide it was found that the tracer was present in mannitol, suggesting that quandong is able to manufacture its own mannitol yet obtains some glucose from its host plant. It appears that quandong is not dependent on its host for carbon, which is what we would expect due to the fact that it contains chlorophyll and can therefore photosynthesise, but it may be obtaining some "bonus" carbon from its host.

### White Cedar/ Cape Lilac

One of the most interesting experiments we have done this year was initiated by discussions with AQIA members at last year's conference in Broken Hill. Quandong fruit from trees growing near *Melia azedarach* trees have been observed to have lower rates of insect damage than fruit from trees not near *M. azedarach*. *M. azedarach* contains many natural insecticides which have antifeedant properties acting on many different types of insect. One of the main chemicals contained in White Cedar is known as azadirachtin and is commonly used in commercial insecticide preparations. This chemical was initially isolated from the Neem tree, a close relative of *M. azedarach*.

Extraction of the quandong fruit from trees near *M. azedarach* showed the presence of an azadirachtin like compound while the fruit from trees not near *M. azedarach* did not contain this compound. This has very interesting implications for integrated pest management in quandong orchards. However the literature available on the toxicity of azadirachtin-like compounds is rather contradictory and whether it is harmful to humans in large quantities is unclear.

Thanks to Trevor Comeadow and Nigel Slator who collected fruit and gave invaluable advice. With under a year to go before I must finish this project I only have time for a few more experiments, most of which will be conducted in the glasshouse on pot specimens. I plan to examine more closely the water transfer between quandong and host and also continue the work on azadirachtin transfer.

— Beth Byrne, Flinders University of South Australia, School of Biological Science, GPO Box 2100, Adelaide 5001.

AQIA: Australian Quandong Industry Association Inc, <A1645>.

## US Macadamia trade under review

**The United States International Trade Commission has initiated another study into the effects of macadamia imports on the US trade position.**

In 1992 a similar study led to apprehension among Australian producers that the US might impose significantly higher import barriers on Australian macadamias. In the event, the resulting report, entitled *Macadamia Nuts: Economic and Competitive Conditions Affecting the U.S. Industry*, did not have adverse effects on Australia.

In fact the report (copies of which are available from the Tree Crops Centre) gave a very useful analysis of the world macadamia trade and of the technical factors in play in the various producing countries.

The new study, with the same title as before, will involve public hearings in Hawaii and in Washington this year, in March and April. Australian producers will be hoping that the new study will not lead to recommendations adversely affecting them, instead will only provide updated trade information.

However, the US situation has changed considerably since 1992, when the USA was the world's largest macadamia producer. That position is now held by Australia.

In addition, US imports of macadamia nuts have swelled enormously. In 1994 these were only about 55 tonnes, mostly from Malawi. In 1995 and 1996 their imports were about 34 and 14 tonnes respectively. In 1997, US imports were 986 tonnes, including 404 tonnes from Australia.

*Information from which the above came was kindly supplied by Peter Koenig of the Washington attorneys Ablondi, Foster, Sobin & Davidow, P.C.*

[Post / 1997 Nov 22]

## Resident wants streets lined with bush tucker

Bush tucker will be on the menu in Saladin Street, Swanbourne, if resident Jan Oldham has her way.

Ms Oldham has written to Claremont council to suggest that existing street trees be replaced with edible and useful bush tucker trees and shrubs. She said she had spoken to five other households in the street who were positive about the idea.

In a letter to the council, she described the trees in the street now as 'a hodge-podge of unplanned plantings, superimposed over what initially was an avenue of Queensland box trees'. "Queensland box trees appear to have nothing in their favour except that they are universally hated by all and sundry," she said.

"I believe the council has a policy where each year these trees are removed from a couple of streets and replaced with trees that are more attractive and enjoyed by the residents."

Ms Oldham said she was aware the council had a policy of planting native trees, and suggested it took it further by planting the street with bush tucker plants.

"Vic Cherikoff, the man who is considered the father of the bush food industry, and Bill Mollison, father of permaculture, have both been suggesting this ecologically-sound idea for decades, but to my knowledge, no-one has actually done such a thing," she said.

