

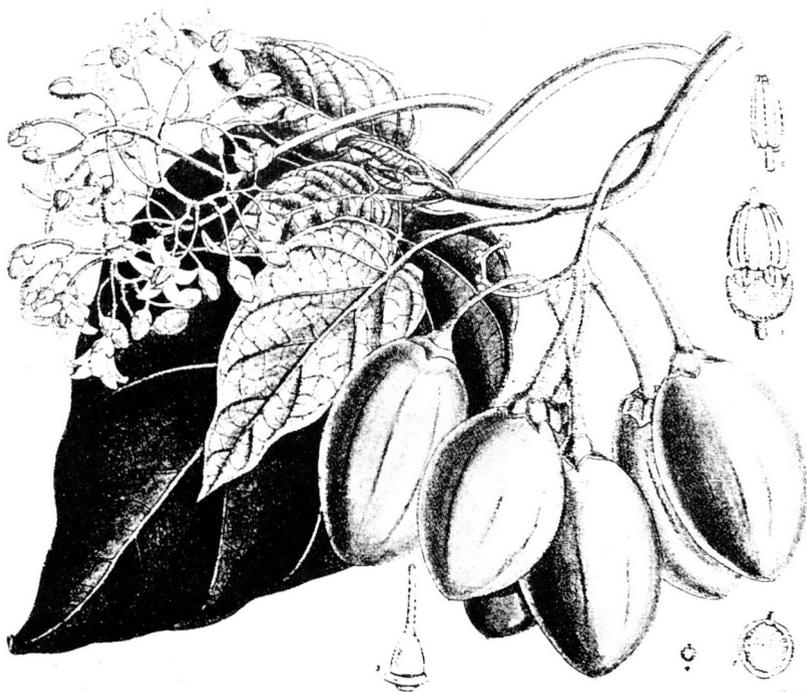
Quandong

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

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The TAMARILLO (*Cyphomandra betacea*)

from Curtis's Botanical Magazine, 1899

Next Meeting:**FOODS FROM AUSTRALIAN NATIVE PLANTS****Dr Jen McComb**

At the next WANATCA meeting we have been fortunate in getting Dr Jen McComb from Murdoch University to talk about this fascinating and potentially lucrative area.

Australia has one of the richest plant resource banks known, due to its largely separate development in later geological eras and the evolution of its plants under extreme conditions. These plants display outstanding abilities to thrive under harsh conditions, and many species have evolved complex means of protection against predators. Often these involve natural plant chemicals which have potential for exploitation as pharmaceuticals or industrial chemicals.

At the same time, because of Australia's relatively recent impact by modern man, it still retains much of its natural plant riches, still unexploited. Only one native food plant, the macadamia, has achieved any real commercial success up till now.

But it seems we are now entering a New Age in the use of Australian Food Plants, one in which our plant riches may be exploited sensitively and with mutual benefit for both the plant and animal kingdoms.

Jen McComb will be known to members from many years back for her work in this area. She is an expert on tissue culture, and gave a paper on tissue culture applications in tree crops back at ACOTANC-1 in 1982. She was the author of the stimulating article on Australia's genetic heritage of plant products in the 1990 WANATCA Yearbook. In her current talk to WANATCA she will be able to show some of the possibilities, both through slides and pictures, and also actual products now coming onto the market. This is a meeting not to be missed.

As usual the meeting is free and open to the public — visitors welcome.

Time: Wednesday August 21, 7.30 pm

Place: Naturalists Hall, 63 Meriwa Street, Nedlands

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[Growing Today/October 1990]

All in the family — The tamarillo and its relatives

The tamarillo is one of those plants that have found its way to NZ without much fuss or fanfare. Originally known as the tree tomato it was first listed in the nursery catalogue of D. Hayes & Sons back in 1891, almost 100 years ago.

The first small commercial plantings appeared in the Mangere district near Auckland with the earliest plantings being the yellow varieties. Later the red form appeared and over the years has proved the most popular.

Most likely introduced from India, where the fruit is well known, the tamarillo is actually native to the Andean region of South America. It can be found from Venezuela to as far south as Argentina and is a typical fruit of the Andean highlands.

Serious commercial growing of the tamarillo started before the Second World War and scarcity of imported winter fruits during the war years provided an impetus in demand for the tamarillo in NZ.

The attractive prices received by tamarillo growers encouraged increased plantings and availability of fruits on the market. Since then the tamarillo has become well established in the fruit shops and obviously enjoyed by New Zealanders. During the early sixties, when tamarillos were being exported to Australia and Canada, the name Tree Tomato was seen as unsuitable for promotional purposes. Tamarillo was coined in 1967 and is now internationally accepted—even in South America where the fruit was formerly known as *Tomate de arbol*.

The tamarillo is usually propagated from

seed. Growers who grow their own plants select seeds from their best fruiting trees, a practice which has resulted in the development of larger, more superior fruits. In fact, fruit selections in NZ are the best in the world. The tamarillo type grown in its native South America is actually small and often of poor quality.



Almost ripe Casana fruits.

The tamarillo needs little description in NZ. Sown from seed it will rapidly grow into an attractive, shrub-like bushy tree with large green pungent-smelling leaves. The plant will start flowering in its second growing season, and the sweet scent of its flowers alone make it worth having in the garden. Flowering takes place over an extended period of time from late spring until as late as

the month of May, with fruit developing soon after flowering. As the green fruits approach maturity, they turn dull purple in colour then a bright shiny red at full maturity, with fruits maturing in succession from late March until October.

In the home garden the tamarillo requires a nearly frost-free climate and free draining soils high in organic matter.

The most proven export variety of red



The original tamarillo in NZ— Oratia Round — was grown in the Endt's Landsend Nursery in Oratia, Auckland.

tamarillo is 'Oratia Round', a selection made in the Oratia district about 20 years ago. Other selections have appeared since and modern tissue culture propagation methods are used to multiply trees of a uniform type.

One of the most interesting new tamarillos to have appeared in recent years is a pure yellow form, an entirely freak tree which lacks the red pigments which make up the red fruit. Instead the fruits are yellow — as yellow as a lemon.

By sheer coincidence I encountered a similar type of tamarillo growing in Ecuador, but these trees were evolved from the yellow tamarillo; a yellow tamarillo still has a lot of red pigment in its leaves and fruit. So now we have a yellow tamarillo which tastes like a red one, and a very similar tamarillo which tastes like an orange yellow fruit. The Ecuadorean fruit is locally known as Oro del Inca.

