

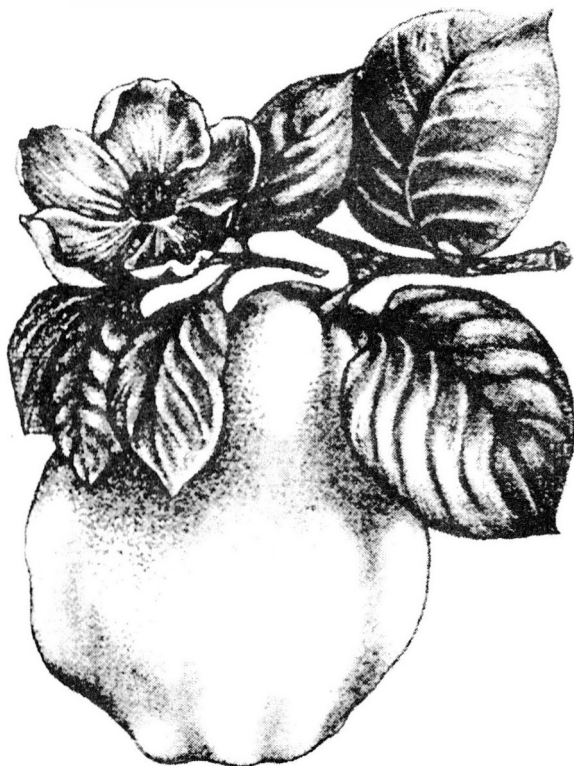


Quandong

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West Australian Nut & Tree Crop Association (Inc)
www.AOI.com.au/wanataca

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The Quince (*Cydonia oblonga*) (See: About the Cover, p. 2)

Quandong • Third Quarter 2000 • Vol 26 No 3

NEXT MEETING: Tuesday August 15, 2000: 7.30 pm

For the next General Meeting we have the opportunity of meeting Mitch Sala-Tenna and Mark Hutchison of Sala-Tenna Irrigation. Their topic is:

All About Tree Crop Irrigation and Layout

Here is an opportunity to meet up with experts with over 30 years experience in irrigating horticultural crops, a period in which irrigation methods and equipment have changed dramatically.

Our guests have asked that you bring along all your questions and requests for the latest data on different aspects of irrigation. In the relatively dry WA climate, irrigation is virtually a must for many commercial tree crops and the methods adopted can have a strong influence on profitability of commercial plantings.

*Meeting at Kings Park as usual. Full details on attached leaflet.
Visitors welcome, no charge. Queries to Tree Crops Centre, 9388 1965.*

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About the Cover

The cover drawing shows the Quince, *Cydonia oblonga* or *C. vulgaris* (See article on page 22). Known and used in Roman times, the Quince is enjoying a bit of a revival in Western Australia recently. This ancient fruit is a native of Europe, but it does have a relative in Arkansas, USA.

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.

[Countryman / 2000 Jul 20]

Moses' desert fruit miracle of survival

Wydgee station will be blooming next month but not with an early display of colorful wildflowers for which the Yalgoo shire has become renowned.

The blooms on Wydgee, about 100 km north of Paynes Fmd, will be of an entirely different nature, clustering on peach, nectarine and apricot trees laying fruit for the station's seventh annual spring harvest.

The Moses family planted the region's first and only commercial stonefruit orchard on the station in 1992 to boost ailing returns from running Merino sheep.

One of the worst droughts experienced in the region hit Wydgee in 1987, forcing the Moses to drastically cut their sheep numbers from 12,000 to 5000 head.

Bill Moses said the country took a long time to recover, and then the wool Reserve Price Scheme was scrapped and the market went into freefall from which it has only just started to recover.

"We had to decide how to diversify to generate more income, or sell up" Mr Moses said. He said his brother, Eric, who was in the drilling industry, came to the rescue, offering to finance a diversification enterprise on the station.

"Eric had researched the stonefruit industry in Carnarvon and had a small stonefruit orchard on his property in Wundowie, and we knew we had a good water source," he said.

Mr Moses said they decided stonefruit was the best option for diversification using this water because there were guaranteed pre-



Bill Moses at pruning time on Wydgee station, preparing for the seventh stone fruit harvest in a remote region of WA where he is the only commercial orchardist

miums for delivering fruit early to market and the market was totally local, with no imports of stonefruit allowed in WA.

He said the other big advantage of stonefruit was it could be produced regardless of seasonal fluctuations because the water supply was constant.

Quandong Links to ATCROS

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

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

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

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

Quandong: Atcros ref. <A1466>.

"The venture is not dependent on rainfall, like sheep production or wildflowers for tourism, and, with the exception of hailstorms, the weather won't really affect our alternative income source," he said.

Despite scepticism from many well-established pastoralists in the region, Wydgee's stonefruit operation has proved to be a big success for the Moses brothers and their mother, Val, who also lives on the station.

The bore water used on the orchard contains about 770 parts per million of dissolved salts — well within the stonefruit growing guidelines — and the deep rich red dirt produces the best tasting and coloured early season stonefruit in the State, according to buyers.

Mr Moses said 4000 trees were planted over 10 hectares in the Wydgee orchard's first year, made up of four varieties of peaches and nectarines. The station received a record annual rainfall of 533 mm to kick them off to a great start.

He said the first harvest came 18 months later and the trees had phenomenal growth rates for the first four years, mainly because of the warm climate and longer growing season. Peak production reached 15,000 trays of stonefruit in 1996.

But now the orchard has been scaled back to a more cost-efficient 2000 trees producing about 5000 trays of the best performing varieties of peaches, nectarines and apricots. Table grapes were also trialled last year.

Mr Moses said apricots were showing great potential and from 40 trees initially put in the ground, he had now expanded plantings to 300 trees and was consistently receiving \$15 a kilogram for early fruit from them.

He said the fruit produced at Wydgee was all low-chill stonefruit because the station had only 470-500 chill units every winter.

The downside of this was it was very labour intensive to thin the fruit, which took about 45 minutes per tree, and finding suitable labour in the region was difficult.

Mr Moses, who pruned the trees last month, said the stonefruit trees have begun flowering, and thinning the fruit would be completed by late August-early September.

He said picking would start in mid-October and the fruit was freighted to Perth by Wesfarmers Transport refrigerated trucks several times a week in varying quantities.

Wydgee was able to get its fruit to market, under its Kia brand, just after Carnarvon — no longer a big stonefruit producer — and take advantage of price premiums.

"Premiums for the fruit in October-November are what makes this venture viable, given high labour and freight costs," Mr Moses said. He said his main work in the orchard was from June to November, and minimal input was needed over summer, with the trees being watered through pumped trickle irrigation.

Mr Moses said shearing had been pushed back from November to January-February to fit in with the orchard's operations and he had found — apart from the heat at shearing — the two enterprises complemented each other well.

"As a diversification option, the stonefruit orchard has been successful, giving us another cashflow when we are half-way through shearing and ensuring we can stay on the station viably," he said.

Mr Moses said without the orchard, woolgrowing on Wydgee would have become increasingly unviable because of high costs of production and high costs of restoring run-down infrastructure.

The Moses run about 10,000 Merino sheep and trap 1000-2000 goats a year on 170,000 ha Wydgee station.

— *Melissa Vaisey*

[FAO-CIHEAM Nucis Newsletter / 1999 Dec]

Almond industry profile in Australia

Commercial almond growing in Australia originally began in the State of South Australia, and was initially centred around the capital city, Adelaide. Most of these plantings have since disappeared under urban expansion, with a few still existing to the South and North.

By the mid to late 1960's plantings had expanded east along the Murray River into the north-western areas of the State of Victoria.



Central Budwood Repository. New varieties just released from quarantine

By 1993/94, production had grown to 5,000 t kernel and was worth US\$ 21m annually, with Victoria producing 57%, South Australia 41% (US\$ 8.7m) and New South Wales 1% (US\$ 0.13m).

The industry has continued to expand at a steady rate of 12-13% per year with production in 1998/99 reaching 8,000 t. Expansion at this rate is expected for at least the next six to eight years. However, suitable soils and water are becoming difficult to find and are limiting expansion. Total area of almond production is approximately 4,000 ha.

Main production regions

The industry can be categorised into two distinct production groups. The first is the relatively smaller grower, primarily based in

the more traditional growing areas centred around Adelaide, and the second is the new, usually larger, holdings along the Murray River and to the east into Victoria and, to a minor extent, New South Wales.

Traditional areas

In this group are the areas to the north and south of Adelaide. There are approximately 100 growers in these areas and they have an average orchard of 1,850 trees or 7.5 ha. The unavailability of good quality water will limit further expansion in these areas and is, in fact, already severely impacting on the productivity of the holdings in these areas.

The natural rainfall of 450-500 mm is supplemented by irrigation, usually by bore water. This water is limited in supply and has relatively low quality, with an average salt level of 1,200 ppm. Coupled with relatively heavy and difficult soils, the trees regularly show the symptoms of chloride toxicity, especially those on peach and almond rootstock. The productivity of the trees in these areas reflects these problems and averages 3.5 kg kernel.

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Big healthy trees in big 6-litre bags
Grafted trees or rootstock only

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PO Box 429, Northam WA 6401

More recent developments

These areas form a narrow belt along the Murray River in South Australia and Victoria. Growing conditions are generally more favourable in these areas, with adequate good quality water and a hot dry Mediterranean climate. Soils, while fertile and generally well drained, can be relatively shallow, with a calcareous subsoil of high pH which can cause problems of lime induced chlorosis.

