Quandong

magazine of the

West Australian Nut & Tree Crop Association (Inc)

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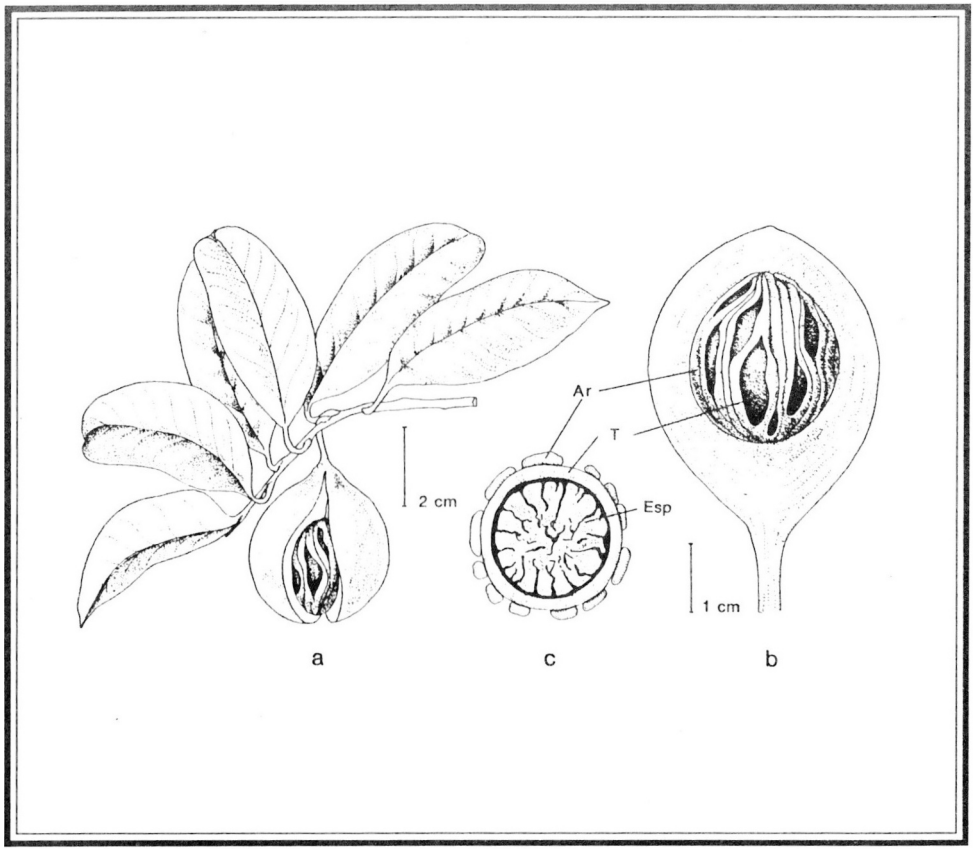

The NUTMEG (*Myristica fragrans*)

(See: About the Cover, p.2)

Next Meeting:

Use of Mycorrhizas in Tree Crops

Dr Bernie Dell

For our November meeting (also our AGM), we have a most interesting speaker, Bernie Dell from Murdoch University. Bernie will be talking about useful Root Fungi (Mycorrhizas) in Tree Crops.

Studies and trials in recent years have dramatically demonstrated the value of introducing different types of useful root fungus in growing trees. Frequently growth rates of inoculated trees can be double that of control trees without fungi, under otherwise identical conditions.

Obviously the commercial potentialities are huge. But we are only at the beginning of the process of exploiting root fungi for crop trees, there is still so much to find out.

Some of these fungi are what might be called 'broad-spectrum', in that they seem to work on a big range of species. Others are much more specific, and a particular strain of a particular fungus species may be needed for best results with a particular crop tree species.

These root fungi also vary in form. One group, the endo-mycorrhizas, actually live within the root tissues, while the ecto-mycorrhizas form a jacket or coating around root surfaces. Sometimes the relationship is so intensely symbiotic that the fungus virtually operates as one of the essential organs of the plant.

The fungi also vary in what they do, why they are beneficial. While many can preferentially extract trace elements and so promote growth, others can suppress diseases in their host plants (see the article on Sterile Red Fungus in this issue of *Quandong*). And some soil fungi actually 'trap' harmful nematodes (eelworms) by catching them in root loops which are drawn tight, a sort of 'underground lassoing'.

Bernie Dell is currently a Senior Lecturer in the School of Biology at Murdoch University. He has a long association with WANATCA, and in fact he was the Editor of our Yearbook for some years in the early days. He was brought up in a horticultural family, and one of his brothers is today a commercial fruitgrower in the Perth Hills area.

Bernie is also currently President of the Royal Society of Western Australia, the State's foremost scientific organization.

Time: Wednesday November 20, 7:30 pm

Place: Naturalists Hall, 63 Meriwa Street, Nedlands

About the Cover . . .

Our cover picture shows the Nutmeg, *Myristica fragrans*. The illustration is from a superb newly-available book, *The Cultivated Plants of the Tropics and Subtropics*, by Sigmund Rehm and Gustav Espig (see Granny Smith advert in this issue).

Nutmeg is a native of Indonesia, which is still the principal commercial source, together with Grenada in the Caribbean. As well as the nutmeg itself, the spice 'mace', from the aril, is also well known.

In addition, an essential oil is extracted from the fruit, and the edible fleshy part is used locally for pickles and preserves.

Australia has a related native species, *Myristica insipida*, which extends down the east coast as far as New South Wales. It is possible that this species could be topworked or used as a rootstock for local nutmeg production in subtropical areas.

Key to figure: (a) fruiting branch; (b) fruit opened longitudinally; (c) seed in cross section. Ar = Aril, Esp = endosperm, T = testa.

Book now for ACOTANC-92

It's getting nearer — the 6th Australasian Conference on Tree and Nut Crops is very close on the horizon.

To be held at Whatakane, on New Zealand's Bay of Plenty, on March 27-29 next year, this is the second ACOTANC conference to be hosted in New Zealand, and the first NZ staging to be held in a provincial centre.

ACOTANC-86, the first New Zealand staging, was held in Auckland.