Another recent introduction from

Ecuador is a normal yellow strain known as Columbia round, the fruits of which are of course, round. The tree itself is dwarfed making it more resistant to wind and harvesting is more efficient.

From Argentina we have a very good red fruited form which is very sweet, and in my opinion much better than the regular red, or the yellow for that matter. While the fruits are not as large as on some of our NZ selections its good flavour makes this strain outstanding.

The tamarillo is botanically known as *Cyphomandra betaceae* (Sendt) and belongs to the Solanaceae family, the same genus to which the potato, tomato, tobacco and peppers belong. All the *Cyphomandra* species originate in the neotropics and to this day most of them are little known. The only reference to many of the species may be found in botanical literature. In South America nearly all of these plants can only be found growing in the wild.

During some of my plant exploring trips in the Andes I have encountered two species, both of which received a botanical description only in very recent times.

The Casana (*Cyphomandra casana*) was totally unknown when I encountered it growing in the mist forest of the Andes at 2,500 metres. Seeds of the casana were introduced here in 1977. The name casana we coined ourselves for lack of an existing name.

The casana grows well in NZ, preferring a cool moist climate and semi-shade, and is intolerant of both heat and frosts. It seems best suited to areas like Taranaki, Nelson, and the West Coast, in areas where little or no frosts occur. The tree of the casana is very similar to the tamarillo with leaves of a dull green and tomentose (furry). The flowers are lilac. The fruit is also similar in shape to the tamarillo but is dull yellow, somewhat smaller, but more numerous on the tree. The flavour though is very unlike the tamarillo. It could be described as reminiscent of the scent of peach and passionfruit. The fruit is rather soft and quality is variable although selection and breeding of this wild plant may result in a very interesting new commercial fruit.

In Ecuador the Casana has now become endangered as much of its forest habitat is being destroyed by fire.

The Chambala (*Cyphomandra* sp. — probably in the *hartweggii* tribe) is another plant very new to the developed world. In fact I think this is the first time details of it have ever been published. Travelling in Ecuador during 1988, the chambala was discovered growing near the roadside in recently cleared jungle. As new roads are pushed through the last remaining forest, new plant species still come to light. How many species useful to man are being destroyed is impossible to tell.

Only three years before I visited this area the only access was on horseback. In contrast to the casana, the Chambala grows at much lower altitudes where near-tropical conditions occur. It's named after the district in which it was found, a broad valley of the Guayllabamba river on the Western slopes of the Andes. The tree itself is tamarillo-like, but much taller, with some trees growing as high as 5m. The fruits hang on what seem like strings, or long pendulous racemes. The size of an egg and pointed at one end, the fruits are green in colour, turning to yellow at maturity.

The only fruit I tasted was not ripe, so I couldn't get a good idea of flavour, but the first New Zealand fruits of the Chambala are ripening at Oratia at the moment, and hopefully will survive the prolonged rains of August. A few seeds were introduced in NZ in 1988.

During our warmer months the chambala grows well. It survived the first winter and during the second growing season blossomed and set fruit (growing outside). This winter

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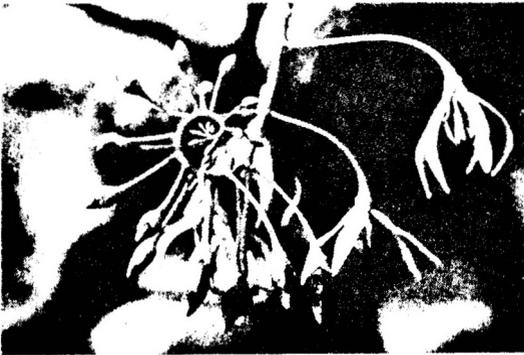
Pacific Hwy, Moorland NSW 2443

Phone (065) 56 3148

*Wholesale Prices (20+ trees).

the trees were rather set back by adverse climatic conditions. The fruits are hanging on though, so I hope for the best. Obviously the chambala is going to be more tender than the tamarillo, but it's a plant with some potential.

The Colombian Mountain Tomato (*Cyphomandra hartwegii*) is one of the few *Cyphomandra* species that is known in the



The rather peculiar looking inflorescence of the Chambala.

country of origin, and is grown mostly in gardens and backyards. Botanically it is allied to the chambala although it is an entirely different plant. It grows in Colombia at the same altitude levels as tamarillo.

The Colombian Mountain Tomato is a robust shrub growing as tall as 4m. In its juvenile stage the large leaves are lobed, then, as the flowering stage is reached, the leaves become cordate and very similar to those of the tamarillo. The flowers are greenish in colour and very numerous. The fruit sets over a short period of time and is rather bitter, becoming edible only at full maturity. In Columbia they're made into jams and jellies. We have some trees growing on Great Barrier Island which are producing a lot of fruit. The tree is very ornamental when young and well worth growing for that reason alone.

There are other *Cyphomandra* species growing in New Zealand too. *Cyphomandra meridensis* is a rather small shrubby plant with small blue flowers. The fruit are rather like casana but smaller and the tree does not thrive here.

Cyphomandra fragrans. A small rather woody shrub with marble sized fruit, is useful only as an ornamental, although it might be used as rootstock for tamarillo.

Cyphomandra corymbiflora. Ornamental only.

Cyphomandra costaricensis is very similar to the tamarillo, and is said to be a wild form. It may be used as a rootstock for tamarillo to overcome nematode problems.

There may be still others in this country but I haven't seen them. What is certain is that there are still many more named *Cyphomandras* in South America, and perhaps more unnamed ones as well. Many of them possibly at risk as their native habitat is destroyed. Further exploration may well yield some outstanding possibilities for the future.

— Dick Endt

The Fruit Tree Doctor

For help with your tree health and pest or disease problems, phone:

Neville Shorter

Horticultural Consultant

Telephone 450 5606

(best time 5.30-7.00pm).

Advice also given on:

- tree types
- varieties
- site selection
- windbreaks
- nutrition
- tree establishment

WANATCA at the Royal Show

The Association will be represented as usual at the Perth Royal Show this year, which runs from Saturday September 28 to Saturday October 5, inclusive.

Our display will be in the WANATCA Headquarters, the Tree Crops Centre in the WA Gardener Building. This is just inside the main gate, against the large Horticulture Pavilion.

The Royal Show is WANATCA's principal public shop-window event, and we intend to make it as good a publicity outlet as we possibly can. All members are asked to see if they can spare half a day during Show Week to help out at our stand. They will get free entrance to the show, and backup help will be usually be available, so helpers are not left to cope alone.

