West Australian Nut & Tree Crop Association (Inc)
PO Box 565 Subiaco WA 6998 Australia

EXECUTIVE COMMITTEE 2007

Stanley Parkinson (President)		9386 2518	Bob Cook (Events)		9574 7103h
John Foote (Vice-President)		9682 1060	Wayne Geddes	0412-075 043	9382 2437
Trevor Best (Treasurer)		9397 5920	David Noël (Publications)		9381 7341
George Ainsley		9390 5338	Charles Peaty	0439-996 662	9433 4442
Simon Barnett	9330 1199w	9384 1213h	Pat Scott (Quandong)		9397 5892

ACTION GROUP LEADERS

CHERRY: Neville Shorter, 9450 5606 (2/9 Clydesdale St Como 6152)
FIG: Alex Hart, 9490 1324 (71 Terence St Gosnells 6110)
JUJUBE: Jim Dawson, 9574 6371 (PO Gidgegannup 6083)
MACADAMIA: John Cory, 9574 6163 (Toodyay Rd Gidgegannup 6083)
PECAN: Bernie Rochester, 9734 1309 (90 Bucktin St Collie 6225)
PISTACHIO: Bert Hayes, 9622 9513 (PO Box 429 Northam 6401)
PITAYA: Bob Nederpelt, 9375 9435 (PO Box 56 Morley 6943)
POMEGRANATE: Julie Firth, 9938 1628 (Lot 12 David Rd Waggrakine 6530)
WALNUT: Graham Fellows, 9773 1346 (PO Box 217 Manjimup WA 6258)

CALENDAR OF FORTHCOMING EVENTS

Deadline for next issue: 6 August, 2007

2007

May 22 Tue	* WANATCA Extraordinary General Meeting
July 17 Tue	WANATCA Executive Committee Meeting
Aug 28 Tue	* WANATCA General Meeting
Nov 20 Tue	* WANATCA General Meeting

*General Meetings are held starting at 7:30 pm. Venue: *As Noted in each case.*
These meetings usually include a display of current world tree-crop magazines offered free.
• Event with WANATCA participation; § Refer to news item in this issue of Quandong.
Material originating in Quandong may be reprinted: acknowledgement of author and source requested.

Current Subscription Rate: $60.00 per year
(includes all publications for four consecutive quarters) Student Rate: $30.00

Quandong is produced by WANATCA, PO Box 565, Subiaco, WA 6008. Phone 08-9381 7341.
This issue edited by Pat Scott. WANATCA contacts: Phone 08-9250 1888.
Fax: 08-9250 2735. E-mail: <quandong@iinet.net.au>. Website: <www.wanatca.org.au>.
Quandong Advertising Rates: Whole page, $100; Half page $60;
Quarter page, $35; Eighth page, $20. 20% discount for 4 insertions.

Quandong • Second Quarter 2007 • Vol 33 No 2

Quandong

magazine of the
West Australian Nut & Tree Crop Association (Inc)
www.wanatca.org.au

Second Quarter 2007 • Vol 33 No 2

ISSN 0312-8989 • $5.00

Boab (*Adansonia gregorii*)

Right: flowers and fruit (not to scale)

See: About the Cover, p.2

AT THE NEXT WANATCA GENERAL MEETING:

7:30 pm, Tuesday, 22 May 2007

An Extraordinary General Meeting

The future of WANATCA is on the line: do we go or do we stay? All members are invited to join this discussion. Is it possible to revitalise and re-energise our Association? Or should we make plans to close down? Please read the two messages on pages 30 and 31 and come and share your thoughts and ideas with us.

This meeting is at Kings Park Headquarters as usual.

Late enquiries to 9250 1888 please.

In This Issue

About the Cover

The Boab, *Adansonia gregorii*, is well-known in northern WA and the NT. It grows to about 15m. The trunk is large and swollen and the branches twisted. The boab drops all its leaves during the dry season. Flowers are white and fragrant; large oval or round woody pods, 10cm in diameter, are produced from April to July.

The pods contain a white pith that is edible and pleasant and is exceptionally nutritious. They must be harvested when mature but before they become hard. The seeds can be roasted and eaten like peanuts. The trunk and roots, when cut, provide a source of moisture: the pith is cut into small pieces and squeezed or chewed.

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.

Notes from the last meeting...

To Russia with affectionate apprehension

David Brown has made many visits to Russia, experiencing and studying aspects of life there. He prefers to visit at times when there are fewer tourists, and goes to remote rural areas off the beaten track, in all the vast and varied landscape of Russia.

David began by thanking all the many guides and interpreters who helped him; men, women and children of all ages.

Russia has much in common with Australia –

They each cover a huge landmass. Russia is twice the size of Australia – the world's biggest land area under a single national control, stretching almost halfway around the globe – altogether, its time zones cover 10 hours compared to China's 5 hours (theoretical). Much of their lands is relatively flat, inhospitable, even uninhabitable and they both have long coastlines, including polar facing coasts.

Climate is extreme – in its annual range Russia is more extreme than Australia though less erratic than Australia. But the climate is changing – some of their broad leaf trees and plants are moving up the mountains to higher altitudes and out-competing the normal plants – most alpine plants do not live under shade apart from cloud.