For this reason, Nemaguard is not a favoured rootstock in these conditions. Productivity in these areas tends to be relatively high, with an average of 6.9 kg per tree being produced in 1994.

The orchards in these areas tend to be larger and highly mechanised. Many are owned by consortiums of investors, with the properties being professionally managed. Productivity on these properties compares very favourably with that being achieved in



Seedling evaluation in the breeding programme (14 months old seedlings, planted 1 m apart, rows separated 4.5 m)

California, and the better growers regularly achieve in excess of 2.5 t of kernel per ha. Typical property sizes range from 40 ha to 1,000 ha.

Unfortunately, future development will be limited since the suitable growing area is a narrow strip along the Murray River. This river system is already overcommitted, providing for the majority of Australia's irrigated horticultural crops as well as towns and cities adjacent to it. Adelaide, South Australia's State Capital, is situated at the end of the river and depends on the Murray for 90% of its water. South Australia is well known as the "driest state in the driest continent", so the limitations are of great concern.

Industry structure

While early plantings were based on a number of Australian hardshell varieties thought to have originated from material brought from South Africa, plantings since the late 1960's have been based on the Californian varieties.

A number of these varieties have proven susceptible to diseases which have become widespread in recent years such as bacterial

MACADAMIA TREES

Grafted, top quality trees from the Eastern States. Health-Inspected by two state Agriculture Departments. More than 20 varieties available including all the top performing and newer varieties such as 816, 842, 849, A4, A16, A38, 781, 783, and Daddow etc.

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Iain Rankin, Ph/Fax 08-9776 1046 or
Margaret River Tree Planting and
Landcare Services <A3259>**

**David Rankin, Ph/Fax 08-9757 2547
PO Box 217 Margaret River 6285**

spot (*Xanthomonas campestris pv prum*) and anthracnose (*Colletotrichum acutatum*).

All current plantings are based on 'Nonpareil' with 'Carmel' as the preferred pollinator. Either 'Price' or 'Peerless' are also included. Early plantings were on almond rootstock, with these trees proving to be long-lived. All later plantings are either on Nemaguard or a locally selected peach x almond hybrid, which is propagated in vitro.

All orchards are irrigated, with around 80% by sprinklers and the balance by drip. There is a trend towards either mini sprinklers or drip. The majority of orchards use electronic soil moisture monitoring. However, in our hot dry conditions with sandy soils, water usage is high. The typical orchard uses 11 -12 megalitres of water per hectare per year to obtain maximum production. In particularly hot years, mature orchards can use 14 megalitres which is of concern with our limited water. Harvesting is by Californian shakers, sweepers and pick-up machines. Smaller properties either use second-hand machinery or employ a contractor.

Industry associations

As the industry grew there was an awareness that in order to ensure long-term success, the industry must be efficient and develop to suit Australian growing and marketing conditions. In a move to coordinate the industry on a national level, the Australian Almond Grower's Association was formed in June 1995.

In 1997 the Association applied to the Federal Government to levy a special tax on growers to help fund an extensive research and development programme. This was granted in 1998, with the funds raised being matched by the Government. These funds now provide for the majority of almond

research in Australia.

There is a dedicated Research and Development Committee which works hard to ensure the industry progresses technically. A programme has been developed which maps out the areas of research to be undertaken over the next five years.

The research programme

The industry has undertaken many small research projects in the past as problems or needs arose. However, now with guaranteed funding and a keen interest in developing technical expertise, a long-term programme has been developed.

Central to this programme is the almond improvement programme. Part of this programme was discussed recently (Bertozzi et al., 1999). It is extensive, covering the breeding and evaluation programme; micropropagation of varieties and rootstocks; the development of genetic transformation systems; germplasm repositories including cryopreservation; evaluating virus indexing techniques; developing virus elimination techniques for use in almonds; sourcing and evaluating superior varieties from around the world; evaluating rootstocks for Australian conditions and identifying superior performing clones of major varieties.

Other areas of research either currently being undertaken or are soon to begin include:

- *Improved orchard canopy management.*
- *Developing a control programme for anthracnose.*
- *Genetic mapping and marker aided selection techniques.*
- *Detection and identification of viroids affecting almonds (other than prune dwarf and prunus necrotic ring spot).*
- *A 'visiting scientist' programme to promote the regular exchange of scientists on*

sabbatical or study tours.

• *Improved nutrient and irrigation management techniques.*

The future

The Australian industry is beginning to change to more closely address the climatic and growing conditions in our country. The current emulation of the Californian technologies, while successful, will need to be adjusted so that varieties, rootstocks and agronomic techniques better suit our unique, and quite different, conditions.

Our dry conditions, shallow soils of high pH, and limited, often saline, water has much in common with the Mediterranean region. We will be moving away from the current varieties to those which are more productive, self-fertile, drought tolerant and disease resistant. We will be using superior rootstocks

that are productive; drought, pH and nematode resistant; tolerant of saline soils and easy to propagate.

Clearly, the objectives and aspirations of our industry are very similar to those of a number of countries. The Australian growers and researchers would like to think they could make a significant contribution to the pool of knowledge and research currently being undertaken.

References

Bertozi, T.; Bennett, C.; Sedgley, M., 1998. Almond improvement in Australia. *FAO-Nucis Newsletter*, (7): 10-11.

— *Ch Bennett*, Industry Development Manager, Australian Almond Growers Association Inc., PO Box 52, Berri, SA 5343, Australia. E-mail: rhc@riverland.net.au.

‘BRING & BUY’ MEETING OFFERS CHANCE OF RARE TREES

Once again, WANATCA has organized our much-anticipated ‘Bring & Buy/Tree Crops Fair’ event, at which members and others can buy and sell all sorts of useful plants, including some real rarities not available anywhere else in WA.

This year the event will again be held in the Carpark of the Captain Stirling Hotel, Stirling Highway, Nedlands. Make a note of the date:

**9.00 AM - 12.00 PM,
SUNDAY, OCTOBER 15, 2000**

This event is open to all buyers and sellers, including commercial nurseries involved with fruit and nut trees, and especially sister organizations.

This year Men of the Trees will have their own sales stand and we would welcome others.

Bookings for sellers will cost \$5, no charge to buyers. Many thanks to Stanley Parkinson for taking on the organization of this event.

To book your space, please contact Stanley on 9386 2518 (or e-mail: swparkinson@hotmail.com), or leave a message with the Tree Crops Centre.

Many thanks to the management of the Captain Stirling Hotel for their generosity in allowing us to use their site. The Hotel offers a fine range of meals and other refreshments — just the way to top off a great morning!

[Tree Crops Centre News Release / 2000 Aug]

Major tree crops conference shaping up well

Progress with Acotanc-2001, the Ninth Australasian Conference on Tree and Nut Crops, has been pleasing, and registrations are already coming in.

The Conference is to be held in Perth, Western Australia, at Easter 2001. With the theme 'Tree Crops: Essential for the Earth', the conference will have as its central thread the superiority of tree-based crops in environmental as well as economic matters.

Conference Coordinator David Noel, who is Director of the Tree Crops Centre in Perth, said that Acotanc-2001 will run from April 13 to 20. The first three days of the Conference will be devoted to concurrent streams of half-day 'Mini-Acs', specialist mini-conferences on topics such as macadamias, figs, olives, tree propagation, Australian medicinal plants, tree crops for saline and arid lands, cactus fruits, quandongs, exotic fruits, and bush tucker plants.

"Many of these Mini-Acs will be organized in cooperation with relevant specialist local groups, such as the Australian Macadamia Society", he said. "I am currently working to set up arrangements with such groups, and anyone who sees scope for a Mini-Ac on their favourite tree crop topic, please contact me".

"Days 4 and 5, that is Easter Monday and Tuesday, will be the core of the Conference, with overviews of where tree crops are going as a vital area of land use, also a feature on poster papers. The last three days will be devoted to site visits and special short tours and events, at the same time we have planned a big specialist industry expo, the 'Acotanc Show'.

Mr Noel said that it was expected that various post-Conference tours, travelling to the Southwest and to the North, would be

available. "These will be a special attraction to overseas participants, of whom we are expecting a large number", he said. "But local participants will be equally welcome, and some of these will have useful knowledge of the projected visit sites".

"We are expecting a big attendance from Western Australia", Mr Noel said. "The dates have been set so that even people with demanding full-time jobs will be able to attend at least a number of the Mini-Acs and the Core opening day".

"Interest in Acotanc-2001 from overseas speakers and participants has been excellent. Already on the interim program we have Nick Pasiecznik from the UK's Henry Doubleday Research Institute, an expert on neem, mesquite, and other dry-country trees, also locust control; Ray Givan, in my view the USA's foremost fig specialist; Roger Meyer from California, a prominent specialist in jujubes and the kiwifruit family; and Professor Roberto Coronel from the Philippines, a leader in tropical fruits".

According to Mr Noel, the Conference will also be breaking new ground in its extensive use of the Internet. "A comprehensive website has been built, at www.AOI.com.au/acotanc", he said. "This already has links to all sorts of local and tourist information, such as a plan showing the venue, Kingswood College at the University of WA. There is a link to Ansett, our official Domestic Airline, who are offering special air fares, as well as the provisional timetable and Mini-Ac list. We encourage

people to look round the site and then, when they are ready, to use the on-line pre-enrolment form to lock in their priority number for some high-demand events”.