The Help Roster is being arranged by Alex Hart. Please ring him on 09-490 1324 now if you think you may be able to help.

Granny Smith's Bookshop will be represented, offering books for sale, and a range of free literature will be available.

The Displays are being overseen by Neville Shorter. If you have any ideas or materials for the displays, please contact him 09-450 5606. Messages for either Alex or Neville may also be left at the Tree Crops Centre, 09-385 3400.

TREE CROPS CENTRE HOURS

Jane Price, our mainstay helper at the Tree Crops Centre, will be away in England till mid-October.

Jane is going to England to get married and catch up with her family and friends from her old stamping ground. She goes with our best wishes for an enjoyable trip, a pleasant ceremony, and a safe return.

Jane's absence means that staffing will be rather tight at the Tree Crops Centre. Until she returns, opening hours at the Centre will be slightly curtailed, running from 10am to 5pm, Monday to Friday.

Outside these hours, please leave a message on the answering machine, we will get back to you as quickly as possible.

TREES AND SHRUBS FOR WINDBREAKS

IN TREE FRUIT PLANTINGS IN WA

Many tree fruit crops for Western Australia will benefit by careful planning and placement of selected windbreak trees or large size shrubs.

Taller trees are best placed around the perimeter of a block. Protection on the windward side is most important. Smaller trees or large shrubs can be placed in front of or behind the taller trees and can be used for dividing a block into smaller 'cells'.

Windbreak trees are best established ahead of the orchard planting to provide protection in the early years.

TREES FOR PLANTING ON BOUNDARIES OF TREE FRUIT BLOCKS

The primary purpose of external windbreaks is to minimise the effect of the main prevailing winds in summer and winter. Some through movement, or porosity, of wind is desirable.

Place trees at 3-4 metre spacing along one or more external boundaries of an orchard block.

The following is a list of taller trees suitable for planting for external windbreaks.

***Casuararina cunninghamiana*, River Sheoak**

Excellent for windbreak purposes. Quick growing to 20-25m. Trees are upright, wider at base than at the top, giving a pine like appearance. Foliage is needle-like. Limb spacing is sufficiently far apart to allow some wind movement or porosity through the trees.

Wide limb crotch angles give strength to side limbs so that there are few breakages. Newly planted trees are extremely responsive to drip or 'microjet' irrigation. Plant at 3-4 metre spacing.

***Eucalyptus robusta*, Swamp Mahogany**

A moderately tall quick growing tree of medium spread, reaching 5-6m in height. Foliage is fairly dense. A crown forms 2-3m above ground, so if this species was used, it would be necessary to have a line of lower level windbreak plants in between the trees and the plantation or orchard planting. Plant at 3-4m spacing.

Trees do not readily lose limbs in strong winds. Young trees respond to irrigation.

Eucalyptus sideroxylon rosea

Another moderately tall quick-growing tree reaching around 6m in height. The narrow blue-green foliage allows some through movement of wind. Will branch low to the ground. Limb breakage is not a problem. Young trees respond to irrigation from the outset. Plant at 4 metre spacing.

Evergreen Poplar strains — *Simonii* Poplar and Tasman Poplar. (*Populus* spp.)

Rust resistant, non-suckering semi-deciduous poplar strains. Trees in both instances are tall and narrow and vigorous growers.

Populus simonii has leaves which have a tapering base and relatively fine teeth, slender petioles. A tree spacing of around 1 metre is recommended for these poplars.

Plants can be raised readily from hardwood cuttings available from the Hamel

or Narrogin nurseries. Cuttings can be planted out directly in the field in later winter or spring. Irrigation by drip or microjet irrigation is then essential. Otherwise, can be grown in a nursery for 1 year.

Willows (*Salix* spp.)

The willow family are moisture loving trees well suited for use as wind breaks. Varieties and strains vary considerably from weeping to upright growth habit.

Clones suitable for use as windbreaks have been developed in New Zealand, and are available in Western Australia. These selections have a good growth rate, narrow crown, are upright growers, have good low branch retention and a long leafing period. Extended leafing is important with some tree fruit crops.

Plants grow readily from cuttings in a nursery or can be planted out directly in the field if irrigated by drip or microjet irrigation. The recommended spacing is 2 to 3 metres.

Pine Trees (*Pinus radiata*, *P. pinaster*, *P. halepensis*)

Evergreen moderately fast-growing trees, well suited for use in a windbreak. Mature heights range from 15 to 30m. Needles are in bundles of two and three and have a bright dark green colour.

P. pinaster grows well on coastal sands. *P. radiata* prefers heavier soils. *P. halepensis*

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has a greater drought tolerance than the other two species and is also more suited to soils which are on the alkaline side.

Plant in rows with a 3 metre spacing.

TREES AND SHRUBS SUITABLE FOR USE IN INTERNAL WINDBREAKS

These are lower level plants that can be used for breaking an orchard into 'cell' blocks, or as a lower-level windbreak in front of a row of tall trees planted along the block perimeter.

The size of each block varies with the crop and the degree of wind movement. The following trees, shrubs and other plants are suitable choices.

Eucalyptus conferruminata

Until recently was known as Bushy Yate or Bald Island Marlock, *Eucalyptus lehmanni*. A small to medium rapid growing dense bushy tree which can reach 5 to 6m in height, with a broad spread. Branches form at a low level.

Trees interlock with close planting provide an excellent quickly formed screen. Flowers, greenish-yellow, appear from July to September. A 3 metre spacing is recommended.

***Eucalyptus platypus*, Coastal Moort**

An excellent choice for areas close to the coast preferring soils of high acidity or pH.

A quick growing dense, bushy, spreading tree 5 to 6m tall. Foliage is fine and dark green in colour. Plants are wider at the base than at the top. Plant at a 3 metre spacing to form a continuous hedgerow.

***Melaleuca pubescens*, Rottnest Island Ti Tree**

A dense quick growing plant which reaches around 6m in height. Foliage is fine, dense, and dark green in colour. Flowers are white and small. Plant at 3 to 4 metre spacing.

***Melaleuca armillaris*, White Flowered Bottle Brush**

Dense quick growing medium sized shrub with fine dark green leaves. Reaches a height of around 4m. Plants have prominent large white 'bottle brush' flowers in December to January. Plant at a spacing of 3m.