This conference has a special connection with WA. Following the successful visit of a group of NZ horticulturists to Perth this year (the members of the group included Roland Clarke, a founder of the New Zealand Tree Crops Association), the same travel agents who arranged that visit expressed an interest in being involved in ACOTANC.

Following discussions with the ACOTANC Permanent Secretariat, itself housed in WA at the Tree Crops Centre, Beth Brown of Blue Ribbon Travel flew to Whakatane (her home town) and concluded an agreement with the NZTCA hosts to arrange all travel and attendance by delegates from outside New Zealand.

The main overseas contingents are expected to come from the various Australian States, but we also hope to see representation from North America, Asia, and Europe. Interested groups all over the world are being circulated with details.

Air travel to New Zealand has never been cheaper. And Beth Brown hopes to bring together travel groups from the different departure points big enough to offer substantial group discounts to the attendees.

Within New Zealand, Beth has arranged a choice of seven different coach tours, enabling visitors to see areas of horticultural and tourist interest on either the North or the South Island. These are designed to suit both dedicated (one-eyed?) growers and their more holiday-minded companions. March is a great time of year in New Zealand!

A leaflet on the Conference is being distributed with this issue of *Quandong*, and the advertisement below gives all the essential details. Book in without delay — there are worthwhile extra discounts for early bookings.

[The Countryman/ February 7, 1991]

Quandongs in line for tourism dollar

Australia's quandong tree or native peach, as it is sometimes called, has the potential to become an important cash crop producer by the year 2000, according to Geoff Wilson, Executive Director of the International Tree Crops Institute (ITCI).

A non-government organisation which now operates in five countries in the Asia Pacific region, the ITCI promotes agroforestry and other tree farming systems.

Geoff Wilson is co-authoring a book, *Farming Australian Quandongs*, with Brian Powell, a well known South Australian farmer who is growing quandongs commercially. The two are among the quandong enthusiasts who have organised a seminar on quandong and carob farming at Mildura, Victoria, on February 19-20.

Geoff Wilson based his projection for quandongs on work done by the CSIRO and others on the practical and economic aspects of large scale production. He considers Australia's developing tourism industry will be one outlet offering a market for a uniquely Australian food and a low-weight dried food which could be sold as a souvenir to departing visitors.

At present dried quandong flesh sells for around $50/kg. Each kilogram provides from 100 to 150 serves. Quandong trees produce fruit in late spring and early summer. Geoff Wilson says this harvest period would fit in well with farm labour needs.

They can be grown on relatively poor soils in low rainfall areas. Most of the best quandong varieties are found in Australia's arid zone.

Brian Powell has found quandongs can be grown using salty water. For 10 years he has drip irrigated his orchard of some 300 quandong trees with bore water containing about 3000 parts per million of salt. Based on his growing experience, Brian Powell believes quandongs will stand up to 8000ppm of salt.

Wilson believes that most economic quandong growing enterprises will be located in arid zone areas where natural stands can be fenced off from farm livestock and native fauna. But an indication of the potential is that the natural habitat of quandongs covers an estimated 300 million hectares of the continent.

With a return of $50 per kilogram, dried quandong flesh could be an alternative crop in the harsher Australian climate of desert regions. Tourists are likely to be earmarked as a market for the rare delicacy, which can be harvested at a time suited to seasonal farm labour demands.

Regrettably, much of the quandong gene pool has been lost due to

overgrazing by cattle and sheep and droughts. According to Brian Powell, the best flavoured quandongs are those from the Simpson Desert, and he hopes for a breakthrough in their commercialism through grafting.

The Mildura seminar should boost interest Australia wide in quandong production. Significant investment has already begun, and a 2000-tree quandong orchard is under way on mallee sands in Victoria's north east.

— Mary Busher

New information on quandong

Interest in the quandong as a fruit has seen a great upsurge recently. Last month, on October 18, the South Australia Department of Agriculture sponsored a 1-day seminar on the topic.

The Seminar, entitled *Quandongs, a Viable Opportunity*, was held at the Minnipa Research Centre. With over 100 attendees, the event was judged a great success.

The Tree Crops Centre has arranged to have copies of the 28-page seminar proceedings available. These will cost $8.45 from Granny Smith's Bookshop.

The papers include articles on quandong history and aboriginal use, research and cultivation at the Quorn Experimental Orchard in SA, marketing and quality control, the SA Ag. Dept.'s quandong evaluation programme, marketing prospects, a range of recipes and other uses, and a copy of the new CSIRO leaflet on quandong.

Also now available from Granny Smith is a nice little publication, *The Quandong Tree Information Booklet*, written by Ruth Anderson, one of the presenters of papers at the Minnipa seminar. This gives a short but detailed description of how to germinate and start quandongs. It is available from Granny Smith at $3.45.

The same booklet is available direct from Ruth as part of her 'Quandong Kit'. This kit also contains a pack of 10 selected quandong seeds, and costs $8.50 posted. Contact Ruth direct for Kits, at Cooyerdoo Station, Iron Knob, SA 5601.

Jumbo Quandong Seeds available

A good supply of quandong seed, kindly provided by WA quandong grower John Saggers of Kendenup, will be available for members to buy at the November 20 meeting.

Normal seed will be 20 for $2. There will also be a small supply of Jumbo seed (some over 30mm across, twice the diameter of normal quandongs) at 5 for $2. First come first served.

The easiest way to raise quandongs is to push the seeds into the soil near a suitable host (such as a wattle) so that their tops are at ground level. Then forget about them. (Patience is a virtue).

[WA Horticulture/ August 1991]

Cashew more than a nut

The $20 million worth of cashews which Australia imports annually could one day be supplied by local production, according to Dr John Millington.

Dr Millington is research director of Voyager Enterprises, which is developing one of two commercial cashew plantings in Australia.

Voyager Enterprises began operations in 1988 and now has 30,000 trees on a section of a 503-hectare farm at Kununurra (in the far north of Western Australia).

"With trees it is a long-term project to get them to maturity and measure their yields, but these ones are encouraging at this stage and consistent with experimental plantings in the Northern Territory," Dr Millington said.