The regular freeze-up in the Russian winter is the ecological equivalent of an annual summer drought as we have in most of southern Australia. In both cases, water is unavailable to plants.

A big difference is in Russia's long annual period of low light, especially in its north. David believes that the importance of light is generally underestimated and misunderstood. For example, we rarely fully comprehend that plants eat light as their basic energy food. Primarily, they eat by means of their leaves, not through their roots as is usually assumed without thought. It is not only the intensity of light that changes with seasons and atmospheric conditions but also its spectral qualities. The various light qualities provide different nutrients to plants. And that is only the start of the mystery we call *plant life*.

Thus far, Russia has resisted pressure to use genetically modified plants in horticulture. They see a long term, competitive advantage to market food to a Western Europe that rejects GMO foodstuffs. However, the pressure from the USA is considerable. (If, for example, a brewer has polluted his own water source so that his beer does not sell, he will try to trick his competitors into polluting their water sources so they lose their competitive advantage.)

In his talk, David focused on kitchen gardens, and described the trees he observed.

Dachas

All over Europe, the system of allotments has long been established. In England, for example, allotments tend to be clustered along train lines, seem to be rather small and untidy. In Germany, allotments are grouped like miniature housing developments, each enclosed with tall, securely-locked fences. They are very tidy and often have small buildings on them where the allotment holders can sit, to relax, and to store tools.

The dacha system is a variation of the theme. They are plots of land that people can buy or lease from the municipal authority to make a kitchen garden. They are often of good size, and have small cottages on them, where people can live for short periods over summer: no one is allowed to live there full-time. Indeed, winters would be too cold and

unpleasant to live there, and gardens are allowed go fallow in winter.

Some tidy dachas

Dachas were promoted a lot, especially in Brezhnev's time, to make a significant contribution to the food supply. Many have fertile soil and are very productive. Each garden is uniquely individual. Flowers are mixed in with vegetables. Frequently, fruit and nut trees, and in the south of Russia, grape arbours make cool, shady places in summer. Popular trees for gardens include apples, pears, walnuts and hazelnuts. Often, they grow very tall. In the northern parts of Russia and Siberia, berries are favoured, especially on acidic, peaty soils.

Kitchen garden plot under an arbour of fruit trees and grape vines

Dachas are respected by everyone. Usually there are no fences separating them, but nobody seems to pinch anything.

The future of dachas in Russia

Increasingly, the people working dacha gardens are elderly women. Young people are busy establishing themselves in a modernising, high-tech world. Many like to buy dachas and use them simply as a holiday place and as a way to announce their economic success.

And, as in other parts of the world, avaricious property developers are eyeing dacha land for development, regardless of the important cultural history of the dacha kitchen garden system and the strategic need for a nation to be self supporting in food and other essentials. For the time being, it is cheaper (in money terms) to import food from other countries, partly because Russia can export oil to pay for the imports of the wealthy.

Gardens on verges

Particularly in the Caucasus region, kitchen gardens are made on the street verges between the road and footpath. Houses are built right up to the edge of the footpath, and pipes from the roof gutters carry the rain over the footpath into the verge gardens. The plants are packed in closely. As well as being highly productive, these gardens create streets of great beauty with their mix of trees, bushes, vegetables and flowers. The microclimate created by the gardens moderates the heat in summer.

The overhead gutters deliver rain water to trees and plants on the verge.

Native forests

There are extensive native forests in much of Russia that are mixtures of broadleaf deciduous trees, such as birch, and the evergreens, conifers such as pines. Birch is used for firewood, and is considered an inferior plant because it is not suitable as a structural timber. Foresters say birch trees tend to fall over and damage more valuable timber trees. Some of the broadleaf trees are widespread across Europe, including beech (*Fagus sylvatica*) and rowan (*Sorbus aucuparia*).

Happily for the Earth, so much of Russia is covered with forests of different kinds. A valuable provision taken from these forests is the fur pelts so necessary for humans (thin-skinned creatures!) to withstand the harsh winters. Population pressure from China causes the forests in Russia's Far East and Siberia to be eyed for clearing and food production and other 'developments'.

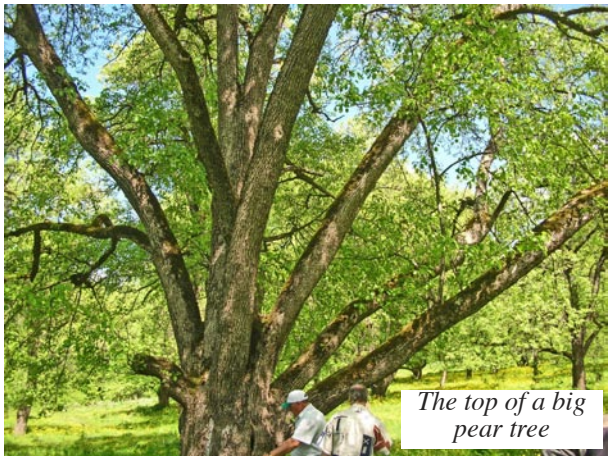
The Caucasus Region

The mountainous geology of the Caucasus reminds David of the Naturaliste-Leeuwin ridge and some of the south coast of Australia in its soil types with its mixture of limestone areas and granites. The Caucasus hills are limestone and the valley bottoms are good soils of volcanic origin, which creates very fertile ecological edges. There is an abundance of water in the Caucasus. However, much farmland has been abandoned because of fuel and transport costs.