“All the spoken papers and poster papers will be published on the Internet after the Conference”, Mr Noel said. “The very first Acotanc was held in Perth, in 1982, and this was a watershed in local attitudes on the economic value of tree crops as a major area of land use. Now, back in Perth after 19 years, we expect Acotanc-2001 to be a similar watershed in appreciating the value of tree crops in achieving economic growth hand-in-hand with environmentally beneficial approaches”.

David Noel and Acotanc-2001 can be contacted at acotanc@AOI.com.au; davidn@AOI.com.au; PO Box 27, Subiaco WA 6008; or by fax at 08-9388 1852.

[The Tree Cropper (New Zealand Tree Crops Association) / 2000 Autumn]

Olive research in New Zealand

The olive trials are coming up to the end of the initial three-year period and funding for another three years is sought. NZTCA or NZ Olive Association money will be needed to complement an AGMARDT contribution. The 12 triallists paid the NZTCA share of the first round by buying the trees, but should not provide our share again.

There are twelve trials from Central Otago to Waiheke Island, with eighteen cultivars being tested. Although variable, the trials have illustrated aspects of olive growing in their respective areas. Cold winters are an establishment problem in the South Island, especially in Central Otago and around Waihopai. At these sites trees need to be as big as possible, in the ground for a long season

before the winter, and then receive protection through the first two winters.

The easiest places for establishment, growth, and fruit set are Marlborough, Nelson, and North Canterbury, and the latter two areas have had a very good set this season, (despite numerous thrips) with heaviest yields on 2-year old trees of promising cultivars Frantoio (2.3 kg), Picual (3.3 kg), Barnea (2.5 kg), Leccino (1.3 kg), Koroneiki (3.9 kg), and Chemlali.

These yields will probably be doubled this season on the most advanced trees, but three-year old Barnea in Israel yield 40 kg, so we have far to go! The North Island generally seems to be harder for good fruit set, but this may be just in the first few years. Flowering begins first in Northland and is progressively later southwards, harvests following suit; so the right varieties for places like Central Otago will be critical.

There is an indication that, as trees get older, they flower earlier. Honeybees have been seen pollinating at one site. Geoff Elliot informed me that pollen appears heavy, and only travels a short distance, which is contrary to overseas views. Cross-pollination is vital to a good set. There is a strong interest in organic growing. Rose at Marlborough Olives is endeavouring to formulate a procedure, and welcomes ideas.

Fifty to sixty oil samples will be tested for the first time this year, and it is important that testing continue over the next three years, when the trees will be more mature, and more cultivars at more sites are cropping. The trials are doing well and should produce useful information over the next few years.

The industry looks promising and I hope we in the NZTCA can do our part to assist the process.

— Roy Hart

Vast water find gets mixed reception

The discovery of a huge new water resource in WA's inland, about the size of Southern California and up to 2 km thick, has met with a mixed reception.

[Sunday Times / 2000 May 21]

That inland sea splits experts

It's either a miracle inland ocean or a dud puddle of dubious quality.

Academics and experts are divided over the potential of nickel producer Anaconda's big desert water find.

Anaconda uncovered the two trillion kilolitre Officer Basin 400 km northeast of Kalgoorlie this week.

Chamber of Minerals and Energy spokesman Dick Scallan said the find could have massive horticultural ramifications.

Aside from the use by mining companies, this water could be used to turn the central desert into an oasis," he said. "The soil in the region is very fertile and it could become the breadbasket of Asia."

Mr Scallan said further tests on the water were needed to determine the value of the resource and the future horticultural uses.

He estimated that by tapping into the inland underground sea he could cut water costs at the Kundana mine by \$800,000 a year.

Bob Nulsen, the manager of natural resources at Agriculture WA, said more tests were needed to determine the quality of the water.

The evidence he had received indicated that the water would be useful only for growing crops such as olives, figs and pomegranates.

"Some crops could be considered and cotton could be an option. The

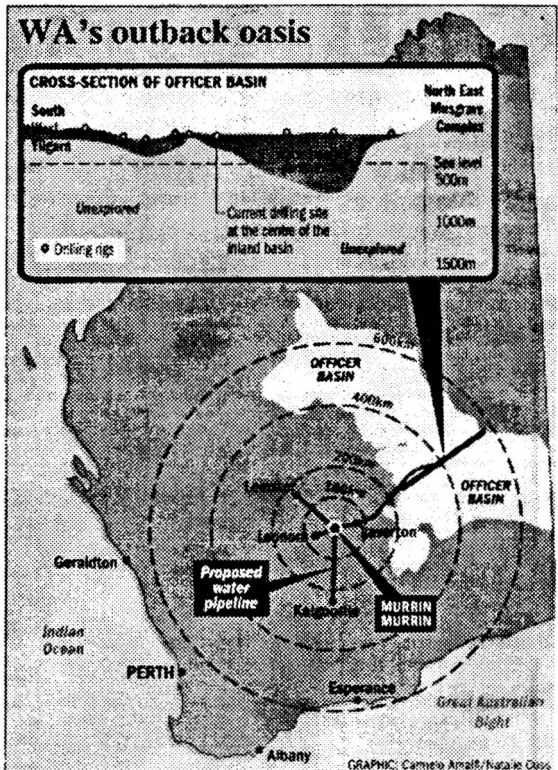
main limitation is the isolation of the site — it's a long way from markets. The soil is pretty variable because the basin covers a huge area, and evaporation is also a concern," he said.

Carbon credits

Adrian Williams, from the Centre for Management of Arid Environments, said the water find had huge implications for Australia's carbon credit problem.

He said Australia was facing tough world environmental standards.

"We can cut down on emissions from factories and power plants or we can build up



GRAPHIC: Carmelo Amalfi/Katana Disc

carbon credits by growing trees," he said. "There is no reason why trees couldn't be grown on a broad scale in this region."

Mr Williams said the Centre was already testing the viability of trees in an arid environment.

Anaconda's manager of water resources, Dr Richard Martin, said he was disappointed at some comments from government figures.

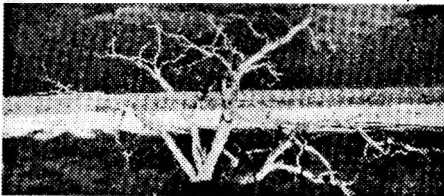
"We would like to see the Water and Rivers Commission embrace the water find a greater manner than they have done so far," he said. "They've only been thinking in terms of Perth, not about benefits to the Goldfields."

Dr Martin said Anaconda would meet with officials in Perth next week. "We certainly believe the water can be used for agricultural purposes," he said. "It's just a matter of people putting up their hands." Dr Martin said Anaconda would use about 225,000 kilolitres of water a day when all of their projects come on line.

Goldfields Utilities director Graham Thompson, whose company is looking at constructing a desalinated sea water pipeline to the Goldfields, said the find was exciting.

He said it had the capacity to service the north-eastern Goldfields and complement his company's project of bringing water to Kalgoorlie.

"People don't understand the critical situation with water in the Goldfields," he



Parched: If the massive water discovery lives up to expectations WA's arid outback could become unbelievably fertile.



Air fresheners: Vast desert plantings of oxygen-producing trees could help Australia's carbon credits

said. "Water industry bureaucrats are severely underestimating the potential of this find."

— *Graham Mason*

ISRAELI EXPERTS VISIT WA

Two experts from Israel's Ben Gurion University of the Negev visited WA in late July/ early August.

They were Prof. Yossi Mizrahi, who specializes in new dryland fruits, especially cactus fruits (and who spoke to a WANATCA meeting in 1995), and Prof. Yuriel Safrieli, who spoke about global warming and dryland agriculture generally.

The guests were brought to WA by the Moora Dryland Forum, an initiative of the Moora Catchment Group, and travelled over much of the Catchment talking to farmers, scientists, and landcare workers.

WANATCA members with e-mail addresses on our records were notified by e-mail. If you have e-mail but didn't receive notification, please let us know.

(Tree Crops Centre News Release / 2000 August)

Premier promises concession in plant introduction dispute

The long-running dispute over introduction of new plants to WA has seen a shift in positions.

The dispute arises over a punitive scheme introduced by the WA Government in 1998 which set up a 'Permitted List' of plant species and required Australian plant nurseries and botanic gardens outside WA to sign a declaration that plants being sent to WA were on WA's Permitted List.

Controversy arose because the Scheme effectively excluded entry of the 99% of plants not on the Permitted List. The List included only about 1% of the World's plant species. Plant industry commentators pointed out that the Scheme was an unnecessary hindrance to development of new plant industries for the State, was a restriction on interstate trade (and perhaps in breach of the Australian Constitution), and imposed an arbitrary ruling from which there was no independent appeal process.

The Scheme was apparently introduced to control entry of new weeds to the State.

In response to letters asking for a review of the situation, the WA Premier, Richard Court, has written to Tree Crops Centre Director, David Noel, outlining an Import Risk Analysis process (IRA) and an IRA Appeal Board proposed to be set up by the Government within Agriculture Western Australia (Agwest). The Tree Crops Centre is a private industry-development body set up to promote new perennial-plant industries.

"We were pleased to get this response from Mr Court", Mr Noel commented, "but it is only one small concession along a very long road needed to be travelled to get the situation

back on its feet. The Appeal Board proposal is welcome, but it cannot be considered independent, as it is proposed to consist of the Chair of the Agriculture Protection Board, another member of the APB, and the Chief Executive Officer of Agwest".