"The three-year-old trees are expected to give significant yields this year, while with macadamias it would take several more years before the first harvest."

He said there were plant nutrition problems because the Ord soils were among the oldest in the world. Even though they were heavy-textured clays they were extremely deficient in all essential plant nutrients.

"Due to their extreme age they have been leached for hundreds of millions of years and the nutrient elements remaining are held mostly as unavailable carbonates, necessitating the use of a complete available fertiliser," Dr Millington said.

"Because the soil has a high pH it has been necessary to use chelates of iron and zinc, in particular, to overcome the problem. Research we have done has made it possible to establish the trees without any notable nutritional check."

Dr John Millington examines the quality of the apple grown on the tree.

With the nutritional problems now resolved, the research team is hopeful of

obtaining this year some measure of the economic performance of the best trees.

The plantation was established using superior trees from Brazil and Kenya and contains some of the best genetic material available. Breeding and selection is continuing with these trees.

Dr Millington said commercial plantings in WA needed to have an economic performance comparable with cashews growing in South American countries, where the nuts grew in the wild and labour costs for harvesting were very low.

"With mechanisation it is possible to compete directly with the cheapest labour," he said.

"The harvesting of coffee in Brazil has shown that even with labour at $40 a month, costs can be halved by machines. The same principle can be applied to cashews.

Dr Millington said the two research programs being carried out at the plantation covered the growing of the trees and the processing of the end products.

But because of the high costs involved with processing the by-products, big volumes were required to justify development.

Dr Millington said the 30,000 trees now on the property should give an early indication of the problems of growing, harvesting, handling and processing the tree and its end products.

Cashew shell liquid (CNSL) is one by-product. It is used as an adhesive and, according to Dr Millington, is extremely poisonous, with the same toxicity as poison ivy.

After World War II the Americans developed intercontinental missiles and created a strong demand for CNSL to bond asbestos in the missile nose cones. The Americans negotiated with the Brazilians to process their cashew nuts to produce CNSL.

The cashew nut kernel, Dr Millington said, was not prized by the Brazilians, who grew the trees for the cashew 'apples' they bore.

CNSL is used in big amounts by motor car manufacturers as it is the only material which

Bronwyn Jennings examines roots for mycorrhiza which assist the tree to obtain essential nutrients

is satisfactory for bonding brake pads.

There are a few trees in Brazil which do not produce cashew shell liquid, and for that reason it is possible to just crack the nut like an almond and eat the kernel wnhout having to process it to remove the CNSL." Dr Millington said.

"However, it is almost impossible to find under the trees nuts that have not been chewed and the kernel destroyed, which indicates how effective the CNSL is in keeping pests

out of the nuts. Some trees with no CNSL are included in the trials at Kununurra."

Dr Millington said that as the cashew tree produced five times as much apple as nut, it was anticipated a substantial tonnage would be needed to meet demand for cashew apple as fresh fruit on the Australian market.

Last year the company sold a number of consignments of the fresh fruit through a food store in Perth.

The cashew apple, Dr Millington said, had five to six times as much vitamin C as an orange and was the most popular fruit juice in Brazil.

There was scope for selection as apples from different trees varied in the amount of tannin they contained, and some were sweeter and more palatable than others. The size of the apple also varied with the variety.

But because cashews were a new venture in Australia, decisions on processing were crucial, he said. A recent release of a scaled down version of the leading processing plant was of great interest as it could work with a small tonnage.

The company, in conjunction with the WA Department of Agriculture, is carrying out a series of grafting trials at different ages and on different root stocks.

"We are grafting trees at ages from 2 to 12 weeks at two-week intervals and then taking the trees into the field to see if they survive grafting at a young age" said Di McFadden, a research officer with the department.

"Basically we are looking to see how young we can graft the trees, for the younger they are grafted and planted out ,the less time they spend in the nursery and the lower the cost of the tree."

— Valma Ozich

Vetiver Grass available

At long last the Association has available some Vetiver Grass for propagation.

This interesting plant, noted for its cold, heat, and drought resistance, has great promise for soil stabilization, particularly in sloping orchard sites, dam and creek banks, and cuttings and gullies.

It sends down deep roots very quickly, and if properly planted can produce a self-terracing effect in hill orchards, by forming an inpenetrable natural fence which holds back loose soil.

We have about 20 pots of vetiver. These originated from the Department of Agriculture research station in Kununurra, and have got down to Perth through the aid of member Julie Firth, in Geraldton. Julie is herself propagating vetiver now at her Yilgarn Traders nursery.

Single pots of vetiver will be given to interested parties who undertake to propagate and bulk up the plant for wider distribution. Contact David Noel at the Tree Crops Centre on 385 3400.

[Australian Farm Journal/ September 1991]

NT spearheads cashew industry

The Wildman River cashew plantation, 150km east of Darwin, is well on the road to commercialism.

This seven-year-old, 40ha pilot scheme involving 8500 trees is the embryo of a venture by a Singapore-based food company and cashew processor and marketer, Britannia Industries Pte Ltd. It is showing the way when it comes to evaluating the commercial future for cashews.

"Britannia believes it will require 4-5 tonnes/ha of raw nuts for long-term profitability but would be prepared to start commercial production on slightly lower yields. Plans are on track for the first commercial planting about 1993," according to general manager, Ian Duncan.

Plantation manager, Christine Fitzgerald, checks selected grafted trees prepared for planting at Australia's largest cashew nut venture at Wildman River in the NT. More than 1 million trees could be established if production targets of 4000kg/ha are achieved and prices exceed $1/kg.

Extensive trial work at Wildman River is determining the possible contributions to be made by better cultivars, irrigation options, added nutrients, integrated pest management, and mechanical harvesting. This research farm is one of several private growers supporting CSIRO and DPIF investigations into these key factors of cashew production.

After an Australia-wide search to find the best soil/climate/water combination for

cashews, Wildman River district was selected for its deep, well-drained, red sandy loams, reliable wet and dry seasons and good quality, shallow underground water supplies suitable for irrigation.