There are many productive plant species indigenous to the Caucasus – mostly in the Rose family. David saw pears, rowan, wild strawberries, apples, plums, miribulla, blackberry, hazel nuts (*Corylus* sp), walnuts (*Juglans regia*).

There are old, abandoned plantings of apple trees that were collections of many varieties. It is still possible to make out the straight rows. These apple trees show considerable variation. Some have unusually-shaped leaves, trilobated, for example. Some have red-tinged leaves, which would protect the plant from intense sunlight. Some have red-fleshed fruit (see the article in Quandong, Vol 33 No 1).

The pear trees in the Caucasus were of special interest – partly for their grandeur and beauty. They are healthy and huge wild trees. Apparently the wild trees have been cultivated through grafting interventions to their established rootstock. The photo below shows the base of a very large pear tree that shows indications of grafting.



The top of a big pear tree

It appears to have been a mature wild pear seedling which was cut back a little up the trunk. Then from its base, it sprouted new shoots and an improved variety of pear was grafted to a number of those shoots. The vast established root system would cause the grafts to grow very quickly. Those graft shoots merged to form a single trunk as they grew but some remained distinct in the branches of the tree.

Foreign introductions and invaders

Other trees that David saw included deciduous tamarisk, rhododendron, azalea, black walnuts (which were not doing well), paulownia, honey locust (*Gleditsia triacanthos*), fig, catalpa, Osage orange (*Maclura pomifera*), and black locust (*Robinia pseudoacacia*). Most of these plants were reasonably well-behaved, but the Robinia has naturalised and is spreading in an aggressive way, colonising in wild areas of the Caucasus. Perhaps there are more Robinia trees and thickets there than anywhere else in the world.

The problem is that the rampant foreigners do not increase ecological diversity (although they do increase mathematical diversity, at least at the start). Many times they introduce a new ecology that is at war with the original ecology. Quite often the new overthrows and replaces the old, resulting in many fewer species overall. An example is the introduction of prickly pear in parts of Australia, resulting in a very diminished spectrum of species.

Spineless blackberries are also present, being deliberately introduced. (Think how different modern Australia would be if the blackberries that were deliberately introduced here had been spineless! They would be eaten out and so controlled by kangaroos, wallabies, etc.)

The Vavilov Institute

The N. I. Vavilov Research Institute of Plant Industry grew from the Bureau of Applied Botany (established in 1894). It is one of the premier plant research organisations internationally, and has included *Vavilov* in its name since 1967. It includes facilities for storing a collection of about 350,000 accessions of gene types representing about 2500 plant species including wild and cultivated corn, potato tubers, grains, legumes, fodder, fruits and vegetable seeds in various parts of Russia. The main centre for this collection is in the Caucasus region. Its building has an earth berm to help maintain the conditions needed to protect the cooled and frozen, dehumidified seeds and other genetic materials stored in its cellars.

The Vavilov Institute Seed Bank Centre in Kuban, Caucasus region

In 1941, the German military blockaded Leningrad for 900 days. Hundreds of thousands of people died from the bombing, the freezing conditions, and starvation. All of the scientists guarding the seeds and tubers in that centre starved themselves rather than eat anything in their precious collection. They said that this collection was the genetic material they held in trust for the future. Five of the scientists starved to death. David expressed the regret that we do not have a reverential attitude to the genetic diversity around us in the wild – especially in a land so well endowed as Australia.

Following the transformation that broke the old Soviet communist state, the Institute was much reduced in its funding, but it continues its work. Seeds in storage cannot be stored forever; they must be grown out in fields and new varieties also tested.

The Institute takes very careful quarantine measures: only essential vehicles may enter a quarantine station from outside; on their entry they drive through a bed of sawdust dosed with anti-fungal agents. People have their footwear similarly treated as they enter by walking through a special passage of sawdust. The photo below shows a man exiting the station through the personal passage to his car left outside the locked gates.

David told us an interesting throw-away comment by the Herbarium director in St Petersburg. Their scientists frequently have difficulty identifying a non-Australian species where the specimen was sent from a plant grown in Australia. It seems that exotics grown here take a different form and so their identity is often enigmatic. David believes the peculiarity in form has much to do with the quality of our sunlight because all plants are sensitive to light in setting their form.

---Pat Scott

Below: in the Caucasus region.

[Agrifood Infonet E-News: Issue 38, 31 January 2007]

Low fat avocadoes

Good news for dieters - avocadoes with less fat and kilojoules.