"All three of these proposed officers are directly employed by the Government instrumentality Agwest, and two of the three are members of the APB, the group which decided not to place a species on the Permitted List in the first place."

"Quarantine is a necessity, and weed problems must be faced", Mr Noel said, "but the current Scheme is not the way to go about it. It means that someone who is researching a new crop plant in the Eastern States, and who is willing to share their work with us in WA, cannot in theory send us plant material without first traversing an extended bureaucratic process to get the plant placed on our Permitted List. It would be quite unreasonable to expect to place such a burden upon a potential generous donor, but that is the only route open to the donor if they are to sign the required declaration."

Mr Noel said that rather than discouraging plant introductions, the WA Government should be promoting them. "In the early years of the last century, the US Government set up a full Department, the Bureau of Plant Introductions, to encourage such work", he said. "Over the years this Federal body and its successors has overseen more than half a million plant introductions into the US, with

immense and continuing benefits to that country. People often don't realize that a range of valuable fruits, such as the avocado, were brought into commerce through US introductions".

Fundamentally flawed

Late in July, Agwest released a 'Draft for public comment' of a State Weed Plan, which Mr Noel has condemned as 'fundamentally flawed, stuck in the 1960s'.

"There are two basically disturbing aspects of this plan", Mr Noel said. "It continues the 'Fortress Western Australia' approach which these days has fallen into disrepute in most parts of the world. For example, the draft plan recommends 'rigorous weed risk assessment processes for all plant material imported into Western Australia', and 'maintenance of rigorous mail checking systems'. Big Brother

is watching!".

"But the most disappointing and outdated aspect of the plan is the flawed assumption that a weed can be defined as such purely by listing its species, without any thought as to how or where it may be grown, and without any thought of combatting expression of weedy behaviour in a plant by a change in its environmental conditions, sometimes quite a minor change. Every plant is somewhere part of a natural ecology, where it cannot possibly be classed as a weed".

"In other parts of the World, the authorities have moved on beyond the simple 'Species X=Weed' syndrome", Mr Noel said. "For example, Trevor Partridge of the New Zealand Government's respected Landcare Research unit has produced an article, 'Understanding those things we call weeds' [QEd: reproduced below] which describes how plants become weeds, and how solutions to weed problems may be found in adjusting land use conditions."

"According to Partridge, in virtually all forms of land use, ranging from intensive agriculture to conservation, and of course including the growing of tree crops, there are plants that make themselves unwelcome. These are the plants that become known as weeds, and despite there being many attempts to define a weed more specifically, this rather imprecise description is as good as any."

"Partridge added that the important thing to note is that such a description has no value in saying whether this or that species of plant is actually a weed. Instead, it uses the situation to indicate that there is a problem, so a weed to one land user can just as well be a good and useful plant to another. The description of what constitutes a weed is a land use property, rather than one based on the plants themselves. It makes good sense, therefore, to consider

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that perhaps the solutions to weed problems might also lie in land use, rather than direct control of the species causing the problem.”

According to Mr Noel, the mild Partridge definition of a weed as a “plant that makes itself unwelcome” is a much more useful one than that used in the weed plan draft, which defines a weed as “a plant which has, or has the potential to have, a detrimental effect on economic, social or conservation values”. He said such a definition could be applied so widely as to be worthless.

Mr Noel also praised the recommendation in the New Zealand report to look for biological controls for weed situations, and pointed to the successful Australian-devised solution to a devastating water-weed problem in Africa’s Lake Victoria which had appeared to doom the livelihood of 30 million local people.

After many millions of dollars were spent on machines and herbicides to clear the choked lake, all to no effect, a CSIRO team led by Dr Mic Julien effectively solved the problem at low cost in the face of entrenched conventional opposition. “Everyone was mesmerized by the notion of a quick fix — chemicals and big shiny harvesters”, Dr Julien said. “All we were offering were tiny weevils”.

Disarray

The other side to the WA Government’s Permitted List of plants, is its ‘Prohibited List’. “While I am against the existence of a Permitted List, as too restrictive for a forward-looking society, I can accept the existence of a Prohibited List, if it is properly managed”, Mr Noel said. “But ours is in total disarray”.

“The Prohibited List currently contains species native to Australia without any sort of weed history, such as *Prosopis pallida*”, Mr Noel added. “It even contains species native to WA itself, such as *Ziziphus quadrilocularis*.

It also contains numerous species, such as *Acacia farnesiana* and *Acacia insolita*, which are currently on sale from the Government’s own Department of Conservation and Land Management”.

“It appears that the compilers of the Prohibited List have added some species in just because they didn’t like the name”, he commented. “One of the most tragic inclusions is Chilean Tamarugo, *Prosopis tamarugo*. Here is a species with virtues extolled by two substantial books from the UN’s Food and Agriculture Organization, and with a history of human use established by archeologists as extending back 14,000 years”.

“The *Prosopis* genus includes 43 species, of which 3 have shown weed problems. This appears enough for WA to exclude Tamarugo, even though it is not one of these 3 species”, Mr Noel said. “The tragedy is that Tamarugo has incredible salt tolerance — it can be planted through a salt crust half a metre thick and grow to establish a useful tree in arid conditions. It could be a major weapon in WA’s fight against salinity”.

Mr Noel said that the Tree Crops Centre would not be submitting any comment on the draft weed plan. “There doesn’t seem any point — none of our previous submissions have been responded to, or even acknowledged. We might be excused for thinking that they are thrown straight in the wastepaper basket as not suiting the agenda of the Weed unit”.

¥

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[The Tree Cropper (New Zealand Tree Crops Association) / 2000 Autumn]

Understanding Those Things We Call Weeds

In virtually all forms of land use, ranging from intensive agriculture to conservation, and of course including the growing of tree crops, there are plants that make themselves unwelcome. These are the plants that become known as weeds, and despite there being many attempts to define a weed more specifically, this rather imprecise description is as good as any.

The important thing to note however, is that such a description has no value in saying whether this or that species of plant is actually a weed. Instead, it uses the situation to indicate that there is a problem, so a weed to one land user can just as well be a good and useful plant to another. The description of what constitutes a weed is a land use property, rather than one based on the plants themselves. It makes good sense, therefore, to consider that perhaps the solutions to weed problems might also lie in land use, rather than direct control of the species causing the problem.

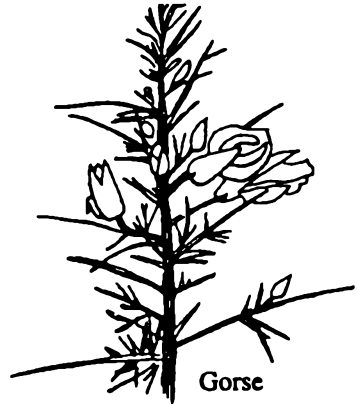
This philosophy is part of a growing movement away from technological solutions towards a much more integrated land use in agriculture and horticulture. Farmers and growers are starting to realise that the solutions offered by technologies such as sprays and sophisticated machinery have not solved their problems or improved sustainable land use in the ways that were promised.

It seems that such solutions bring with them side-effects that can be detrimental to the land, and that many of the old, less intrusive methods of our forefathers were better in this regard. This change in attitude has led to landowners taking a much broader approach to how they manage their land, and this approach is akin to that used in the study of ecology.

The foundation of ecological management is the concept of the ecosystem, that is, the interaction of all the living species present,

and the important aspects of their environment that sustain them. The application of this concept gives quite a different view of weeds and their management, and some of those views will be described.

This article offers no solutions to specific weed problems, but uses some weeds as



Gorse

examples, with special emphasis on the kinds of situations likely to be encountered in the growing of tree crops. It approaches the question as to why weeds occur, and asks whether there might be land use solutions to the problems. The most critical question is whether weeds are born or made.

To help address this, there is a very nice set of plant behaviour life strategies that were described by the British plant ecologist Grime. He saw that plants behaved in essentially three ways.

The first is the competitor, this being a

species that grows quickly, and gathers resources for its survival most efficiently. It is best exemplified by a tree in a stable forest. It tends to be long-lived, and puts limited effort into reproduction, with most work going into gaining resources such as light, nutrients and water. It does this at the expense of others trying to gain the same resources. The cost of doing this is that it doesn't respond well to disturbance, and it cannot tolerate tough conditions such as poor light or drought.

The second is the coloniser, this being a species that exploits the opportunities offered by disturbance. This is a quick-growing but short-lived species, that puts most of its effort into reproduction, its seeds being well-dispersed and long-lived, as it searches or waits for new disturbances. Its life is limited owing to its inevitable replacement by competitors that can overtop it, or gather resources more efficiently.

The third group is the stress-tolerator. This species avoids competition by toughening-out difficult conditions. Most of its resources are applied to surviving extreme conditions of drought, excess water, poor nutrients, low temperature, salinity, etc. To do so, it must be slow-growing, persistent, and usually small. If conditions improve it is usually replaced by more competitive species.

All plants have limited resources to apply to these strategies, so any tendency towards one extreme weakens the other strategies. There is therefore no such thing as a "super plant" that has all three strategies in abundance. If we look at these three strategies, the classic definition of a weed is most closely aligned to that of the coloniser.