The pilot farm's role was to select suitable cashew varieties and to determine, through scientific research, appropriate horticultural and mechanical techniques including irrigation options, nutrition, integrated pest management and harvesting. Britannia has 26,000ha at Wildman River which includes nearly 5000ha of suitable soil and water for cashews.

If the pilot scheme returns are favourable, this farm is set to become one of the largest cashew sources in the world.

Brittania currently controls sufficient cashew processing and marketing facilities to absorb the full cropping potential at Wildman River.

Development began in 1984 when the initial area was cleared; the first cashew trees were established in 1985. These trees will soon reach top bearing potential, which means careful evaluation is essential.

The initial 3 tonnes/ha yield targets should be achieved this season. (Later planted trees are of higher quality and should exceed this target.) The original planting on a 7m x 7m grid has been adjusted to 8m x 6m in later plantings.

Further work is underway using various clones to develop close-set, hedgerow plantings. Other plant habit manipulation techniques are company secrets.

In 1990, 2500 trees were planted at various spacings, including a 12m x 4m hedgerow configuration, to test new tree habit and competition factors. Superior grafted rootstocks are producing 2-3kg of quality nuts at 15 months, which gives an early return for set-up costs.

Other research is testing the role of growth regulators and better terminal bearing characteristics. Cashews are responsive to improved nutrition and timely irrigation.

Sidebanding and fertigation applications of NPK plus zinc and iron are being tested. Both drip and spray type irrigation installations are being compared for crop response and cost.

Research has shown mature trees can extract soil moisture from 4m depth through a well-developed tap root, but the best yields come with timely irrigation, according to farm manager Christine Fitzgerald.

"Infrequent waterings on new grafted trees should encourage deep rooting which helps young trees remain upright," she says.

Strong storm winds during the wet season can destroy many of the fast growing, top heavy cashew cultivars. Challenges still remain — the role of pollinating insects must be determined and the reason for low fruit set, around 16% from 98% pollination, is unknown.

Free Tagasaste Seedlings

Kayley Griffiths, who works at the Kewdale Inspection Centre of the Plant Quarantine Service, has masses of tagasaste seedlings at home which she is offering free to anyone prepared to come and dig them out.

Kayley can be contacted at 353 2757 (office hours).

Management strategies to avoid insecticide application at flowering, and control the voracious Darwin termite, have to be perfected. Integrated pest management incorporating bio-control offers a feasible solution given local expertise in these areas.

Mechanical harvesting will be essential if the Australian cashew industry is to be competitive. Trials using a modified, US-made, Flory suction macadamia nut harvester gave excellent recovery rates after a Flory sweeper pushed the ripe cashew nuts into windrows. This unit handled 70 trees/day in a 1200 tree test last season.

Britannia is seeking an infield processor which could remove the apple (peduncle) and return this high nutrient source to the soil.

Local mechanical processing to remove the kernel from the shell offers the best marketing option. A prototype sheller being developed in Darwin could be the answer; its design is simple and effective.

While much of northern Australia is suitable for cashew nut culture, only a combination of realistic capital investment, high yielding, clonally propagated varieties, cheap land, adequate water and improved husbandry, and innovative handling technology, will ensure a viable tropical tree industry.

Economic picture — achieving targets

Cashews will be the most profitable tree crop in Australia when current research goals are achieved.

The outlook to reach the essential economic targets — 8-10g size nuts with yields of 30kg/tree from 250 trees/ha — is good. When combined these parameters will exceed the profitable yield threshold of 4 tonnes/ha while some genetically tailored 'super trees' could achieve 5-7 tonnes/ha.

Without these breeding and husbandry breakthroughs, cashew plantations in Australia will remain small, domestic, labour-intensive and uncertain enterprises.

According to CSIRO principal research scientist in horticulture at Darwin, Dr Elias Chacko, northern Australia growers will have to achieve 4-4.5 tonnes/ha raw nut yield to match the return achieved by high labour input, low wage countries, which survive on current world average yields of 0.5-1 t/ha.

The current world price is around $1/kg, which means cashew trees in top producing Northern Territory plantations can return more than $4000/ha in their fifth year.

Currently the world cashew market is undersupplied despite new, large scale plantings in India, Brazil and southeast Asia.

Last year Australia imported processed cashew products worth some $20 million, while domestic nut production was negligible.

To encourage this emerging industry, the NT Government will distribute to designated growers, thousands of selected buds for grafting to existing seedlings this year. In 18 months they will be eligible for a $25/tree bounty for each viable grafted tree in their plantations.

Industry sources urge caution before committing establishment costs of $50 to $100 a tree.

Experienced growers share these observations:

• "Yields of 30kg x 250 trees/ha may be many years away."

• "Unless growers have access to economic domestic processing they will remain sellers of raw cashews. The technical and economic limitations to securing a processing factory remains large and it could be many years before this is resolved."

• "On the subject of yield targets and returns, Australian growers must achieve adequate after-tax returns to justify investment. You will need at least 4 tonnes/ha raw nut for an adequate return. Most of the crop in Third World countries is low input/low yield. Yields are usually less than 500kg/ha. They don't have to go out of business when prices fall because in a peasant economy cashew is only part of their crop program."

• "Current world prices for raw nuts are A$1.00-1.20/kg. As all world prices are nominated in US dollars, exchange rates can have a large impact on local returns."

• "If the world price is the best indicator of supply then the market is adequately supplied; current prices around US$2.75/lb (processed) (A$7.89/kg) for W230 grade (the market standard) are about the same as 10 years ago. Remember input costs have risen substantially in that time."

• "Political problems in Africa from 1979-87 caused a large fall in available crop. This was partially made up from other areas, but remember cashews have to compete against expanding production of other nuts."

• "There is an enormous demand for cashews at the right price. To generate a viable profit, Australian enterprises have to concentrate on high yields and cost-efficient production."

— Gary Alcorn

New low-chill Pistachios from Israel

Two new varieties of pistachio, notable for their low chilling requirements, have been developed by Mr A. Nevo in Israel.

Insufficient chilling has been a prime factor in the poor cropping of pistachios in some years and areas, as in lower-elevation sites in Arizona.