South African Barner Grass (*Pennisetum sp.*)

A quick growing bamboo like plant which, closely planted, can be developed into a dense continuous hedge row 2-3m high.

Ideal to form a fast windbreak. Can be used as an external windbreak in front of trees while the trees are growing. Plants form a matted fibrous root system.

Cuttings are best planted out directly in the field in later winter or spring at 0.5m spacing. The cuttings soon root and must be kept irrigated by drip or microjet irrigations, steadily increasing the amount provided during the growing season.

Tagasaste, Tree Lucerne (*Chamaecytisus palmensis* or *C. proliferus*)

A quick growing, easily propagated dense bush which can reach 4m tall. Extremely

\$300

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Name.....

Address.....

adaptable to most sandy, gravelly and loamy soils near Perth and in the southwest of Western Australia. Has dense bright green foliage, medium sized leaves. A relatively limited lifespan.

Mechanically trimmed bushes can be formed into a continuous hedge — plant 2 to 3m apart.

The trimmings can provide valuable feed. Plants vary in their palatability at the time of trimming. Palatability is assured if there is a 2-day lapse between trimming and feeding. Leaves have a high nutritional value.

An electric fence can be placed between the hedge and the tree fruit planting, to facilitate feeding. Alternately, the trimmings be baled.

Plants respond readily to fertiliser,

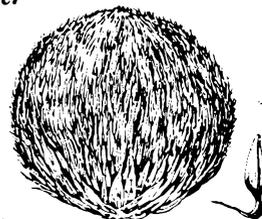
particularly superphosphate. Young plants can be raised from seed or from softwood cuttings. Mist propagation is required if softwood cuttings are used..

Seeds should be taken from preferred parent plants, grown under controlled cross pollination. Although a nitrogen fixing legume, seed does not need to be inoculated.

Plants raised from softwood cuttings are true to type and therefore much more uniform in growth.

— *Neville Shorter*

(*Araucaria
imbricata*)



Araucarian pinenut or arauco

Welcome to Bob Haywood, new Life Member

The Association extends a welcome and thanks to long-time member Bob Haywood, who has taken up the Life Membership subscription option (currently \$500). Bob becomes WANATCA's fourth Life Member, joining David Noel, Alex Sas, and Warren Chislett.

The Executive view every such Life Membership by subscription as a vote of confidence in the continuing future of the Association. However, in recognition of its obligation to be able to continue servicing such subscriptions into the future, it has resolved to set aside \$1000 of WANATCA's tiny capital reserve into a special Life Membership Fund. This will be invested in a secure long-term fund, and only the interest from this fund will be used for Association purposes.

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bookings please contact—

Valerie Hopkins, 'Waterford', RMS
147, Nuttman Rd, Chapman Hill,
Busselton 6280. Phone 097-531029.

Darwin Fruit Farm Opportunity — Interested?

WANATCA member Jack Larcombe is the owner of Romadad Mango Plantation, a 42 hectare holding at Berry Springs, a half-hour drive from Darwin.

Berry Springs is part of a thriving horticultural community, complete with shops and a school.

Jack's principal crop is mangos, with 670 trees planted, of which over 350 are cropping in 1991. First crop was in 1988, and in 1990 over 10 tonnes were produced.

There are also 154 grafted rambutans, most still young, although some have fruited. The property also has 100 grafted, selected cashews, intended as a source of superior budwood for the general development of the cashew industry.

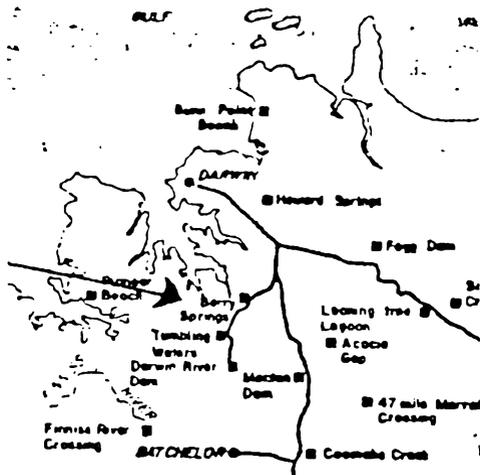
In addition Jack has smaller plantings of sapodillas, citrus, carambolas, custard apples, and jak fruit. Properties in the area are producing other tropical crops successfully, including bananas, pawpaws, melons, pineapples, mangosteens, and a range of vegetable crops.

Jack has brought the property to a productive and debt-free state, but because of advancing age he is seeking to scale down his day-to-day involvement with the property. He would be very interested in hearing from others who would like to participate in the venture.

Some possible ways are sharefarming (part of profits in return for labour), a partnership scheme with capital injection by an active partner, or a negotiated sale with Jack remaining in an advisory capacity.

This is a unique opportunity to become involved in a forward-looking tropical horticulture enterprise which already has

cash flows. Jack Larcombe may be contacted on 089-886279 or 089-815636 at Romedad. Postal address is PO Box 39375, Winnelic NT 0821. Further details of the property are held at the Tree Crops Centre.



Letter from Colin McQueen

The ATCROS Directory is great. Just a note about *Cordia subcordata* (Code codsu, page 46). In the Solomon Islands it is known, as I understand it, as Kerosene Wood, and is a **superb** carving timber.

It normally grows adjacent to the sea, and is also fairly fast-growing.

It is also extremely durable, and used as house stumps in the tropics it can last 100 years or more, it is also resistant to salt water. I think it would have great plantation potential, or for interplanting in coconut plantations.

Book Review

The Complete Book of Fruit Growing in Australia. *Louis Glowinski.* Published by Lothian Books, Melbourne, 1991. 382 pages, Hardbound, \$75.00. Available from Granny Smith's Bookshop.

During the many years that I have been involved with tree crops, I have come across only two books that I wish I had written.

The first of these was J. Russell Smith's *Tree Crops, a Permanent Agriculture*. This fascinating, informative, and highly readable book set the scene for an informed appreciation of the value of tree crops which has inexorably grown in credence ever since. As Russell Smith's book was first published in 1929, before I was born, I was not about in time to have written it.

The second Book I Wish I Had Written was Edwin Meninger's *Edible Nuts of the World*, an amazing compilation on nuts, well-known and obscure, tropical and temperate, tremendous and indifferent. Meninger spent some two to three years not only researching all the published literature on nuts, but also writing about all over the world, and similarly phoning people up, to gather letters, notes, and photos and unpublished information about nuts. I know because I was one of the people he got on to.