In many situations however, plants of all three types can become weeds, and especially in the rather peculiar situations offered by the

growing of tree crops. As stated above, the potential solutions to the weed problems lie in understanding the actual conditions that have caused a species to become a problem, along with which strategy the species is using.

Problems with colonisers usually occur where frequent disturbance occurs as part of the land use. For tree crops, this might be during ground cultivation. As to which species of coloniser becomes a problem, that often depends upon the type, timing and frequency of the disturbance. With many colonisers, the repeated timing of disturbances can match the reproductive timing of many species, so that each disturbance event adds to their dominance and hence their nuisance value.

Land use practices can be adjusted to limit the impacts of coloniser weeds. The frequency of disturbance can be adjusted; this involves

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asking the question of whether cultivation or spraying is necessary, to thereby limit the ability of the colonisers to establish. With less disturbance, they will be replaced by more competitive species, as the opportunities for their repeated establishment become reduced.

Competitive species can be a major problem in agricultural practices that rely upon the maintenance of low-growing vegetation such as grass, and involve the incursion of plants that are taller and more effective at grabbing resources. This process is known to ecologists as succession, and the resource which plants compete for is light. In the tree crop situation, however, the stature of the crop plants as trees means that the kinds of plants being grown are already those of competitive species.

For instance, whereas gorse would find a grass sward ideal for overtopping, an orchard is well beyond its capabilities. Certainly, such plants may appear under the canopy, but are unlikely to be competitive with the crop, being instead spindly individuals in poor health, producing little seed, and easily removed.

However, the third group of plants, the stress-tolerators, can be a nuisance to tree crops. They are seldom problems to pastoral

land users, unless they have problems of drought (for instance mullein can be a problem) or excessive water (for instance rushes may be a problem).

This difference occurs because beneath the crop canopy lies a stressed habitat, and in that situation the stress is the limited light conditions, unsuitable for both colonisers (depending partly on disturbance levels) and competitors (insufficient light resource). There are however, many shade-tolerant species that can exploit this opportunity and can indeed become nuisances.

These kinds of plants put little into reproduction, but their energies are diverted into vegetative spread, either by rhizomes (underground stems), stolons, (creeping stems), or occasionally bulbs. These kinds of species cover the ground with a mat, and although they may not directly interfere with productivity, some, by their very growth form, have the ability to climb as well. So, a mat of periwinkle or aluminium plant may seem ideal as a ground cover, but careful vigilance is needed to ensure that they do not reach beyond their desirable values.

One other important aspect has contributed to improving the ability of many introduced species to become weeds. This is the absence of their natural predators, such as leaf and seed feeding insects and diseases. This absence gives their behaviour strategies a boost, be they competitors, colonisers or stress-tolerators. The most logical way of overcoming this advantage is the introduction of some of their predators, but only those that are specific to the target species, as part of a biological control programme.

Such a programme is already underway for many of the problem weed species in New Zealand. By understanding these plant strategy

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characteristics, and linking them to land use practices, weed problems take on a completely different meaning.

So to answer the question as to whether weeds are born or made, it becomes clearer that on the whole, weeds are made. Certainly, some have the ideal characteristics that are liable to make them a nuisance, such as the colonisers, but many are just exploiting the opportunities offered by the land use itself.

With this in mind, many weed problems can be seen as nothing more than processes of natural vegetation behaviour, be that exploitation of opportunity by colonisers, replacement sequences by competitors, or the occupation of difficult habitats (such as shade) by stress-tolerators. By understanding these strategies, any problems with weediness can be counteracted by land use changes, rather than having to resort to sprays and other extreme measures.

Ecology was once the realm of the conservationist. As can be seen from this article however, it is becoming a valuable tool in the rural setting, and indeed even in the urban situation. All our crops live in the environment, both physical (light, water, nutrients) and biotic (plants, insects, diseases). Natural systems provide many ecological lessons for management of crops, and these will result in agriculture and horticulture becoming managed as ecosystems in tune with the land and environment rather than impositions upon its resources.

One of the most valuable lessons is a reassessment of attitudes towards weeds, and hopefully this article will have explored some of those alternative views.

— *Trevor Partridge*, Landcare Research New Zealand

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[The Curator: Journal of the *Heritage Seed Curators Australia* / Harvest 1998]

An Inventory of Quince Varieties in Australia

The quince is botanically known as “*Cydonia Vulgaris*” because the old Roman name 2000 years ago, was “*Malus Cydonia*” or Cydonian Apple, as the Romans first obtained this fruit from Cydonia in Crete and the wild quince is most common in the Eastern Mediterranean and Balkans.

Probably there are also in the villages of these areas many different domesticated “landraces”. Most of the varieties listed here are those that have been taken up and sold by nurserymen. A couple are varieties bred by Luther Burbank in California in the 1880's and 1890's with the aim of producing a quince that could be eaten fresh, without cooking.

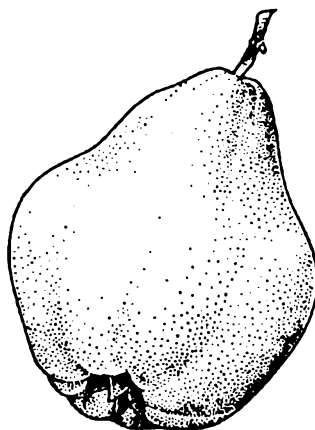
NB :Varieties in” plain text” are varieties that we know a location for in Australia. Those varieties

“In *Italics*” are varieties that are lost because there is no known source of scion material. Members of the HSCA would like to find these varieties to get grafting material so that they can be preserved into the future.

If any readers know the location of any “lost” varieties please contact Bill Hankin on: 03 51550227 or email: han.HSCA@b150.aone.net.au.

Angers: An old french variety, above the medium size, dwarf tree mentioned in the Goodmans Fruit tree Catalogue in 1914. It is still extant in Australia at 2 places: a) Orange Agricultural Research Station (thanks to Jill Campbell who is the Quince curator there, for this information.); b) There is an Angers Quince tree in the Sydney Botanic Gardens. (Thanks to Paul Nicholson at the Sydney Botanic gardens for this information.)

Apple Shaped: A heavy bearing apple shaped quince variety. Fruit ripens mid-season and is very juicy, good for culinary purposes. The tree is vigorous, spreading, small leaved



and is a productive bearer. Fairly resistant to fleck (*Fabraea Maculta*) Source: Orange

Badener: Mentioned in the Goodmans Fruit catalogue of 1914.

Burbank: Variety bred by Luther Burbank with large, smooth skinned fruit best used for drying and cooking

Champion: Readily available, heavy bearing, USA , early to mid-season variety with small, uniform pear shaped fruit of excellent flavor; bears heavily when young . The fruit has a thick mat of down and is greeny-yellow when ripe; tender fleshed. Stands up to handling quite well.

Child's Quince: (AKA *Santa Rosa*) Variety bred by Luther Burbank in 1890's from crossing *Rae's Mamouth* and *Portugal*. “Remarkable for it's great size and productiveness, for beauty of form and it's pale yellow , almost white ,skin.” Also has

tender flesh, and is small cored. This variety is almost free from the acidity of most quinces and can be eaten raw.

De Bourgeaut : French heritage variety that yields a light drop of very fine pear shaped fruit with a rich golden color and a smooth velvety skin; fruit ripens late after Pineapple and Rea's Mamouth. The fruit stores well. The tree is vigorous and spreading with large leaves. so far proved to be free from leaf blight. Source : Orange

De Vranja : (AKA Berezki) Early maturing variety originally from Serbia in the Balkans. The fruit is pear shaped, large and can weigh nearly 1.5 kg. A good cooking variety but has a low pectin content . The tree is vigorous, upright and large leafed. Source : Orange.

Fuller's: American variety that is a heavy bearer of very large pear shaped fruit with a clear bright lemon coloured skin; fruit ripens mid-season to late and is quite tender. Reported in old fruit tree catalogues to be highly flavoured. The tree is spreading and large leafed. Source : Orange

Herefordshire: Large and "good." English variety mentioned in Goodmans Fruit Catalogue in 1914 as having large late ripening fruit, of good quality.

Manning's Seedling: According to Goodman's Fruit Catalogue in 1914 'The very best quince grown'. The tree reputed to be a strong grower and a very heavy cropper.

Master's Early: A productive (Australian?) heritage variety that is early flowering but late ripening. The fruit is "medium large" and pear shaped. The tree is vigorous, spreading and small leafed. Source : Orange

Meeche's Prolific: Large, pear shaped fruit, very tender, with a nice flavour, fine

culinary variety; a heavy cropper. Mentioned in Goodmans Fruit Catalogue in 1914.

Missouri Mamouth: USA variety that produces a light yield of very, very, early ripening, large round fruit that has a deep eye and a sunken stalk. Fruit is susceptible to rots and splits. The tree grows compactly with small leaves. Source: Orange.

Mumery's Seedling: An Australian heritage variety developed by a Mr. Mummery of Blacktown in NSW. The fruit is large cone shaped, with a small calyx, and ripens late. The tree is a strong grower, upright with some spread and has large leaf that hang onto the tree. Source : Orange.

Orange: Very productive heirloom variety of unknown origin. The fruit ripens mid-season and is nearly round with a smooth skin. Has a very attractive color and a rich aromatic flavour. The tree is vigorous and spreading with small leaves. Source : Orange

Pear Shaped: Large fruit of first quality. Medium. (Goodmans 1914) Very large fruit. Medium. (Railton approx 1880.)