Mr Nevo is seeking commercial licensees for the varieties, in Australia and elsewhere. Suitable male pollenizers are available. He would prefer a single licensee for the whole of Australia.

Mr Nevo can be contacted at PO Box 500, Omer 84965, Israel.

ROYAL SHOW
DISPLAY A SUCCESS

The WANATCA display at the Tree Crops Centre went over well at this year's Royal Show.

We are fortunate in that the WANATCA headquarters is within the Royal Agricultural Society Showgrounds (in the WA Gardener Building), and so is automatically on site for the show.

Emphasis in this year's display was on Fuji Fruit, the non-astringent persimmon development which is now beginning to figure as a commercial fruit here.

Samples of Fuji Fruit, kindly donated by Mr Nando Civo of Karagullen and held in cool store by the Ag. Dept, were given out for tasting. Almost everyone who tried a sample liked it, supporting the view that fuji will have a growing market here.

A smaller feature on Quandongs was also popular, and innumerable queries on fruits and nuts were tackled by the WANATCA volunteers who manned the display.

Some fruit trees in pots, kindly lent by Neville Passmore of Blossoms, also brightened up the display.

Our grateful thanks to Bob Haywood, Greg Pratt, Amos Machlin, Pat Scott, Matt Bruekers, Tom & Christine Bateman, Bill Napier, Ian Fox, Wilf Prendergast, Clive Pegler, and Milan Mirkovic for all their efforts.

And particular thanks to Alex Hart for organizing all the rosters and arrangements, and to Neville Shorter for working out the displays, as well as working on the teams.

Election of Executive

In accordance with the Association's Constitution, half the WANATCA Executive Committee will retire at the end of 1991 (Committee Members serve for two years).

Those retiring this year are David Noel, Matt Bruekers, Alex Hart, and Milan Mirkovic.

In addition, Bob Haywood, who was co-opted to replace David Turner on his resignation, is due to have his position ratified by election.

The Committee will be putting forward nominations for these positions at an election to be held at the AGM. However, other nominations or expressions of interest are welcomed from any member — contact David Noel, current WANATCA President, if you would like to discuss anything in this area.

WANATCA's President and Vice-President are elected by the Committee from among their members at their first meeting of the new year. The Secretary-Treasurer's position is an appointment made by the Committee as a whole.

Hope for Chestnut PC Dieback Solution

In some locations in WA's Southwest, attacks on chestnut trees by the fungal disease *Phytophthora cinnamomi* (PC) have been a major problem.

In WA, PC is usually called Jarrah Dieback, as it is best known as a killer of the beautiful local eucalypt timber species, Jarrah (*E. marginata*). However, in other parts of the world, as in California, it is better known as Avocado Rootrot.

PC can also be deadly to avocados. An effective, though expensive, treatment of avocado trees has been developed which involves injecting the trees with a chemical ('Ridomil' is one tradename).

The disease is basically water-borne, and spreads naturally along streams and watercourses. However it can also be spread in infected soil, often that caught up in vehicle treads. In an attempt to halt the spread of dieback, the WA Government has closed off most of the native eucalypt forests to vehicle access.

Now a new natural approach to combatting dieback is being trialled, one in which one fungus is being used to fight another. The 'goody' is a new local discovery known as Sterile Red Fungus (see article 'Sterile Red Fungus' in this issue of *Quandong*).

WANATCA member Clive Pegler has access to Sterile Red Fungus samples, and has begun a trial to see if introduction of SRF can effectively protect chestnuts from attack by PC.

He is working in conjunction with Tony Fontanini of Manjimup, also a WANATCA member. The Fontaninis have been major chestnut growers in this State, but their trees have been hard-hit by PC in recent years.

While the problem is not yet solved, the approach does look very promising. SRF has been proved to be an effective counter against PC in a range of other plants of known sensitivity.

For chestnut growers in America and Europe, SRF also offers a possibility of protection against the devastating Chestnut Blight, also a fungal disease (*Endothia parasitica*). This disease, introduced accidentally from east Asia into the US at the turn of the century, virtually wiped out the native American chestnut, *Castanea dentata*, and spread to affect European or Spanish chestnut, *C. sativa*. The Chinese and Japanese species, evolving in areas where chestnut blight was also found, have considerable resistance to the disease.

— David Noel

Chestnut Alliance active in the US

WANATCA has received a letter seeking to establish contacts from the Chestnut Alliance, a US-based network involved in promoting chestnut and walnut culture in North America.

Bill Wininger, Senior Field Consultant with the Great Lakes office of the Chestnut Alliance, writes that they would be "delighted to host visits and excursions of any length in the Great Lakes region of North America" for any WANATCA members visiting the area.

Here is your chance for what one of my friends recently described as a bit of 'Power Bludging'!!

Bill can be contacted at PO Box 191, Bellaire, Michigan 49615, USA.

[WA Horticulture/ October 1991]

Carnarvon tests viability of carambola

Fulfilling one of its roles to identify new crops, the Carnarvon Research Station is assessing the viability of carambolas (five-corner fruit) being grown in the area.

Ten varieties of the tree are being grown at the station to investigate the suitability and market acceptability of the fruit.

Results have been very encouraging, according to station manager Terry Hill, and growers have already planted substantial numbers of the trees. Particularly popular was the Wang Tung variety.

Mr Hill said that one of the bonuses of the fruit was that in the Carnarvon climate it was quite usual for it to produce a crop twice a year.

He said this was a great advantage for growers who would have two cash flows from harvest instead of the normal one.

Another plus was that carambolas did not take long to come into commercial production.

The trees at the station were planted three years ago and produced their first substantial crop this season.

Carambolas were often referred to as five-corner fruit. The fruit, which matures in April-March and August-September, has a five-pointed star cross-section, is juicy, and can be eaten directly from the tree.

Visiting horticultural adviser Maragaret Graham tastes one of the ten carambola varieties being tested at Carnarvon

Call for Speciality Timbers

Many fruit and nut trees have outstanding timber, much sought after for cabinet work. The same is true of unusual specimen trees growing in gardens and parks.