Meninger's book finally appeared in 1977. My excuse for not writing that book was that at the time I was a full-time employee and didn't have the time or resources.

Now a third book has appeared which I wish I had written, and the only grudging

reason I can think of why I didn't, is that I just didn't know enough to be able to!

WANATCA member Louis Glowinski has indeed produced a superb book. Louis



Three Australian nuts - bunya, quandong, macadamia

told me that his publishers made him call it *The Complete Book of Fruit Growing in Australia* — he wouldn't have been so bold. His publishers were fully justified!

While no book can ever be truly complete for any length of time, this is as close as we are going to get to it, for temperate and subtropical Australia. The information is all there, and it is well presented. The writing style is easy, succinct, accurate — and it is alive, it has 'feelings' about things which are lacking from traditional texts. Try reading Glowinski's comments on the Yucca, and its cohabitation with ugly cream-coloured brick home units!

Over 200 species of fruits, nuts, and

berries are described. These descriptions are not re-hashes of other publications, much of their content is based on Glowinski's own personal observations.

And much use is made of comments from others who are both genuinely interested and genuinely involved in the area: people and organizations are named, the whole complex and ethos of the fruit enthusiast is encompassed.



This is in stark contrast to typical 'official' publications, which perforce tend to be rather impersonal, careful, and a little dry.

Glowinski admits that he has the enthusiast's 'obsession' with growing fruits, nuts, and berries, especially rare fruits, rather than the professional grower's need to concentrate on what will give the best monetary returns.

The result of this obsession is a book

which, interestingly, just could not be matched by a horticultural professional.

In fact Louis Glowinski is a full-time medical doctor in 'real life', working in a busy family medical practice in the western Melbourne suburbs. Why is it that there are so many doctors in nut and fruit growing? The examples are endless — perhaps they know something.

I could go on to detail all that the book contains, but take my word for it — whatever you are looking for, it will probably be there. The illustrations and colour photographs are not only technically excellent, they are also superbly selected, containing graphic information not easily found elsewhere.

You need this book. If you live outside Australia, you still need this book, it is almost certain you have nothing comparable for your own country.

Lothian books are usually good value for money, and while this is a higher-priced title for Lothian at \$75, it is still very good value. I will report the comment of someone who has seen it — "I have to have this book, who can I find to give it to me for my birthday?!"

— David Noël

USEFUL TREE SEEDS FROM CHILE

Good range of seeds of fruits, nuts, and other useful trees from Chile. Many should be suited to Australia. Contact **Jan Correa** for list at:

Gondwana Seeds

Casilla 53027, Correo Central,
Santiago 1, Chile

[ACIAR Forestry Newsletter/ February 1991]

Acacia Seed for Human Food

Seed of *Acacia* species has been part of the traditional diet of aboriginal people from Australia's arid and semi-arid areas. The green seed pods of some species can be eaten raw or alternatively the pod can be cooked in ashes. The dry seed may be ground to flour, mixed with water and eaten as a paste or baked to form a cake.

Nutritional analyses of the food potential of *Acacia* seeds have produced some noteworthy results. A compilation of published results by Orr and Hiddins (1987) indicates protein levels of 17-26%, fat 3-16% and carbohydrates 30-50%. The protein, fat and energy values are considerably higher than those of traditional seed crops such as wheat and rice.

Some of these species such as *A. holosericea*, *A. tumida* and *A. cowleana* have shown considerable promise in forestry research programs in sub-Saharan Africa. They present real possibilities for introducing perennial woody food-producing legumes into sustainable dryland farming systems.

Acacia holosericea has been widely tested in Africa. It is a very fast growing, nitrogen fixing, multistemmed shrub which produces heavy seed crops after it is two years old. It tolerates dry conditions and infertile soils and is resistant to termite attack and browsing by cattle. The seeds are borne in the dry season, when food is often in short supply and unemployment high. With these agronomic characteristics and the nutritional value of the seed, the potential for this species to contribute to human nutrition in semiarid areas is high.

Acacia tumida is also a highly promising multipurpose small tree for the dry tropics. Attributes include rapid growth, good

coppicing ability (variable between provenances), adaptation to infertile soils (including sand dunes, podzols and lateritic types) and nitrogen-fixing capacity. It yields a useful fuelwood, and its low bushy habit is ideal for sand-dune stabilisation and windbreaks. It has performed well in Niger, Burkina Faso and Senegal. Specific advantages of *A. tumida* are its early seeding (first seed 12 months after planting), high productivity on infertile sites (estimated to be 150-400 kg/ha seed at year 2), ease of harvesting and cleaning, and hard seed coat which enable the seed to be stored for many years without deterioration. These advantages extend to a small number of other pioneer species (especially *A. cowleana* and *A. holosericea* — inland form). *A. coriacea* is another promising human food source, but this species is slower growing and slower to bear substantial quantities of seed.

The question of the acceptability of acacia seed products to local people in terms of texture, taste, appearance and ease of preparation has still to be answered. There are likely to be differences in acceptability between different cultural groups. However, in southern Niger the seeds of *A. holosericea* have been prepared in various ways and served in dishes either alone or in blends with other grains and pulses. In this area there has been a very favourable response to the acacia dishes.

One advantage of the acacia is that no phase of the seed preparation — harvesting, threshing, cleaning, or grinding — required either new technology or special skills. General constraints to wider use of *Acacia* seed as human food include possible toxicity (unlikely for species consumed by Aborigines), labour-intensive preparation of seed into flour, and unpleasant odour (for certain species).

If acacia seeds are to make a significant impact on diets in the semiarid tropics, then further study by food specialists, geneticists,

and silvicultural researchers will be necessary to improve management, yields and food values of the product.

— *Anthony Rinaudo and Lex Thomson, SIM International, Niger, and Forestry Consultant, Canberra.*

Reference: Orr, T.M. and Hiddins, L.J. (1987). Contribution of Australian acacias to human nutrition. In 'Australian Acacias in Developing Countries' ACIAR Proceedings No 16, pp 112-115.

DISCOUNT OFFER FROM RICHGRO

Together with this issue of *Quandong*, current subscribers will receive a Discount Card issued by Greens Horticultural Products, the new trading name of Richgro Garden Products.

Richgro are a division of A. Richards Pty Ltd, WA's largest garden supplier, who have recently celebrated their 75th Anniversary in WA. The main products store is at 1369 Albany Highway Cannington (see map on back of card). The card offers WANATCA members a discount on different products around 10%.