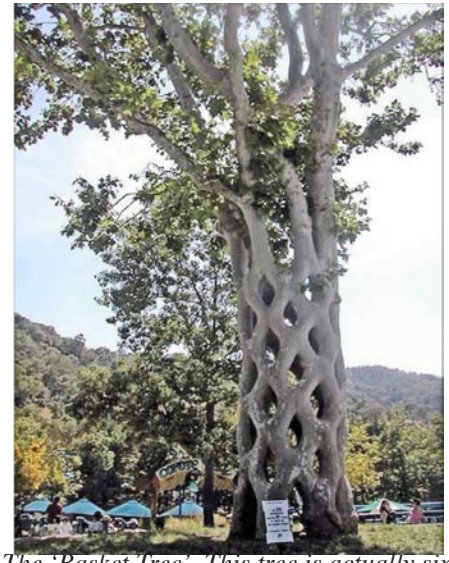
Sainsbury's is cashing in on the health market by launching the UK's first lower fat, lower calorie avocado. The new variety of avocado called Frias contains 30 per cent less fat that the more commonly known Hass avocado, whilst still containing the same vitamins and minerals. Frias avocadoes are on sale at Sainsbury's priced at £1.49 (A$3.62). Sainsbury's is keeping abreast of current health trends as the first supermarket to offer the new healthier avocado to British consumers. The food retailer now sells 15 million avocadoes per year, after witnessing a surge in popularity during the last five years. "The health benefits are there to be enjoyed by anyone who would already enjoy avocadoes and for those who will maybe now try something new." Avocadoes are high in monosaturated fat and good for the heart when eaten with a healthy balanced diet. They also contain vitamin E which acts as an anti-oxidant. Avocado production is mostly based in Mexico and Southern California. The EU remains the world largest importer of avocadoes, importing 40 per cent of its supply from non-member states. The research markets group estimates that demand will grow in Europe as avocadoes become more available and as the organic market begins to mature.

[http://www.bonfantegardens.com/circus.html]

Home of the Circus Trees™!

An amazing example of man's patience and imagination once known as the Tree Circus has been rescued from a forgotten plot in the Santa Cruz mountains and transported to a new home in Gilroy, California where they are now the centerpiece for a horticulturally-based theme park called Bonfante Gardens Family Theme Park.

The collection of unusual trees often appeared in Ripley's 'Believe-It-or-Not' and other magazines during the 1940s and 50s. These trees represent one of the most visible demonstrations of the love of nature by man - first to create and nourish, then to maintain, and finally to preserve and cherish these stunning creatures.



The 'Basket Tree'. This tree is actually six sycamores grafted together in 42 different connections to give it its basket shape.)

The botanical adventure began in Hilmar, California in the 1920's when Axel Erlandson, a farmer by trade, observed the natural grafting of two Sycamores. His first major project consisted of fusing four Sycamore saplings into a cupola that he named the "Four-Legged Giant." Using intricate grafting techniques, Erlandson wove his wonders with threads of living wood. Straight tree trunks became complex and compound designs in shapes like hearts, lightning bolts, basket weaves and rings.

The 'Four Legged Giant'

Erlandson claimed to be divinely inspired and spent over 40 years of his life shaping and grafting the bodies and arms of these full-sized trees. He could control the rate of growth, slowing it down or speeding it up to blend his designs to perfection. In 1945, Erlandson dug and moved a dozen or so of his trees to Scotts Valley, California where he continued to create more natural wonders.

This son of the land died in 1964 and left a legacy of 74 spectacular trees, but with no one to care for them, they languished and began to die. In the mid-1970's, a Santa Cruz architect named Mark Primack led a valiant effort to save the trees, even risking arrest for trespassing in order to water and feed the trees. Keeping as many alive as he could, Primack's efforts finally took root when they attracted the attention of tree lover Michael Bonfante who bought the trees for a theme park he was building in Gilroy.

Due to Bonfante's creative vision, 29 of the remaining coiled, scalloped and spiral shaped Sycamores, Box Elders, Ash and Spanish Cork trees were saved. During the winter of 1984 they were carefully hand dug and boxed, their roots trimmed, then watered and fertilized to revive the trees. On November 10, 1985, they were hauled over 50 miles of mountains. More than 20 municipal, county and state agencies were involved in the permitting process and the ultimate move to their final home at Bonfante Gardens.

With love and a bit of luck, Axel Erlandson's Circus Trees will continue to awe all who can appreciate the time and talent involved in creating this tribute to nature.

All 29 of Erlandson's creations survived the ordeal and are happily situated at Bonfante Gardens Family Theme Park in Gilroy, California, where 19 of the Circus Trees are on public display throughout the park.)

There are quite a few sites on the internet where you can find tree sculptures. One of them is http://www.arborsmith.com/ which has many links to other such sites.

---Pat

Trees outstrip most people in the extent and depth of their work for the public good.

---Sara Ebenreck,
American Forests

PISTACHIO NUT TREES
Large Grafted Trees
GROWN IN W.A.
Phone Bert and Angie Hayes
W. A. Pistachios

Phone, fax: 9622 9513
Mobile: 0428 181 689
Web: www.wapistachios.com.au

[http://www.scidev.net/Features/index.cfm?fuseaction=readFeatures&itemid=592&language=1]

The dark side of biofuel: palm oil in Indonesia

The search for alternatives to petrol is on in earnest. Conservationists say that palm oil monocultures do not support biodiversity and are destroying rain forest.