If one of these trees dies or has to come out, they can be worth good money. Keep an eye out for one becoming available, on your own property or elsewhere. Even quite small trees, only 10 cm across, can be worth using. Why see these trees go for firewood or to the tip, when they can used and displayed? Even more common fruit trees, such as almond or apple, are needed. Some of them have beautiful figuring or grain.

If you spot anything, please contact Roy Lundy of Timbecon Pty Ltd on 356 1653 (after hours, 444 8640). Postal address: 49 Kent St Cannington 6107. Also David Noel at the Tree Crops Centre would like to know of larger sources of speciality timbers.

[WA Horticulture/ May 1991]

Sapote ready for share of market

When avocados first hit the WA market some years ago demand was so limited many growers pulled out their trees to convert to a "more popular" crop.

That is the parallel John Verheyen believes will one day be drawn when discussing the casimiroa or white sapote.

While John, the biggest casimiroa grower in WA has received limited sucess in the market place to date, he believes casimiroa will one day easily rival the most popular of fruits.

The fruit comes from a tree (*Casimiroa edulis*, family Rutaceae) which is native to Mexico and Central America, and derives its genus name from the Spanish botanist Casimiroa Gomez de Ortega. Its other popular and more common name, White Sapote, comes from the Spanish name sapote blanco.

The woolly-leaf white sapote (*C. tetrameria*), a close relative, is known as the Guatemalan sapote, and as the yellow sapote in California.

There are about 40 varieties of sapotes recognised throughout the world and John has the seven main ones on his Guilderton property — Lemon Gold, Pike, Ortego, Wilson, Luke, Sun Rise, and Vista.

It was not John's idea to plant the sapotes in the first place—he inherited them when he bought the Barbados Valley property two years ago. The property is divided into two sections — the subtropical or exotic fruits section "which makes very little money" and the stone fruit section "which keeps going up".

Despite the difference in returns on the two sections it is the exotics section that he most likes working in.

John says that the state of the economy has not done anything to aid promotion of the sapote or any other exotic fruit. Asian consumers provided the bulk of the customers for exotic fruit and at least give growers a basic return.

Sapote are a combination of peach, pear and apricot and are a high quality sweet-tasting fine textured fruit related to citrus. Like avocados, it takes a little practice to determine the right time to eat a sapote.

The taste of exotic . . . John Verheyen sees a big future in white sapote which he is growing on his Guilderton property: "The exotics are different and offer a wonderful learning experience.

The guy I bought the property from also planted lychees which will not mature for about six years and that is something I am really looking forward to. There are also the persimmons and guavas to keep me interested.

I studied for my diploma in Holland before coming out to Australia so I suppose I treat everything as a learning experience."

John said it was possible to test for ripeness by putting the fruit in the palm of your hand and pressing slightly — the fruit was ideal when it was spongy.

The sapote is an evergreen vigorous and open-natured tree which grows to 15 to 20 metres. Leaves are pale green, palmately compound, and made up generally of five leaflets.

Although the branches may be brittle when the trees are young, they become stronger with age and are capable of supporting big crops.

John said one of the big advantages with sapote was that it could be frozen and kept for some time. Sapote are high in nutritional value, particularly vitamins A and C, and comparable to a fig or banana.

Grafting Parana Pine onto Bunya

A few months ago I got ace propagator John Dowell to graft a lot of seedling avocados in my yard over to improved varieties.

While he was there I asked him to try grafting some tips of Parana Pine from southern Brazil (*Araucaria angustifolia or braziliensis*) onto some seedlings of Bunya Pine (*Araucaria bidwillii*), our own Queensland nut tree. Both stocks and scion were about 50 cm high, in pots.

From the main stem of the Parana, John took the top 6 cm and a further 6-cm piece immediately below it. It is necessary to use stem material for grafting, as only the stem buds (orthotropic) produce normal upright growth.

John shaved the small hard triangular leaflets off the sides of the scions and grafted each onto a Bunya rootstock, using a standard whip-and-tongue and a wedge graft. Both grafts were tied up in budding tape and surrounded with a plastic freezer bag containing a little water in one corner.

Now both grafts appear to have taken and are growing. The tip scion has put on extra leaves, and the piece from below the tip has three stem buds pushing out (to get a single-stem tree, it may be necessary to rub off the weaker buds at some stage, leaving only the strongest grower).

The Parana used as the scion source has also pushed out three buds from the remainder of the top. I may let all of these grow to serve as later sources of grafting wood, as they will be all orthotropic buds.

Both the Parana and its Chilean relative, the Monkey Puzzle or Chile Pine (*Araucaria araucana*) produce good edible nuts. Here is a possible way that orchards of Parana and Chile Pine nuts can be built up quickly, using the vigorous, hardy, and locally-adapted Bunya as rootstock. It may also be possible to topwork existing Bunya stands over to the South American species.

— David Noel

Fuji Fruit Trees for Sale

WANATCA stalwart and propagation guru Alex Sas has some Fuji fruit trees for sale. There are limited numbers of 2 varieties, *Fuyu* and *Suruga*. Price is $12 each.

Fuyu was the original variety which brought the non-astringent persimmon into prominence, while Suruga is a newer variety.

Alex can be contacted at his Roleystone property on 397 5628.

Sterile Red Fungus

An important new tool in the fight against fungus diseases in plants has been developed in Western Australia.

This tool, which is itself a fungus and has been called Sterile Red Fungus (SRF), was first isolated by Majeed Dewan, a PhD student at the University of Western Australia, on the roots of wheat plants from a farm in WA.

It was found that wheat plants on which SRF was growing were immune to a devastating wheat disease called Take-all, caused by the fungus *Gaumannomyces graminis* var. *tritici*, usually abbreviated to Ggt. It has been estimated that Ggt can cost Australia up to $400 million each year in lost wheat yield.

Because SRF could not be induced to form spores or fruiting bodies, from which the classification of a fungus is determined, it has not been possible to classify and assign a species name to this strange organism.

Mr Dewan was working with Dr K. Sivasithamparam's group in the Department of Soil Science and Plant Nutrition at the time; the group had been researching take-all for many years. It was found that, not only did SRF immunise wheat against take-all, it also made it grow larger, faster, and stronger.