For members in the Southwest, the card can also be used at the Greens store at 94 King Road Bunbury. Also discounts on bulk soils are

available with the card at Soils Ain't Soils outlets in Balcatta, Cannington, and Malaga.

Members outside WA should hold on their cards — the discount offer is likely to be extended to Eastern States associated horticultural stores in the future. Enquiries to A. Richards on 455 1323.



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[Countryman/ Feb 14 1991]

Tree Crops Centre well worth a visit

'Stability Through Diversity'.

That could well be the motto of the Tree Crops Centre, now located in new premises at Claremont Showgrounds.

"We subscribe strongly to that goal," was how centre director David Noel summed up policy.

"It is not that we are advocating that all farmers grow nuts instead of wheat. But there is a place for a whole range of sideline crops on farms.

"Some, like tagasaste, tie in well with existing lines. Others, like chestnuts, olives, or casuarinas, can be used as sleeper crops — harvested when the market is good, but at other times left to grow on."

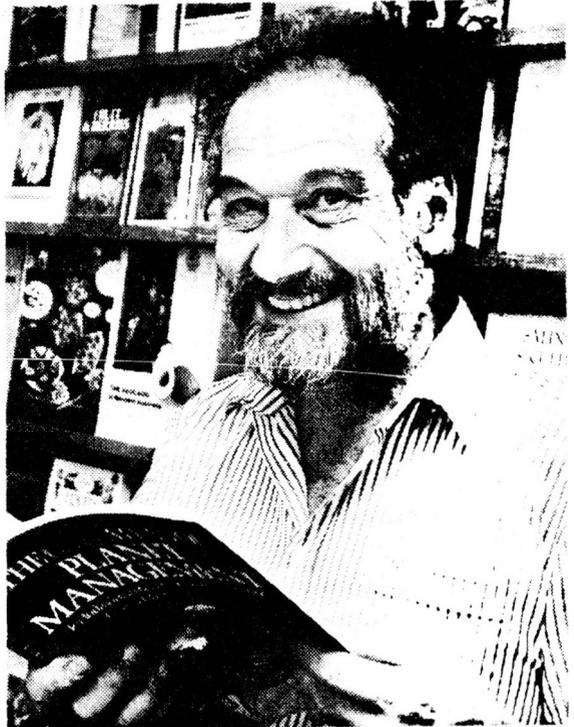
The Centre is designed to provide information and books to farmers and others interested in tree crops.

It is also the public access point for the 300-member strong WA Nut & Tree Crop Association, of which Mr Noel is president.

Being an in-town representative of different crop groups is another aim of the Centre, which Mr Noel describes as pushing the diversification ideas which farmers support.

"Most farmers recognise they need trees. What we are saying is, try to get some money back from them," he said. "Crops like chestnuts, figs, olives, loquats, which are tremendously under-used and can be dried. Another is stone pine for pine nuts.

"The Indonesians, many of whom have a



Director of the Tree Crops Centre, David Noel, with some of the books and information available at the Centre's new premises.

tree-crop based economy, are supposed to take over 4000 different products out of their forests.

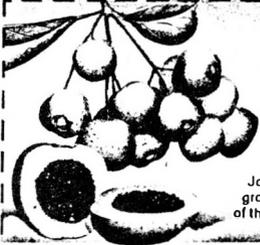
"A typical WA farmer will take off only three or four different things. This must put them at risk when the market drops dramatically for one of those things."

— Ann Page

Roz Hart on Native Fruit Jellies

I was interested to read the article 'Wattle it be — Bunya Nuts or Lilly Pilly?', reprinted from *The Australian* in the latest *Quandong* (Vol 17 No. 2).

I wonder if members are aware that *Aeroplane Jelly*, which is widely available in supermarkets, comes in unique Australian flavours. For example, lilly-pilly, midjin berry, and quandong (not WA quandong, unfortunately), as well as other less exotic flavours like strawberry and raspberry.



Acmena smithii

This unique tree with its bright pink fruit has its heritage as far back as Captain Cook's first landing when it was found by Botanist Joseph Banks. Today it still grows wild in the bush areas of the East Coast of Australia.

From the Aeroplane Jelly Company

Lilly-pilly jelly is our favourite, and the others are not only quite acceptable — they're very nice. I feel it is important to recognize, support and encourage such products.

— Roz Hart, 21 Rankin Rd, Shenton Park WA 6008



QUANDONG
Elaeocarpus grandis

The Quandong is an unusual fruit from one of the tallest native trees found in the coastal rainforests of Queensland and northern N.S.W. The fruit is an oval shape and its juice a brilliant blue.

AUSTRALIAN FRUIT SERIES N°3
From the Aeroplane Jelly Company

WANATCA Yearbook gets good reception

The 1990 WANATCA Yearbook, distributed to current members with the previous issue of *Quandong*, has been enthusiastically welcomed by recipients.

The Contents List, reprinted here, is for those who are not regularly receiving WANATCA publications — just see what you're missing!

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MIDJINBERRY
Austromyrtus dulcis

Native to Australia the Midjinberry tree was first found by early settlers growing in Queensland in the 1800's. The fruit is a creamy blue colour with dark spots and the juice is dark purple.

AUSTRALIAN FRUIT SERIES N°2
From the Aeroplane Jelly Company

[Horticulture Today/ July 1991]

A perfect fruit for WA... all we need is demand!

Although jujubes have been grown in China for about 4,000 years, they have only just made their debut in Western Australia.

And Ian Fox, the West Australian Nut & Tree Crop Association's action group leader for jujubes, says the challenge to increase grower and consumer awareness of jujubes has only just begun.

Introduced to Europe about 2,000 years ago, jujubes — or Chinese dates — can be eaten fresh pickled, candied or dried.

"Jujube fruit has white flesh like an apple, a single seed and is maroon to burgundy in colour," Ian said. He said the fruit is up to 5cm long and oval or round in shape.

"The fruit is cheaper to buy than ordinary dates and it tastes sweeter. The jujube is propagated from seeds, cuttings, budding or grafting.

"Jujubes are well suited to WA because they like hot, dry summers and cold winters.

"In fact, they tolerate everything we have in excess. They can withstand salt, water-logging, and drought stress. Some experimental trees grown down south even managed to survive last year's locust plague."

Ian, who works as a horticultural technician at the University of WA, said about 20 jujube trees had been planted at Balingup and a further 10 trees had been planted at Stoneville.