Claremont's acting town engineer Alan Lamb has recommended to the council that it give consideration to Saladin Street in the street tree replacement program in the 1998/99 financial year.

## ACOTANC Conference looms very close

*ACOTANC-98, the Australasian Conference On Tree And Nut Crops, is being staged in Nelson, New Zealand, on April 25-26, 1998.*

*Here is the latest news from the organizers. Further details are available on the Web at <<http://www.AOI.com.au/acotanc>> or from the Tree Crops Centre.*

### **Nelson -New Zealand is not one eyed**

The 1998 ACOTANC conference is being held in Nelson, in the north of the South Island of New Zealand. This is the Top of the Mainland, according to South Islanders. Nelson is an important horticultural area of New Zealand, but also has numerous other industries and interesting things to occupy visitors.

**Horticulture:** —the main horticultural activities are apples, kiwifruit, grapes, and berryfruit. These contribute to the busy port, exporting all over the world. But not of course apples to Australia. Many other minor crops are grown in the area for commercial reasons, but even more are grown locally by Tree Croppers for their own use and interest.

These include; feijoas, persimmons, tamarillos, avocados, pears, plums, apricots, nuts, just to mention some of them. The latest interest, and possible new industry are olives.

**Forestry:**— We have recently had the misfortune of losing one forest through fire. However, there are still major forestry blocks of radiata pine and douglas fir. Other species are grown on a smaller farm forestry scale. Connected to the large pine forestry are two medium density fibreboard factories exporting mainly to Japan. Whole logs and wood chops are also exported.

**Vineyards:**—Large vineyards have mainly developed in Marlborough. Vineyards in Nelson are generally smaller family businesses producing their own individual character wines. The wine industry in New Zealand has been the success story of horticulture over the past 20-30 years. Some nice fruit wines and vinegar are also produced in Nelson.

**Fishing Industry** Two major fishing companies operate in Nelson, Talleys and Sealords. They both process fish for export to many countries, and also work in cooperation with foreign fishing fleets. Hoki and Orange Roughy are two local deep sea fish that are exported from Nelson. Local boats also catch Bluefin Tuna. Oysters, Mussels and Scallops are also farmed.

**Dairying:**— There are two dairy factories in the district producing cheese and dried milk. The local domestic market and an Ice-cream factory are supplied.

**Arts and Crafts:**— Nelson is rich with artistic talent. And is especially famous for its potters. However, we also have excellent Glass Blowing, Weaving, Painting and Sculpture. Music and sport are also well represented. Recreation This includes all the water sports, Nelson having an extensive beautiful coastline. Ideal for sailing, kayaking, motorboats, fishing ( sea or river) . In the countryside there is tramping, hunting and climbing.

Come to ACOTANC! This mentions some of the things going on in Nelson, to encourage you to come to the conference in April 1998. It is certainly an interesting place to visit, not just to see horticulture, but also the many other cultural pursuits in the area. The climate is also one of the best in New Zealand, with a definite winter, including frosts, and a warm summer. The people of Nelson are also warm and friendly.

— Roy Hart

## BOOKS

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**JUJUBE:** Phil Ciminata, 9328 5718 (36 View St, North Perth 6006)

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**DICE Group:** PO Box 27, Subiaco WA 6008

## CALENDAR OF FORTHCOMING EVENTS

*Deadline for next issue: Apr 20*

1998

- Feb 17 Tue General Meeting (Neville Shorter - Developments in WA Fruitgrowing)
- Mar 28 Sat \*Festival of the Trees (MOTT), Hazelmere
- Apr 4 Sat \*Hills Small Farm Field Day
- Apr 7 Tue Executive Committee Meeting
- Apr 18 Sat \*Balingup Small Farm Field Day
- Apr 25-26 SACOTANC-98, Nelson, New Zealand
- May 19 Tue General Meeting (?Barry Shelton - Palms with Edible Products?)
- Aug 18 Tue General Meeting (?Pin Tay - Less Usual Fruits of Southeast Asia?)
- Nov 17 Tue Annual General Meeting (?Zora Singh - Ber & Jujube?)

\*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.

Material originating in Quandong may be reprinted; acknowledgement of author and source requested.

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