Europe's aim to cut greenhouse gases by one fifth by 2020, partly through demanding that one in ten vehicles are fuelled by biofuels, will spark a surge in demand for palm oil. But conservationalists say it is not necessarily a good thing.

Currently 83 per cent of the world's palm oil is produced in Indonesia and Malaysia, and the UN predicts that 98 per cent of their rainforests will disappear within 15 years to make way for palm oil plantations.

Conservationists claim the plantations are a cover for continued logging.

They point to Kalimantan, the Indonesian part of Borneo, where only a tiny fraction of the six million hectares allocated for palm oil have actually been planted, reports Ian MacKinnon.

The forests are cleared by draining and burning peatland, which releases massive amounts of carbon dioxide, making Indonesia the third largest emitter of carbon dioxide in the world.

To make matters worse, palm oil monocultures support little biodiversity, and leave local people who depend on the crop vulnerable to market fluctuations.

"It's no good other countries looking to us to help cut their carbon emissions without helping to support us in that effort," says the chief executive of Indonesia's biofuels development board.

Link to full article in The Guardian:

http://www.guardian.co.uk/indonesia/Story/0,,2049671,00.html?gusrc=rss&feed=12

Elais guineensis, the African Oil Palm is a native of Nigeria. The oil derived from its seeds has been used for cooking for a long time. This is the primary species being planted in the new oil palm groves in South East Asia.

The big fig leaf cover-up

The long drought and hot summer days take their toll on fruit production and quality. Alex Hart observed that the best figs grown at the Hillside Farm Fig Collection this year were growing on trees with big leaves. Alex recommends considering leaf size when buying or propagating fig trees.

[http://www.nature.com/news/2007/070205/full/070205-14.html]

Reafforestation by bat

While one sector of humankind is busily destroying native rainforests, another sector is striving to rebuild the forests. Rainforests house much of the world's biodiversity, and play a major role in mitigating climate change by capturing carbon, so researchers are keen to reverse the damage done by the widespread and continuing deforestation that has taken place over the past century.

Bats can be lured into areas of destroyed rainforest with fake fruits, researchers have found. This, they say, could be the key to restoring patchy parts of the landscape.

South American leaf-nosed bats of the family *Phyllostomidae* defaecate the seeds of the fruits they have eaten as they fly. This process, known as 'seed rain', aids plant dispersal throughout the rainforest.

Gledson Bianconi of the Universidade Estadual Paulista in Rio Claro, Brazil, along with a team of ecologists and chemists, wondered if this efficient seed-dispersal mechanism could be harnessed to restore damaged parts of the rainforest. If bats could be controlled, they thought, they could perhaps be used by researchers aiming to regenerate parts of the forest that had been used as agricultural land or pasture until the topsoil washed away.

The team extracted the essential oils of fruits that are a favourite meal of some species of leaf-nosed bats, and saturated artificial fruits made of foam rubber with the oils. They placed these fruity lures in the midst of damaged rainforest, where bats would not normally bother to fly in search of food.

They staked out the forest by night, and waited to see if bats would be tricked into visiting the area. Using night-vision goggles, they saw up to a dozen bats come out of the denser rainforest each night to visit the fruit.

Many restoration projects involve planting a mixture of native plants along with more exotic pioneer species, which are better able to deal with the relatively harsh conditions of exposed land. But this creates a landscape very different from the pristine rainforest that conservationists would like.

"Most reforestation projects cannot plant many native rainforest plants because they do not have them available," says team member Sandra Bos Mikich of the ecology laboratory of the Brazilian Agricultural Research Corporation (Embrapa), Colombo, Brazil. For many of these plants, seedlings are not commercially available owing to the difficulty of growing them; for some, the seeds need to be digested before they can germinate properly.

Using the essential oils of fruit to attract bats for seed dispersal, she explains, would be an easy way of increasing the flow of native seeds to the area, and of ensuring a high diversity in the forest.

This research may provide a nice way of reintegrating native rainforest plants into damaged areas. The tough question is whether those native plants will be able to survive in the harsh dryness, heat and bright sunlight that comes with open land.

All such strategies also need to compete with alternative uses for the land - such as using it to farm crops. "It would be ideal if we could only regenerate 'real rainforest', but we have to be realistic. We have to be able to feed people too."

Mikich and her team now plan to identify the components of the oils that are responsible for bat attraction, so they can synthesize them and make this technique of forest regeneration more widely available.

---Matt Kaplan

[The West Australian, 4 Oct 2006]

Boab root industry starting to bear fruit

Little-known bush tucker is making its way on to the State's fine dining tables.

The roots of the iconic boab tree are providing WA with a potential new agricultural industry.

Peter Fox and Denise Hales, of Kununurra, have become the world's first commercial baby boab growers and hope to become part of WA's $400 million horticulture industry.

They admit that tempting people to eat the little-known bush tucker is not proving easy but the Department of Agriculture and Food is helping them realise the venture's prospects.

The Department has helped the couple research the viability of commercially growing and marketing the crop. They received a Rural Industries Research and Development Corporation grant for the project.