"The problem for potential growers centres around the difficulty of getting the *Zizyphus jujuba* rootstock. At the moment, the only two grafting trees in WA are in my glasshouse.

"In the future, I'd like to get more members of the WA Nut & Tree Crop Association and the Canning Vale markets involved in growing and marketing jujubes.

"The Claremont Fresh market would also be an ideal selling venue for the up-market fruit.

"I've had interest from some growers in Geraldton, and I'm prepared to supply a couple of trees to growers in different regions



to help determine where the trees grow best"

Ian said it takes five years for a jujube seed to start producing fruit, and the tree reaches full maturity after 10 years.

"The tree's root system needs deep sand and should be watered once a week during its first summer. The fully-grown tree reaches a height of between six and 10 metres."

Ian said the jujube is a traditional agroforestry species in China because it rarely competes with the intercropped crop for water, nutrients and fertilizers.

— Tracy Taggart

Editor's Note. Since the appearance of this article, and another one in *The Countryman* newspaper, Ian Fox has received many phone calls from people interested in jujube or already growing plants. He is compiling a list of sites in WA where jujube has been planted, and already has more than 30 sites listed, covering a lot of the State.

POMAG

News from the Pomegranate Action Group

There have been some interesting developments from our members working with the Pomegranate, once a popular backyard fruit in WA but one which has been very much neglected in recent years.

John Burt of the Department of Agriculture has this year obtained samples of six promising pomegranate selections (Berry, Veles PG10, Wonderful, Gulosha, Griffith,

and Victorian Giant). He is trialling these at the Medina Research Station near Perth.

He has also made some of these selections available for POMAG trials. One batch has travelled south to POMAG Leader Marius Loeffler's property at Yarloop, about 100km south of Perth, where they will join Marius's growing variety collection. (These were kindly transported by Malaysian WANATCA member Sin Siang Yang, during a visit to Val Hopkins' permaculture farm at Busselton — Mr Sin is also growing pomegranates in Malaysia.)

Another batch has travelled 300 km north, for trial at Julie Firth's Yilgarn Traders nursery at Geraldton. Julie is specializing in useful tree crops which are suited to drier conditions, and the pomegranate is an excellent example of such crops.

The pomegranate is believed to have commercial potential not only as a fresh fruit (the Tree Crops Centre has received enquiries for this fruit for export to the Middle East), but also as a source of fruit juice — pomegranate juice is a delicious drink.

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HELPING YOU GROW !

Use your literature!

The Tree Crops Centre receives an excellent range of magazines and journals of prime interest to tree croppers, either from exchange with WANATCA publications, or through subscription.

Newly-received magazines are displayed at each WANATCA meeting for members to look at and note interesting items. As many as a hundred different titles are received, some very regular (each month), others only one a year or so.

Titles include such things as *Growing Today* (NZ), *Australian Horticulture*, *The Fruit Gardener* (California Rare Fruit Growers), *CRFG Yearbook*, *Rare Fruit Council of Australia Newsletter*, *Australian Pistachio News*, *Australian Macadamia Society Newsletter*, *South African Avocado Growers Yearbook*, *Northern Nut Growers Association annual report*, *The Nutshell* (NNGA), *Horticulture Today* (WA), *Horticulture 2001*, *The Nut Grower* (USA), *WA Horticulture*, *Australian Nutgrower*, *CSFRI Information Bulletin* (South Africa), *Northern Victoria Fruitgrower*, *The Nut Kernel* (Pennsylvania), and many more.

There are also many other interesting items received which go beyond horticulture and tree crops, such as *Rural Research*, *Leaflet* (Greening Australia), *Ecos*, *The Garden* (UK), *ACIAR Forestry Newsletter*, *California Agriculture*, *MOTTO* (Men of the Trees), *Tree Society Review*, *Australian Hobby Farmer*, *Greenworld*, *APACE Newsletter*, *Australian Farm Journal*, *Society for Economic Botany Newsletter*, *Trees and Natural Resources*, and many more, including publications from Brazil (in Portuguese) and Chile (in Spanish)!

New Service

To improve the use of these magazines, the Tree Crops Centre will have them available for casual inspection and reading by WANATCA members at the Centre, in two batches:

- A) the last complete 3-month batch, as displayed at the previous general meeting; and
- B) the currently-accumulating batch, to be displayed at the next general meeting.

We do not have the resources to permit borrowing of these magazines, however it will normally be possible for members to make photocopies at the Centre (cost 10c/sheet).

Tung Nut Planting rediscovered

Noticing a property with unusual crop trees at Gidgegannup, 30km from Perth on the Toodyay road, Ivor Davies investigated and found that they were tung nut trees.

Ivor researched the property and found that the trees were the remnants of a 1400-tree planting put in by Mr C H Dark, a Treasury Department official, in the 1930s. At that time the tung nut, source of a drying oil used in paints and other industrial products, was a 'hot' horticultural item. The planting was described in the *Western Mail* for Feb 3, 1944.

The property is currently owned by Mr Les Ormsby, c/o Post Office, Gidgegannup WA 6555 (phone 574 6094). Mr Ormsby has very kindly offered to let members pick up seed nuts from the property (on the ground now) or take cuttings for propagation by arrangement.

More details of the property will appear in the next issue of *Quandong*, and we hope also to visit the property during the next WANATCA field day in November.

Tepary Bean trials expanding

Interest in growing in the planting of a number of perennial legumes which produce bean- or pea-type seeds.

Of these perhaps the most interest has been shown in the Tepary Bean, a legume from the relatively arid southwest United States which not only produces good edible bean seeds, but also an edible underground tuber. This was one of four native US plants with potential which featured in a *National Geographic* article some years back.

Most work has been done by WANATCA Executive Member Pat Scott, who has raised Tepary Beans at Roleystone for several seasons. She has now been able to supply a quantity of seed, which is being used by Alex Sheppard in farm planting trials in different parts of the State.

Tepary Bean is botanically known as *Phaseolus acutifolius* var. *latrifolius*. Pat has also been able to supply smaller quantities of seed of two other perennial legumes which she raised, the Perennial Pea, *Lathyrus latifolius*, and a Perennial Bean, *Dipogon lignosus*. These are also under limited trial.

Pat notes that these plants are "pioneering legumes — very tough and hardy. Seeds ripen late November". The basis for more promising perennial crops for WA?

Karragullen Horticultural Field Day

to be staged September 13

Defying all superstitions, this year's Karagullen Field Day will be held on Friday, September 13, starting at 9 am.