Pineapple: Prolific variety selected and named by Luther Burbank in 1893, after 15 years of breeding of crosses of Portugal and Rae's Mamouth. Fruit ripens late and is pale lemon in colour, Medium size. smooth skinned, and when fully ripe is eaten raw having a pineapple taste. Cooks very quickly and makes good jelly and first rate cooker. The tree is vigorous and fairly upright with medium small leaves. Source : Orange.

Portugal: Very large, low bearing, early to mid season variety; the fruit is pear-shaped with a very woolly skin and almost orange coloured when ripe; keeps well in storage. Good quality cooking quince. Probably comes from Portugal. Source : Orange.

Powel's Prize: Australian variety that

produces small pear shaped early ripening fruit. The tree is vigorous, spreading with medium to large leaves. Source :Orange.

Rae's Mamouth: An old USA variety with large, handsome, orange-shaped. fruit that ripens mid-season. Used by Luther Burbank in most of his quince breeding program in the 1870-1900's. The tree is vigorous, spreading with small leaves. Source: Orange.

— *Bill Hankin*

Sources Used

1. Quince Varieties in Australia by Dr. Jill Campbell of the NSW Agricultural and Veterinary Research Centre, Orange.

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3. Louis Glowinski The Complete Book of Growing Fruit in Australia Lothian 1992

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5. Luther Burbank How Plants are Trained to work for Man Volume 3

6. W.W. Meech Quince Culture: An Illustrated Handbook for the Propagation and Cultivation of the Quince Orange Judd Co. New York 1888 144 p.

Heritage Seed Curators Australia: <A.....>

[Countryman / 1999 Jul 29]

Likely cocoa shortage spurs northern project

Cocoa could soon be a major crop in northern Australia, if early indications of a trial are anything to go by.

A collaborative research project began recently to investigate the feasibility of growing cocoa in northern Australia.

Agriculture WA development officer Nick Richards said the project was being driven by an expected worldwide shortage of cocoa over the next 5 to 10 years.

Cadbury Schweppes has reported continuing supply problems from traditional cocoa growing countries in South-East Asia, combined with increasing demand as Asia emerged from its economic downturn, which could lead to future production shortfalls.

The Queensland Department of Primary Industry conducted limited trial work in the 1970s and 1980s at Cairns which demonstrated promising yields were possible.

A pilot planting of cocoa had also been grown successfully at a site near Darwin.

Mr Richards said substantial areas across coastal northern Australia could be well suited to cocoa growing.

The Northern Australia Cocoa Development Alliance has committed \$1.26 million to the project to conduct yield and variety trials in the three States over the next three years. Further funding would depend on the success of the initial trials.

In WA the work will be based in Broome managed by AgWA's Centre for New Industries Development.

"This project could result in a valuable new industry being established, and could foster regional development," Mr Richards said.

"We plan to thoroughly investigate the agronomic potential and economic viability of this tropical tree crop, as well as addressing



Agriculture WA's Nick Richards is assessing the viability of cocoa in northern WA.

current production constraints”.

“This will be the first time cocoa has been looked at in the context of developed world production systems to achieve high yield, good quality and cost efficient production through mechanisation.”

The joint project involves AgWA, the Department of Primary Industries Queensland, Northern Territory Department of Primary Industry and Fisheries, Rural Industries Research and Development Corporation and Cadbury Schweppes.

Mr Richards said Cadbury Schweppes would be closely involved with the project.

In addition to funding, they would provide technical advice on cocoa growing and processing including quality assessment of the Australian produced beans.

Should cocoa production in Australia prove feasible, Cadbury Schweppes has expressed interest in entering into supply arrangements with domestic producers.

“During stage one hybrid yield evaluation trials and quality testing will be undertaken on

half to one hectare plots at Darwin, Broome and in north Queensland,” Mr Richards said.

“The project will also investigate farming systems for cocoa including planting layouts, irrigation and tree management, and harvest aids to reduce labour costs. Mechanisation of cocoa pod splitting and bean extraction is also being pursued”.

“Effective pod splitting and bean extraction technology could lead to specific opportunities for commercial collaboration and export prospects for Australian engineering companies.”

Clonal cocoa will also be introduced into quarantine facilities at Darwin.

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WA 'synthetic seed' breakthrough could revolutionize tree crops

A recently-announced local breakthrough in producing 'synthetic seeds' from all sorts of plants could give a dramatic boost to many areas of plant use, including tree cropping, land reclamation, conserving rare plants, and combatting salinity.

The process, called 'somatic embryogenesis' involves treating plant cells with a regime of plant hormones to trick the cells into thinking that they are fertilized egg cells. The cells then grow into 'synthetic seeds', which when mature can be germinated and grown on to produce a new seedling each.

Unlike normal seedlings, these plants will be clones, genetically identical to the parent plant. The process has parallels with a natural phenomenon which occurs in some fruits, such as mangos and citrus.

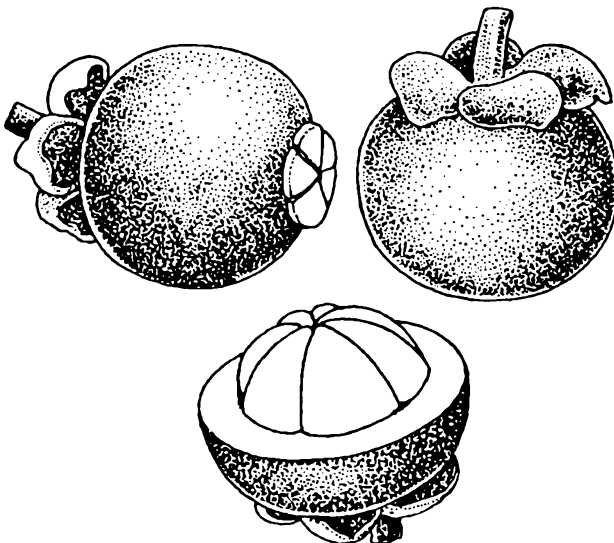
A single mango seed may contain a number of embryos packed tightly together, and each of these embryos can develop into a separate plant. In these 'polyembryonic' seeds, only one or none of the embryos is produced by the

normal sexual fertilization process, the rest are derived from the mother-plant tissue and are clones. So seeds from the 'Kensington Pride' or 'Bowen' mango, widely grown in Australia, will usually come completely 'true to type'.

With the somatic embryogenesis technique, each new plant originates from a single cell, and so enormous numbers of plants can be produced quickly from a single individual, perhaps a rare or threatened species down to a single individual in a remote location.

The process could also be used for the Mangosteen, *Garcinia mangostana*, one of the most highly-regarded tropical fruits. The weak and slow-to-grow 'seeds' produced by the Mangosteen are in fact derived from the mother plant tissue, and all *G. mangostana* plants are believed to be genetically identical, a single clone. Hence no nursery offers a range of Mangosteen varieties, although there are other *Garcinia* species which may also be called mangosteens.

The breakthrough was described in an announcement from the scientists at Perth's Kings Park and Botanic Gardens (see below), and I contact Kingsley Dixon, their Director of Plant Science, for some further information. Somatic embryo-



Mangosteens

genesis shares with tissue culture techniques the ability to produce large number of clones (although in tissue culture the technique is essentially one of growing very tiny cuttings).

I asked Kingsley whether the mixes they used for SE tended to be different for different sorts of plants, as happens in tissue culture. He said yes, it did, though success or otherwise with tissue culture was unrelated to success with SE.

Tissue-culturing of plants is a powerful technique, but there are often major difficulties in getting tiny tissue-cultured plants in their flask media through to the stage where they can be safely planted out. I asked Kingsley whether this was true of SE plants. He said no, the SE process produced what were essentially seeds, and these grew as vigorously and independently as any other seeds.

Of course I asked Kingsley about how tree crop people could get into the act. Apparently the research was funded by WA mining companies, which in WA have both obligations and a very positive record of funding plant research through their commitment to rehabilitating mining sites. Kings Park cannot undertake SE work on tree crops without a similar funding source, but their work is not subject to confidentiality restrictions and they are able to freely pass on whatever expertise they have generated.

And SE is a technique already in prospect for tree crops. The Australian Quandong Industry Association already has a proposal in (see below) for its use with quandongs.

Finally, for a bit of blue-sky thinking, there is no reason in principle why somatic embryogenesis could not be used for cloning animals. Present animal-cloning techniques, as with Dolly the Sheep, depend on extracting the cell nucleus contents from an existing

embryo and replacing them with DNA from the animal to be cloned. How much simpler to just generate directly the number of embryos required ...

— *David Noel*

[*West Australian / 2000 Jun 6*]

Rare plants get revival hope

Kings Park scientists have made a world-first plant cloning breakthrough which could allow them to emulate and then beat nature by mass-producing rare native species.

The breakthrough could be used to grow endangered plants or to produce particular species identified as valuable for land reclamation or fighting salinity.

It was revealed by Environment Minister Cheryl Edwardes yesterday to mark World Environment Day.

Kings Park and Botanic Gardens director of plant science Kingsley Dixon said the process, known as somatic embryogenesis, was faster than starting with seeds from wild plants.

The program, five years in the making, involved taking a piece of the plant and putting it in hormone gel, from which it produced many cells.

The cells then went into a hormone cocktail, which tricked them into believing they were an egg in a flower that had just been fertilised. They then produced plant embryos which could be grown into copies of the original plant.