The boab tree (*Adansonia gregorii*) is an icon in the Kimberley but the concept of a crop is relatively new. Ms Hales said she and Mr Fox had been growing the roots since 2001 but this was the first year their business, Boabs in the Kimberley, looked like having commercial success.

Hales said local people and restaurants had incorporated the food in their meals but it was harder to encourage the wider market.

Baby boabs are grown from planting boab seedlings and within 16 weeks become a tuber up to 30cm long, with fresh, edible leaves.

Ms Hales said the tubers had a crisp, crunchy texture like a water chestnut and a refreshing taste, while the leaves had a nutty flavour.

"They are really versatile and can be used in salads, stir-fries or grated and used in quiche or cakes," she said.

Liz Green, the Agriculture Department's horticulture technical officer in Kununurra, said their research had found the tubers were grown in Madagascar but as backyard produce rather than commercially.

"Other people are interested here but are waiting to see if the tubers are popular in the market," she said.

Frasers Restaurant head chef Greg Farnan said he had incorporated the vegetable into various dishes, including salads, curries or laksas and seafood.

"I don't think it will ever be a staple vegetable like a pumpkin or broccoli but it is a product that is easy to incorporate into dishes and it has a fresh, crisp and sweet taste," he said.

---Gabrielle Knowles

Boab roots.

- Boab - an ancient tree found in the Kimberley. Originally native to Madagascar but the species has now been identified as Australian because of its history in the country.
- Baby boabs, grown like a carrot, provide edible tuber and leaves.
- Boab tubers are high in iron and potassium, with a high level of protein and fibre and a relatively low fat content. Leaves high in vitamins A and C.
- Can be eaten raw or cooked and last up to a month in the fridge.
- They cost about $4.50 for a 350g pack or $12.50/kg.

The great tribe of Boab...

'Boab' is Australian for 'baobab.' Their family is Malvaceae, subfamily, Bombacoideae. There are a total of 8 species. Only one is native to Australia, in the region of Broome; 1 to southern Africa and 6 to Madagascar.

Boabs of the world

1. *Adansonia digitata*, Africa
2. *Adansonia grandidieri*, Madagascar
3. *Adansonia madagascariensis*, Madagascar
4. *Adansonia perrieri*, Madagascar (very rare!)
5. *Adansonia rubrostipa* (fony), Madagascar
6. *Adansonia suarezensis*, Madagascar
7. *Adansonia za*, Madagascar
8. *Adansonia gregorii*, Australia

But take note! There are many trees of *Adansonia grandidieri* around Broome!

Baobabs are very distinctive; small to large trees with massive trunks, cylindrical, bottle-shaped or irregularly gnarled. The bark is smooth, the wood is fibrous with a high water content. Leaves are produced only during the wet season, starting as early as late October and persisting until approximately April. The adult leaves are digitately compound. There are usually 5-11 leaflets whose margins are entire in all species except *Adansonia rubrostipa* in which they are serrate. All species set fruits in the late dry season or early wet season. Flowers are large and sturdy and produce nectar only one night. The fruit is a dry berry or an indehiscent capsule. The seeds are numerous, large, kidney shaped and have a very thick testa. Enveloping the seeds is a cream-colored pulp or tartar, the texture of which varies from chalky to spongy depending on the species and the age of the fruit. The length of viability of *Adansonia* seeds is unknown but exceeds five years. Germination percentages are usually less than 10%.

An online key to determining the different species of *Adansonia* can be found here:

http://www.baobabs.com/Baobabs_species.htm

A previous Quandong (Vol 28 No 2) reported that a Kununurra woman was making roasted boab seeds into a chocolate-covered sweet, said to have a citrus-like flavour.

---Pat

[http://www.baobabtek.com]

Baobab fruit pulp

A Canadian-based company working in partnership with Baobab Fruit Co. Senegal in Africa, the single largest harvester of baobab ingredients in the world, is introducing the baobab (*Adansonia digitata*) fruit pulp to the Canadian market.

The large, gourd-like, woody fruit contains a tasty pulp that is rich in vitamin C (six times that of an orange), calcium and dietary fibres (22% soluble and 23% insoluble) and is used as an intestinal regulator in cases of gastric disorders. It serves as a natural revitalizing source to combat fatigue and as an energy boost for athletes. The essential amino acids present in the pulp are a great source of energy. The pulp also possesses strong anti-oxidant characteristics and hepatoprotective activities proven by studies, and while it can be taken as is, flavours, food and beverages industries have already shown a strong interest in baobab ingredients and have already started working on developing innovative products such as teas, cereal bars, energy drinks and smoothies.

[Australian Nutgrower, March 2006]

What happens to trees after harvest?

Orchardists would be wrong believing that not much happens to deciduous trees once the fruit is picked. Although the trees no longer need to support a crop, photosynthesis continues and will do so until all the green pigment in the leaves, called chlorophyll, has disappeared, and the leaves have dropped off. While this article was written for deciduous fruit trees, Bas says that it equally applies to deciduous nut trees.

Photosynthesis is the process where leaves absorb carbon dioxide from the air and water from the soil to make carbohydrates, also called sugars. This highly complicated process is driven by the energy that the leaves get from sunlight. The carbohydrates are the building blocks from which all other plant materials are made.