The Karagullen Field Day, held on the Karagullen Oval, is the principal annual public Expo for WA's orchardists and fruit-growers. The oval houses a huge range of displays of machinery, equipment, and services.



WANATCA will be represented at a stand shared with

Granny Smith's Bookshop in the hall at the oval. There will be special demonstrations on microwave cooking and on handling and storage of fruit. Pigs-on-a-spit will be roasting from 4pm on.

Karagullen is an important fruit production centre, in the hills about 25 km southeast of the centre of Perth. Admission to the expo is \$3.00 (pensioners \$1, students free). Enquiries to Julie Coppin on 09-293 5297.

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[Queensland DPI Farmnote HO8804004]

(G I Jamieson & M J Rice)

NEEM TREES —

Source of a natural insecticide. Part 2

(Part 1 in previous *Quandong*, Second Quarter 1991)

CULTURE

Western-style commercial development of neem tree products is very recent and is still in its infancy. No large scale plantations have yet been established, although small experimental plantings have been made recently in many parts of the world. Therefore current limited knowledge of the culture of neem trees is based on its performance in non-commercial situations.

As neem trees are established from open-pollinated seed, they show a wide diversity of characteristics, including seed yield and azadirachtin content. It is uncertain whether they can be grown from cuttings. It is expected that development of a suitable tissue culture technique will eventually allow mass clonal production of superior trees.

Seed should be collected from only precocious-fruiting, high-yielding trees whose seeds have a high azadirachtin content. This may be very difficult to arrange with overseas seed suppliers.

Fresh seed germinates rapidly, and the seedlings should be raised in a nursery. When well developed, they are carefully hardened off before being transplanted into the field. Newly transplanted seedlings may benefit from temporary shading. The most common planting density is around 150 trees/ha, but densities between 100 and 300 trees/ha are being tried. To allow passage of machinery through mature plantations, the spacing between rows should probably be greater than

the spacing within the rows. However, there is no information yet on optimum tree spacings.

Probably little soil preparation is required before planting; but every effort should be made to ensure that the soil has excellent internal drainage. Fertiliser spread around the planting site may benefit seedlings after their initial establishment. Except in very infertile soils, fertiliser applications may not be required by fully grown trees, because of their extensive root system and natural leaf fall.

Neem trees are usually not irrigated, even for establishment, so the value of irrigation is not known; but heavy and occasional watering of young trees with drip irrigation should encourage the deep root system. Possibly, carefully managed deep irrigation may improve the productivity of bearing trees.

Weeding around the young seedlings will assist their establishment, although the seedlings can survive weed competition.

Little is known about the pest and disease problems suffered by neem trees, but it is unlikely that many will be found. However, some pest attacks have been recorded overseas, which have temporarily reduced growth. Red cedar tip grubs have attacked neem trees at Nimbin in northern NSW, which is well beyond the tree's optimum climatic zone.

Measured seed yields from mature trees have varied between 11 and 50 kg/tree, with

an average of around 20 kg. Thus there is a lot of scope for improving yields through selection.

Commercial harvesting of the fallen mature fruit may pose some difficulties. It is difficult to collect the small fruit from under the trees, and there is a risk that the seeds may become infected by a soil fungus which is the source of aflatoxins. A technique is being developed to catch the falling fruit in a net. From there it can be transferred to a collecting bin with vacuum equipment.

SEED QUALITY

Two important aspects must be considered. These are: the seed selected for planting; and the quality of seed harvested for the production of ARC and neem oil.

Seed for planting should be taken only from superior trees. Be warned that many overseas seed suppliers apparently devitalize the seed, probably in an attempt to prevent other countries from planting neem trees. Fresh seed gives higher and more rapid germination than aged seed. Air-freighted seed for planting must travel in a warm hold, otherwise it will freeze on the aircraft. Seed keeps best if dried and stored in a cool, dark environment.

There are 3000 to 5000 neem seeds to the kilogram, depending on the source of the seed.

Azadirachtin must be extracted from neem seeds within a month of harvest. The azadirachtin content of the seeds falls fairly rapidly to zero after about one year. A standard neem tree produces seed with around 2% azadirachtin, and very occasional samples yield up to 4%. Yields of 5% appear to be achievable through rigorous tree selection and ideal growing conditions.

(To be concluded in the next issue . . .)

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V111 • MANAGING PHYTOPHTHORA Root Rot in AVOCADOS. (Qld, 1991). 24min. Essential video for the serious grower. \$34.95

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484C • DESERT GARDENING: Fruits & Vegetables, the Complete Guide. Brookbank (US, 1991). 282p. Pb. Excellent guide from Arizona for the dry-country horticulturist. \$28.95

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ACTION GROUP LEADERS

CHERRY: Neville Shorter, 450 5606 (2/9 Clydesdale St, Como 6152)

FIG: Alex Hart, 490 1324 (71 Terence St, Gosnells 6110)

JUJUBE: Ian Fox, 354 3131/H, 380 2571/W (15 Stringybark Ramble, Willetton 6155)

MACADAMIA: Wilf Prendergast, 384 3047 (PO Box 291, Claremont 6010)

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PISTACHIO: Tom Bateman, 401 8138 (4 Lygnern Cres. Kallaroo 6025)

POMEGRANATE: Marius Loeffler, 097-33 5220 (P.O. Box 22, Yarloop 6218)

CALENDAR OF FORTHCOMING EVENTS

- 1991
- Aug 21 Wed *General Meeting (Jen McComb — Foods from Australian Native Plants)
- Sep 13 Fri §Karagullen Horticultural Field Day
- Sep 28-Oct 5 PERTH ROYAL SHOW, Claremont Showgrounds
- Sep 30 - Oct 3 §'Role of Trees in Sustainable Agriculture' Conf, Albury
- Oct 15 Tue Executive Committee Meeting
- Nov 20 Wed *Annual General Meeting (Bernie Dell — Use of Mycorrhizas in Tree Crops)
- Dec 1? Sun ?Field Day, Toodyay & Gidgiegannup
- 1992
- Mar 27-29 §ACOTANC-92: Whakatane, Bay of Plenty, New Zealand

*General Meetings are held at the Naturalists Hall, 63 Meriwa Street, Nedlands, starting at 7.30pm.

These meetings usually include a current magazine display.

§ For contact details refer to the Tree Crops Centre

Current Subscription Rate: \$40.00 per year
(includes all publications for the year). Student Rate: \$20.00

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