The group also researched the effects of SRF on other plants, including cereals, legumes, and oilseeds. It was found both to be a successful colonizer of virtually all plants tested, and to have a beneficial and protective effect against other fungal diseases, including *Phytophthora* (Jarrah dieback disease) and *Rhizoctonia* (Bare-patch disease).

Following these discoveries, the research group formed an association with a local company, Biotech International Ltd, to exploit the new approach. Biotech have now developed and patented a new inoculum delivery system based on perlite, a porous mineral commonly used in horticulture.

Peter Keating, Director of Research & Development at Biotech, envisages a growing success with SRF in the fight against fungus diseases in plants. He also sees a much greater role for SRF in the future, based on genetic engineering principles.

Many plants could conceivably be improved along particular directions by genetic engineering, but their genes are relatively complex and difficult to manipulate. Fungi are genetically much simpler and readily amenable to genetic manipulation through techniques such as use of recombinant DNA.

In an article in *Australian Natural History* (Autumn 1991), Keating suggests that because SRF readily colonizes most plants, a genetically-engineered form of SRF (say one producing a natural insecticide) could give the same benefit as genetically working on the target plant itself.

Moreover, because fungi grow clonally like bacteria, large amounts can be produced relatively quickly, and applied to a range of plants (instead of needing to repeat the genetic engineering on each species).

What about that bogey of all genetic engineering work, that the product will somehow mutate into a monster and take over the world? Fortunately, as SRF is sterile, it cannot form spores to spread away from where it is deliberately introduced. And it can survive for only a short time in soil, so if its host plant dies, it rapidly declines.

It almost seems too good to be true. But the approach feels right — it is working with nature, using nature's own resources instead of synthetic chemicals to achieve a result. In the long run, such an approach will always be superior.

— David Noel

How the Association stands (or perhaps slumps?) financially

The WANATCA Executive have maintained their continuing effort to run the Association as leanly and efficiently as possible, providing the maximum number of benefits at the minimum cost.

Our annual budget is around $10,000 per year. The major proportion, over 98%, of our income comes from subscriptions. The biggest part of our expenditure, around 70%, goes on our publications — our major benefit for more distant subscribers.

A summary of expenditures for the 1990-91 financial year is shown below. Costs for producing *Quandong* were about $3100, the *WANATCA Yearbook* about $2200, and for *ATCROS*, the new Sourcebook, about $1100. In addition, mailing costs for these were a further $700.

The Secretary's (very nominal) honorarium was just over $1000. No other member of the Executive, or any other member, receives anything in payment, other than the refunding of direct expenses incurred for the Association.

The carry-over of funds from one year to the next is very small, around $2000. This is frighteningly tight, but reflects the Executive's resolve to return members' subscriptions back to them directly, rather than try to build up a cash reserve. We have virtually no fixed assets.

If the Association had a nest-egg of, say, $100,000, we would be getting a return from fixed investments of at least $10,000, which would double our income. Unfortunately no Good Nut Fairy has yet appeared to hand the sacks of money over to us for this.

It is absolutely imperative for us to maintain and improve membership numbers, since many of our expenses are much the same whether we have 100 members or 1000. Every new member we can get takes us closer to the goal of providing better services and value for a subscription kept as low and as stable as possible. Who do you know who could be invited to join?

Summary of WANATCA costs, 1990-91 year

Quandong magazine	*3080*
WANATCA Yearbook	*2180*
ATCROS Sourcebook	*1080*
Secretary's Honorarium	*1040*
Mailing	*780*
Rentals	*580*
Leaflets & Membership forms	*440*
Stationery	*270*
Royal Show costs	*250*
Phone	*240*
Video tapes for library	*220*
Post Office fees, taxes	*130*
TOTAL	***10 270***

NEVILLE'S NOTES

On going through the literature received at the Tree Crops Centre, I came across some items worth mentioning in *Quandong*.

Australian Pistachio News (from Pistachio Growers Association Australia, PO Box 34, Paringa SA 5340):

Considerable progress has been made with pistachio cultivation around Loxton and other Murray River irrigation areas in South Australia. For irrigation, mini-sprinklers are used in some areas, but flood irrigation may be used where soil type and topography allows.

Efforts are being made to eliminate chemical herbicides. This is helped by the use of soil mulches for weed control, where cheap enough mulch is available.

The Nut Grower (California), April 1991:

Better management of leguminous cover crops is being sought. While clovers and vetches have been around for a long time, the feeling is that they are not being managed to their full potential. Benefits of legume cover crops are well known, the challenge is to get maximum performance in terms of raising organic matter and nitrogen content and improving general fertility.

It appears a key factor is more regular and timely mowing, from late winter through to late spring.

The Nut Kernel (Pennsylvania Nut Growers Association), June 1991:

Chestnuts grow over a wide range of soils, from light sands to heavy loams.

But they do have a moderately large chilling requirement, of 500-700 hours. This means they need to accumulate this number of hours below 10°C each winter for good growth.

[Local comment: Chestnuts grow and crop well in the Perth Hills (Roleystone, Karragullen), and in inland districts of the Southwest (Balingup, Donnybrook, Manjimup). They can be devastated by Jarrah Dieback disease, caused by the fungus *Phytophthora cinnamomi*.]

— Neville Shorter

Fungi key to industry

WA scientists are pioneering research into native fungi which promises major economic benefits for developing new rural industries based on the Tasmanian blue-gum.

CSIRO's State Forest Research Group, in association with Bunnings Tree Farms, is using fungi to promote significant increases in the growth rate of forest trees.

This group, part of CSIRO's Division of Forestry, hopes to have its first selections of fungi ready for commercial application later this year.

CASANA SEEDS AVAILABLE

WANATCA member Peter Brew has some Casana seeds for sale, price $2 per 10 seeds, plus postage. The seeds are quite small and should travel in an ordinary 50c envelope.

This interesting South American plant, related to the tamarillo, was described in the last *Quandong*, the 3rd Quarter 1991 issue.

Peter can be contacted at Stringybark Nursery, Cathcart, NSW 2632. His phone number is 064-94 2077.