Apart from carbohydrates, the tree also needs nutrients for growth and development of leaves, shoots, buds, flowers and fruit. The roots take up nutrients together with water from the soil. Of all the nutrients needed, nitrogen (N) is needed most. So, what happens in autumn to the carbohydrates and nitrogen, when the trees no longer need them for vegetative growth and growth of fruit?

To answer this question, we need to look at the roots. Although difficult to see and observe, roots regulate growth and performance of the tree. Roots absorb water and nutrients from the soil and translocate them to the parts of the tree above the ground. Roots make hormones which are necessary for breaking dormancy, and for growth. Roots also act as an anchor against the weather. Roots also store carbohydrates, such as starch; and nutrients, especially nitrogen, to be used in spring to open flowers, set fruit and produce the first leaves.

Other parts of the tree, such as the trunk and shoots, also store carbohydrates and nutrients just under their bark. But the roots store most of the carbohydrates and nutrients. About 80% of new growth in spring is due to stored carbohydrates and nitrogen. For about eight weeks after bud movement the tree relies on these reserves. After this the trees start to use carbohydrates produced by the new fully-grown leaves. As the temperature of the soil increases the roots become active and start to take up nutrients.

Figure 1 shows that concentrations of carbohydrates in roots are high in winter and are being used in spring and summer. As soon as the fruit has been harvested, the tree "pumps up" its roots with a new lot of carbohydrates. It is important that leaves remain healthy and green after harvest, so that they can keep photosynthesising and producing carbohydrates for next season's early growth.

The accumulation and use of stored nitrogen is similar to accumulation and use of carbohydrates, except that the nitrogen is accumulated and used more gradually than the carbohydrates.

About 50% of the nitrogen in the leaves moves back into the roots, trunk and shoots after harvest. In due course, part of the nitrogen in the leaves that have fallen in autumn, is mineralised in the soil, so also becomes available for the trees.

The level of stored nitrogen is known to affect cell division in fruit. A high level of stored nitrogen can lead to fruit with more cells and firmer fruit than those in fruit from trees with a low level of stored nitrogen.

To ensure that your trees go into winter with plenty of stored carbohydrates and nitrogen, keep the leaves on your trees as long as possible. When the leaves turn yellow in late autumn, you can be sure that your trees have been able to accumulate enough carbohydrates and nitrogen to see them through

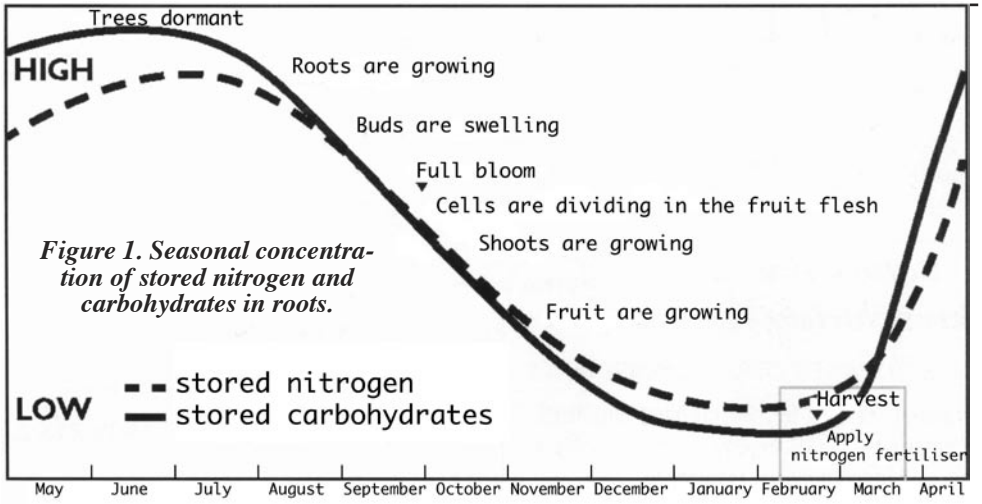


Figure 1. Seasonal concentration of stored nitrogen and carbohydrates in roots.

Figure 1. The solid line shows what happens with stored carbohydrates and the dotted line shows what happens with the stored nitrogen in roots of mature fruit trees. As soon as the fruit has been harvested, the tree starts to replenish its roots with carbohydrates, ready for next season's growth. It also shows when to apply nitrogen fertiliser to help the trees regain the level of stored nitrogen of the previous winter, for growth next spring.

spring (Figure 1).

- Nitrogen fertiliser applied just before harvest helps the roots, trunk, shoots and buds to store nitrogen. Little or none of this nitrogen is translocated to leaves or fruit just before harvest.
- Nitrogen fertiliser applied after harvest (early autumn) helps roots store nitrogen.
- Foliar sprays of low biuret urea after harvest (early autumn) increase concentrations of stored nitrogen in buds. Little nitrogen from sprays in early autumn is available to other parts of the trees.
- Always apply nitrogen fertiliser when the leaves are still green.
- Trees take up nitrate-nitrogen more quickly than they take up ammonium-nitrogen. With dried fertiliser, about 30% of the nitrogen is lost through leaching, volatilisation, growth of weeds and ineffective placement, and so is not available to the roots. With fertigation through drip lines, 90% of applied nitrogen is taken up by roots.
- Leaf analysis in mid summer will tell you if the nutritional status of your trees is deficient, low, adequate or too high.