Maggie Panaia, a PhD student involved in the work, said the process could overcome

difficulties caused by some native plants which produced little seed. Some seeds were also difficult to germinate.

One gram of plant cell could produce up to 60,000 artificial seeds.

Dr Dixon said the process could be particularly useful in regenerating wetlands and native heaths.

He said rushes and reeds did not produce many seeds and they did not have a good survival rate.

[*Acuminatum*: Newsletter of the Australian Quandong Industry Association / 2000 Sum-Aut]

AQIA research and development proposal made to RIRDC

A research proposal entitled "Clonal propagation of elite quandongs by in-vitro somatic embryogenesis" has been submitted to RIRDC.

In-vitro somatic embryogenesis is a tissue culture technique where plant material is made to produce artificial seeds without the use of flowers and pollen.

The project requires the interaction of three groups: Australian Quandong Industry Association (Ben Lethbridge) Alternative Crops Development Association (Mark Henley [also AQIA] and Peter Taverna), and South Australian Research and Development Institute (Phil Davies)

The research, to be conducted at SARDI by Phil Davies, will explore the potential commercial value of a method developed by Peter Taverna for somatic embryogenesis of quandong, and adaptation of a method developed for somatic embryogenesis of

Santalum album (tropical sandalwood) to quandong.

Bimonthly meetings will be organized for industry input and assess the progress of the project.

The full research proposal was submitted to RIRDC in February 2000, for consideration and ultimately funding of a half time technician for a period of one year. A token monetary contribution has been made by AQIA to the project. ¥

Australian Quandong Industry Association: <A1645>

Kings Park and Botanic Gardens: <A1308>

RIRDC: <A1483>

SARDI: <A3397>

For Sale

Capuli Cherry Plants

(*Prunus salicifolia*) Seedlings \$6-10 (30-60 cm). Grafted trees (varieties: Fowler, Avon) available soon at \$15, order now

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or phone

John, Linda Price: 08-9497 2302

Bill Napier: 9399 6683

New local e-mail resources on olives, bushfoods

Anyone who has e-mail and is interested in olives or bushfoods will find it worthwhile to hook up with two new WA resources on these topics. This costs you nothing and could provide some valuable information.

Harry Goff is producing an e-mail newsletter on olives, The WA Olive Network Newsletter. Here is an extract from Newsletter No.4.

Paul Seats of Olive Brook Estate from Boddington offered the following:

In regards to water usage, especially on young trees. I think that you are absolutely correct in your discussion of local conditions as a function of water requirements.

My trees which I planted last May (1999) received 10 litres every 3-4 days over summer. Some are now in excess of 2 metres high. All trees are heavily mulched with no weed competition. They also have tree guards which helps to preserve moisture.

Water was always applied to the mulch, never to the bare ground. I was constantly amazed at how the mulch helped to preserve and maintain the soil moisture. Apart from the added benefits of improving soil structure and providing habitat for all sorts of macro and micro-organisms. Mulching is king in my books!

To get on this newsletter distribution, just e-mail Harry at <colyton@iinet.net.au>.

WA native foods discussion group

Recently Helen Coleman <helenc@

southwest.com.au> has set up an e-mail discussion group growing native foods in WA. This is run through a list server (this takes in comments ["posts"] from a member of a group and automatically distributes them to all members of the group).

Here is a recent post:

As a follow-up to the Native Foods Seminar held at Muresk, WA in April 2000 an email discussion group has been created. The focus of the group will be on sharing information and ideas about bushfoods and the development of the industry in WA.

If you would like to join the group, just go to the sign-up page at <http://NativeFoodsWA.listbot.com>

This post was on the well-established and active Australian Bush Foods e-mail discussion group, run so ably by Sammy Ringer of Australian Bushfoods magazine. That group can be contacted at: Bushfoods <bushfoods@listbot.com>.

Help is at <bushfoodshelp@listbot.com>, and the associated Bushfoods website is at <www.hotkey.net.au/~bushfood>.

Australian Bushfoods: <A3075>

WORKING ON MEDLARS

Chris Tebbutt (phone 08-9319 8728) is working on the Medlar (Mespilus germanica), an old European fruit which was once popular but now is very little known.

Chris has ordered some trees from Flemings in Victoria (\$20) and reports that Hoops Nursery in Forrestfield have some at \$80 each. Peter Coppin of AgWest told him of some trees in Watsonia Road, Araluen. Contact him if you have more information.

[Los Angeles Times / 2000 May 17]

California Cherries — a Tale of Ups and Downs

The best cherries are irresistible: dramatically dark, bite-sized, crunchy but still melting in texture, with an intense tangy-sweet flavour that begs you to eat another.

Too often, however, cherries are small, underripe and disappointing. The saga of the California cherry industry is full of ups and downs: bumper crops and weather-induced disasters; giant, matchless cherries and mediocre, pinkish fruits; the decline of traditional growing areas and the emergence of new markets.

But for those who are careful, the state offers transcendent cherry experiences, from mouth-watering Bings to a fruit paradise in the Valley of Heart's Delight, where you can sample exquisite Coe's Transparents and legendary, outrageously flavourful Dukes.

California's cherry season, which will reach its peak in the next couple of weeks, begins in April with a gold rush near Arvin, in the southeastern corner of the Central Valley. Few Americans ever taste this crop; it's virtually all air-freighted to Japan, where brokers vie to procure the first cherries. They'll pay up to \$135 for an 18-pound carton, five to 10 times what Americans will pay. The Japanese so prize cherries that they'll spend a shogun's ransom at department stores for two or three fruits in a paper cup.

Until recently, cherries were rarely grown in the southern half of the Central Valley because the hot summers caused trees to bear "spurs" and "doubles," malformed fruits. In the last decade, after breeders developed two early-bearing varieties, Brooks and Tulare, that proved resistant to this problem, growers planted several thousand acres.

On a sweltering morning at Steven Murray's ranch near Arvin, in the shadow of the Tehachapi Range, bright red fruit gleams like Christmas lights on the branches as Murray ties yellow ribbons to the trees ready for picking. While workers with metal buckets strapped to their waists manoeuvre tall ladders into the canopies, Murray exhorts them to pick only the darkest cherries and to be gentle when they pour the fruits into giant bins.

Last year, for once, the Arvin growers struck

gold with a huge harvest. This year, more typically, a lack of the winter cold necessary for cherries to set fruit resulted in a light crop in the area. Even experimental low-chill varieties, which might potentially allow cherries to be grown as far south as Los Angeles, had few fruits.

The problem is that cherries have exacting climatic requirements. If the winter is too warm, or if it freezes or rains during bloom, fruit set suffers; if rain falls around harvest time, the cherries swell and crack open, leaving them unsalable.

Vanishing 'Tarts'

Early on a harvest morning in Linden, in the heart of California's main cherry district, dew still moistens the leaves as J.P. Barbagelata roars on a three-wheeled cart around his 40-acre orchard of cherries and walnuts. Pulling up to a gnarled old tree with a 3-foot-thick trunk, he reaches out to a branch heavily laden with small, purplish-black cherries with finger-staining black juice and a remarkably nuanced blackberry-like flavour.

"When my dad arrived from Italy in 1919, the Black Tartarian was the fresh cherry grown around here," he says, popping a fruit in his mouth. "It's still my favourite for eating, but it's small and soft, so there's no demand for them, except at farmers markets. The Tarts are here strictly as a pollinator for the other trees."

He rides over to a tree of Bings, large, plump, crisp and aromatic fruits that account for more than 80% of California's crop. Fortunately for cherry lovers, the Bing tastes as good as it ships, a combination rare in the world of fruit. In the days when growers shipped mostly to local markets, soft varieties like the Black Tartarian, known as "hearts" for their signature shape, were much appreciated for their fine flavour and tender texture.

According to Edward Bunyard, the great early 20th century English philosopher of fruit, some connoisseurs considered firm-fleshed varieties "a blot on the cherry escutcheon."

But in the last 50 years, the increased importance of long-distance shipments led to the dominance of roundish, crunchy types, called bigarreaux (the name originally meant bicoloured, like the yellow and red Royal Ann, but it came to refer to all firm cherries).

Although other varieties are nipping at its heels, the Bing continues to be king. Its longtime consort, the Royal Ann, has fallen from its throne. At one time the most illustrious of bigarreaux, this light-fleshed cherry with yellow skin mottled by a red blush was once California's most important variety, used for canning and brining (to make maraschinos), and beloved as a fresh fruit for its size, beauty and rich flavour.

For its time it was a giant, but the Rainier, a similar-looking but bigger, sweeter Washington-bred variety introduced in 1960, has taken its place. The Rainier may lack the complexity of a dead-ripe Royal Ann, but it's extraordinarily sweet, registering up to 24 degrees Brix (a scale measuring sweetness), compared to an average of 18 for Bings.

Growing it to perfection takes some coddling. In cherry country, it's not uncommon to see a stand of Rainier trees, like bathing beauties out for a tan, soaking up the rays from Mylar reflectors spread on the ground to intensify the blush on the fruits.

An Early Start

Fittingly, the California cherry industry got its start with the Gold Rush. Spanish missionaries and Russian traders kept a few cherry trees, but it was only after 1850, with the arrival of American settlers, that substantial orchards were planted.

Through the early 20th century, Santa Clara, Alameda and other counties adjoining San Francisco Bay, blessed with an ideal climate for cherries, were the main growing areas. Plantings peaked at 18,000 acres in 1927, just as Washington overtook California as the leading sweet cherry producer.