The work is concentrating on Eucalyptus globulus (Tasmanian blue-gum), which is the focus of a potential major new forest industry and opportunity for Southwest farmers to diversify by including wood lots in their farm planning.

The fungi, known as mycorrhizal fungi, are found naturally in soils and form symbiotic, or mutually beneficial, associations with plant roots.

The mycorrhizal fungi increase the ability of the plant to uptake nutrients—particularly phosphorus — which often limit growth in Australian soils.

Bunnings Tree Farms will have ectomycorrhizal seedlings available for sale next year.

Eucalypts for Food

The Autumn 1991 issue of *Austalian Natural History* has an interesting article with the above title, written by well-known bush food writer Tim Low.

Tim points out that three species of eucalypt (*Eucalyptus largiflorens, E. miniata, E. ptychocarpa*) were sources of seeds the Aborigines used for food.

Other species were rich sources of nectar, sucked straight from the flowers, and the Western Bloodwood (*E. terminalis*) produces an unusual edible gall of coconut flavour ('bush coconut' or 'desert apple').

But there are two eucalypts which produce a sweet sap like maple syrup, not only interesting, but also of possible commercial value.

One is the Cider Gum (*E. gunnii*) of Tasmania. The other is our own Yate from the Southwest of Western Australia (botanically *E. cornuta or E. occidentalis*).

WA settler Edith Hassell, who lived northeast of the Stirling Range in WA, told of how aborigines got a thick purplish syrup by stripping and scraping the bark of yate trees. She said "They often eat this syrup like honey, and said it was very nourishing. I have frequently eaten it and it tastes like a mixture of treacle and honey".

Another industry for our struggling South-west farmers?

[Queensland DPI Farmnote HO8804004] **(G I Jamieson & M J Rice)**

NEEM TREES — Source of a natural insecticide. Part 3

Particular care must be taken to prevent contamination of processing seed by aflatoxins that are produced by a fungus. Infection can occur if the seeds come into contact with contaminated soil. Aflatoxins in ARC insecticide could be a hazard to people who come into contact with the chemical or its spray drift. It could also cause problems through the spray residues.

DEVELOPING THE INDUSTRY

The most suitable areas in Australia for commercial production of neem seed are the hot, dry tropical areas of northern Australia, including parts of far north Queensland. Commercial extraction of ARC, formulation, packaging and marketing of the pesticides could be based anywhere in Australia — possibly carried out by new or established chemical companies.

An Australian industry must develop in competition with overseas producers. We are currently well advanced in extraction and assaying technology; but we are well behind our future competitors in access to improved neem trees.

Australia has advantages over many other potential producing countries. It has large areas of suitable land; Australia is noted for its political and social stability, as well as its advanced horticultural and chemical processing technologies. However, ours is a relatively small market for pesticides, and it will be necessary to develop export markets as the industry develops.

At present, Australia has the major disadvantage of poor access to neem planting material. Although large amounts of seed are produced in those parts of the world where the tree is naturalised, very little is harvested for commercial use. The need for care in purchasing this seed for planting has been stressed; but at present, they are the only source for large-scale introductions of planting material. They could also serve as source material for the initial development of an Australian ARC extraction industry.

Very small numbers of superior neem seedlings are on sale from the Entomology Department of the University of Queensland. These seedlings are the progeny of trees that bear fruit at three years of age. Also, the seedlings were established from seed stock that assayed over 2% azadirachtin content. The Department also has contact with some overseas seed suppliers.

Before ARCs can be sold as pesticides on the open market, they will have to be registered by the appropriate Commonwealth and State authorities. This can only be done after research has proven the effectiveness of commercial formulations, and established their level of safety to humans.

Registration has already been granted to some ARC pesticides in USA. These products are very expensive and their availability is very limited.

THE NEED FOR RESEARCH

Australian and overseas research is continuing to develop uses for azadirachtin pesticides and to develop satisfactory methods of using them in field situations. While this work must continue in Australia, we must also expand the scope of research to include the economic commercial production of neem seed. We will also need to do the research required to gain government registration of commercial azadirachtin pesticides.

Research is severely hampered by shortage of the product and its extremely high price. This problem will be relieved

somewhat when researchers can tap supplies extracted from locally produced neem seed.

The local shortage of producing neem trees is making it very difficult to select high-producing lines. However, selections from the available trees can be used to develop viable tissue culture techniques. This research will eventually lead to the availability of large numbers of cloned superior trees. As the number of seedling trees increases in Queensland, it is expected that tissue culture techniques will be available for commercial multiplication of selected superior clones.

QDPI will evaluate the performance of neem trees at Cairns and in the Burdekin district. Comalco is conducting similar investigations at Weipa.

However, the most rapid development of a neem industry will come from entrepreneurial investors who are prepared to invest in a calculated risk enterprise. These investors would be advised to make very careful selections of seed from overseas, and to establish pilot plantings in potential areas in northern Australia. They must also employ competent horticulturists to select the seed source, evaluate the pilot plantings and to develop viable cultural techniques.

But finally, a few strong words of warning:

• before investing in any neem-growing enterprise, you should be thoroughly confident of its financial and business credentials. Equally importantly, ensure that the proposed enterprise is based on a very sound and well-researched technical footing;

• especially in the early pioneering days, commercial production of neem seed will be a somewhat speculative industry. At this stage, do not invest more in the industry than you can reasonably afford to lose.

—G I Jamieson &M J Rice
(University of Queensland)

(Parts 1 and 2 appeared in Quandong, Second and Third Quarters 1991)

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CALENDAR OF FORTHCOMING EVENTS

1991

Nov 20	Wed	*Annual General Meeting (Bernie Dell — Use of Mycorrhizas in Tree Crops)

1992

Jan 14	Tue	Executive Committee Meeting
Feb 19	Wed	*General Meeting (Baard Maehle — Aerial Water Mapping in Tree Production)
Mar 27-29		§ACOTANC-92: Whakatane, Bay of Plenty, New Zealand
Apr 15	Tue	Executive Committee Meeting
May 20	Wed	*General Meeting
Aug 19	Wed	*General Meeting
Nov 18	Wed	*Annual General Meeting

*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

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