Over the next two decades, the cherry industry moved east to San Joaquin County, around Stockton, where land and water were relatively cheap. Although Santa Clara still grew the finest cherries, economics favoured San Joaquin, which emerged after World War II as the California

industry's centre.

After a decline in the 1970s caused by disease and urbanization, the cherry industry has expanded steadily since the opening of the export market to Japan in 1987; it's an estimated 21,000 acres today. That's an all-time high, and many farmers fear that if the trend continues, oversupply may lead to bust. According to some counts, California's record crop last year, 106.7 million pounds, actually surpassed Washington's.

Usually Washington and Oregon rank first and second in sweet cherry production. This year's California harvest initially appeared to be average, about 67 million pounds, though a rainstorm in the Central Valley Monday night could have reduced that by as much as 10%.

Today, two-thirds of California's crop grows in the triangle formed by Stockton, Linden and Lodi, where mild delta breezes moderate the heat of the San Joaquin Valley, allowing cherries to mature slowly enough to build size, firmness and flavour.

Despite the commercial predominance of the San Joaquin Valley, it's the Santa Clara Valley, where the sea breezes bring moderate temperatures, warm days and cool nights, that produces the state's largest, finest cherries.

Valley of Heart's Delight

In Morgan Hill, south of San Jose, Andy Mariani sometimes picks cherries as large as small plums, though such behemoths are rare. With most fruits, bigger does not mean better, but for cherries, size is important for commercial and taste reasons: Larger ones generally have more sugar and flavour.

Humans like the same climate as cherries, though, and that is proving to be the undoing of Santa Clara's farmers. In California's golden age of stone fruit between the wars, it was known as the Valley of Heart's Delight, but in the 1950s and '60s, factories and subdivisions pushed out the orchards, leaving only a vestige of commercial production in the renamed Silicon Valley.

Santa Clara's cherry season starts a few weeks later than Stockton's, typically the end of May. About the third week of June, Mariani holds a cherry tasting of 40 to 50 of his hundred-odd cherry varieties. The lucky visitors gobble rare cherries

(many available nowhere else) set out in wicker baskets on long tables as they trade rare-fruit stories and listen to Mariani.

"Depth of flavour is what you look for," he says as he bites into a Black Republican, the dark, sweet father of the Bing. Abandoning his usual understatement, he rhapsodizes about the Black Eagle's intense, complex taste. On this day he calls it his favourite, but his eyes gleam as he holds a Coe's Transparent up to the sun, revealing the stone. The dainty little fruits, pale salmon with a pink blush, have tender, almost liquid flesh and sugary sweet juice.

Most intriguing is a dead-ripe San Martin Duke with a penetrating citrusy flavour. Dukes, crosses of sweet and sour cherries that share the characteristics of both types, have an ideally refreshing balance of sweetness and acidity.

Regarded as the aristocrats of cherries a century ago, they're ill-suited to modern commerce and are grown only by fruit collectors today.

'The Santa Clara Valley Is Done For'

Mariani's tastings may not continue much longer, as development marches south and swallows prime agricultural land. He claims that since Morgan Hill has become a bedroom community—traffic heading north on U.S. Highway 101 often jams by 5:30 a.m.—warmer winters caused by asphalt, autos and heated homes mean he rarely sees a full crop anymore.

"We used to get over 1,000 hours of chilling in a winter; now it's more like 700 to 800," he says wistfully. "The Santa Clara Valley is done for."

This has already happened in Sunnyvale, just west of San Jose. Once, this district grew the state's very finest cherries, with a climate even more ideal than what's farther south.

Now, Charlie Olson, tall and tanned with a farmer's giant hands, rescues one last miraculously bountiful crop just ahead of the bulldozers tearing up his family's 12-acre farm.

"We've been here 100 years, but we're broke, and the land is worth upwards of \$1 million an acre," Olson says. "It turns my stomach, but what can I do?" From his favourite tree, he picks a lusciously huge, crisp Bing, bursting with layer upon layer of flavour.

A bit later, his daughter Debbie strolls across the road to a 3-acre plot of cherry trees owned by the city of Sunnyvale, which the family will continue to farm, almost as a living historical museum.

Her fruit stand will continue to sell Santa Clara cherries until only the ghosts of vanished orchards remain to sing of sun and sea breezes, of what was once California's best cherry land, now covered with houses.

CHERRY VARIETIES

Bigarreaux. Firm-fleshed, roundish cherries such as Bing and Rainier. Prototype was Yellow Spanish, a 400-year-old variety. Name, from bigarre, meaning mottled, originally referred to yellow fruits with a red blush, such as Royal Ann.

Bing. Seedling of Black Republican named after the Chinese workman who found it at the Lewelling nursery of Milwaukee, Ore., in 1875. Large, very crisp, dark red skin and flesh, complex flavour, aromatic. Midseason. The predominant commercial cherry, 83% of California's crop. Among the best, if well grown.

Black Eagle. Cross of Yellow Spanish with May Duke, selected in England about 1810. A heart-shaped, small, tender, deep purple or nearly black, with a rich, high-flavoured juice. Early to midseason.

Black Republican. Seedling of Black Eagle originating in 1860 at the Oregon farm of Seth Lewelling, an ardent abolitionist; name antagonized pro-slavery neighbours. Small to medium, firm, dark red to glossy black, very sweet with a distinguishing smack of astringency. Late season. Excellent flavour, but too small for commerce.

Black Tartarian. Originally from Russia, introduced to U.S. in early 19th century. Medium, soft, purplish-black; has rich, nuanced blackberry flavour. Early. One of the oldest, best-known hearts; still available because it's used as a pollinator.

Brooks. Cross of Rainier with Burlat, released by UC Davis, 1988. Large, very firm; skin and flesh range from pink to purple; low-acid, tastes reasonably good even when immature; flavour excellent when ripe. Early. Resistant to spurs and doubles; mostly grown for export; 5% of California's crop.

Burlat (Early Burlat). French variety, selected

by L. Burlat; released in the U.S., 1961. Medium size and firmness, fair flavour when ripe. The earliest cherry.

Duke. Class of hybrids between sweet and sour cherries, ideally mixing refreshing acidity and sweetness. The prototype and most celebrated, May Duke, dates from 1688. Revered as the finest cherries in the 18th and 19th centuries, Dukes are rarely grown today except in Eastern Europe. Excellent for preserves.

Heart. Class of soft-fleshed cherries, often heart-shaped, such as Black Tartarian and Coe's Transparent (above). Many have excellent flavour but are too delicate to ship. No longer commercially important. Also called "geans."

Montmorency. Old French variety. Small to medium, bright red skin, pale yellow flesh with pink juice, tart. Midseason. The leading sour-pie cherry variety, important in Michigan and New York but rare in California.

Rainier. Cross of Bing with Van; originated in Prosser, Wash.; introduced 1960. Very large; skin yellow, covered by pink-red blush where exposed to sun; flesh firm, white-yellowish, very sweet when ripe. Midseason. A premium cherry but hard to grow; just 2% of California's crop.

Royal Ann (Napoleon). Old European bigarreau, first named Lauermann; renamed Napoleon; Seth Lewelling brought trees to Oregon in 1847, lost the labels but recalled the name featured royalty. Medium to large, skin yellow with pink-red blush; flesh firm, white-yellowish; flavour superb when ripe.

Midseason. Once California's leading variety, now used for processing; rarely planted today, usurped by Rainier.

— *David Karp* <dkarp@sprintmail.com>

[WANATCA member David Karp, also known as "The Fruit Detective", is a master of research and description of fruits in his native USA.]

"The fruits of excessive caution are short-term complacency and long-term dismay"

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920D * **DIRECTORY of APPLE Cultivars.** Crawford (Aus, 1996). 234p. Pb. Tremendous sourcebook, full details (dates of flowering, ripening, picking, fruit character, diseases etc) for over 2650 cultivars, plus varieties for special uses and conditions. A unique work at a special price. \$44.95

1346F * **FOOD & FRUIT-Bearing FOREST Species - Examples from LATIN AMERICA.** FAO (Italy, 1986). 308p. Pb. Highly-recommended source of scarce information. \$104.95

L134 * **GERANIUM Oil (NSW, 1985).** 2p. \$2.00

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CALENDAR OF FORTHCOMING EVENTS

Deadline for next issue: Oct 20

2000

- Aug 15 Tue **General Meeting** (Sala-Tenna Irrigation - All about Tree Crop Irrigation & Layouts)
- Aug 19 Sat § Australian Quandong Industry Conference, Adelaide
- Aug 26 Sat *Agroforestry Field Day, Boyup Brook
- Aug 29-31 *Dowerin Field Days
- Oct 15 Sun **WANATCA Bring & Buy / Tree Crops Fair**
- Nov 14 Tue **Annual General Meeting** (Grafting and Budding Workshop / Seminar)

2001

- Mar 10-11 § West Australian Olive Festival, Gingin
- Apr 13-20 **ACOTANC-2001 Conference, Perth**
- Apr ?22-?29 Commonwealth Forestry Association Conference, Perth?

*General Meetings are held starting at 7.30pm. *Venue: Theatre Room, Kings Park HQ, West Perth.* These meetings usually include a current magazine display.

• Event with WANATCA participation; § For contact details refer to the Tree Crops Centre.

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

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