Have a look at how vigorous your trees are, as indicated by the length of the shoots. The leaves should also be deep green. Use these indicators to calculate how much actual nitrogen you should apply to boost the nitrogen stored in your trees.

Nitrogen fertiliser applied just before or after harvest does not affect vegetative growth and avoids too much nitrogen going into the fruit. Fruit that is high in nitrogen is prone to fungal infection, storage disorders and breakdown. Nitrogen fertiliser applied in spring increases vegetative growth and produces fruit with high concentrations of nitrogen.

Looking after your trees after harvest is a vital part of orchard management. A good level of stored carbohydrates and nutrients, especially nitrogen, is insurance for a good start of a new fruit season.

---Bas van den Ende

[http://money.cnn.com/magazines/fsb/fsb_archive/2004/12/01/8214501/index.htm]
[http://www.davewilson.com/z_file/TOC_zaiger.html]

Designer fruit

No one has done more to change the produce aisle than Floyd Zaiger, but his biggest creation might be yet to come.

Some day you may walk into a farmers' market and find a fruit that you have never seen before and may not be able to pronounce: the peacotum (it rhymes with 'sea bottom'). With the yellow flesh of a nectarine, the texture and juiciness of a plum, and the velvety overcoat of an apricot, the peacotum tastes more like fruit punch than any of its parent breeds and is the first three-fruit hybrid headed for the mass market.

Floyd Zaiger, a Modesto, Calif., inventor and the most prolific fruit breeder in the world, created the peacotum. His family-owned company, Zaiger's Genetics, has patented more than 200 new varieties of fruit, all through conventional pollination. (Despite the company's name, Zaiger performs no genetic modification; instead he accelerates the natural selection process through hand-pollination.) Among his achievements, Zaiger, 78, has found a way to reduce the acid level in peaches, give unripe apricots an appealing red blush, and make white nectarines—previously a mushy mess—firm enough to be shipped around the world. (Not sold commercially until 15 years ago, white varieties now make up 22% of all nectarines in the U.S.; Zaiger created most of those breeds.) Another of Zaiger's successes is the pluot—a plum-apricot hybrid that is available in purple, yellow, or green with red polka dots and now constitutes about one-fourth of the plum market. (Never heard of a pluot? Ask your kids. Some are sold under the name 'dinosaur eggs.')

For his accomplishments in creating new fruit, Zaiger has been recognized around the world. The King of Morocco invited him to recommend selections for planting, and the French government named him Officier in the Order du Mérite Agricole (one step up from knight). "He's the father of exotic fruit," says Paul Buxman, a farmer who grows many Zaiger varieties at Sweet Home Ranch, a 55-acre spread in Dinuba, Calif. "He's a biological inventor who treads where most scientists don't think about going. He'll be in the encyclopedia one day."

Zaiger may seem to be following an odd pursuit, but there's big money in new fruit varieties. "On the retail end, everyone is looking for something different," says Eric Christensen, a citrus grower and the owner of Rising C Ranches in Reedley, Calif. While the traditional staples—bananas, apples, grapes, and pears—are still the biggest sellers, fruits that were once unheard-of in the U.S. now bring in $100 million each year, or more. According to the Produce Marketing Association, based in Newark, Del., mangoes sell about $280 million a year, and papayas have grown to a $96 million business. Although too small to be tracked by the PMA, other specialized items have started appearing on the shelves recently: the thin-skinned, high-juice Meyer lemon; the easy-to-peel seedless Delite mandarin orange; and the 70% apricot, 30% plum aprium (this one, a Zaiger creation, saw consumer demand jump after Martha Stewart made aprium jam on her TV show).

Of all Zaiger's creations—including two others entering commercial testing in 2005: the nectaplum (nectarine and plum) and the white aprium—it's the three-in-one peacotum that stands out as the biggest recent advance in fruit technology. "The peacotum is most unique," says Robert Woolley, owner of the Dave Wilson Nursery, a company that grows and sells Zaiger's creations.

The path to the peacotum began not with a "Eureka!" moment but with a few questions and a large dose of natural curiosity. Floyd Zaiger grew up picking strawberries on a migrant labor crew before catching what he calls the "dreaded disease of fruit breeding." (He says his obsession earns him little money; his wife, Betty, says it gave him ulcers.) In the 1950s, Zaiger apprenticed with Fred Anderson, a fruit breeder, now deceased, who was known as the 'father of the nectarine.' After a few years with Anderson, Zaiger struck out on his own in 1959, first experimenting with ornamental plants and eventually graduating to fruit hybrids—trying to create something bigger, firmer, prettier, or tastier by mixing peaches with nectarines, nectarines with plums, plums with cherries, and so on. Zaiger took many of his cues from nature—these crosses can happen in the wild, courtesy of bees. In the 1970s he discovered a fuzzy plum in the middle of a tree of smooth plums that he had crossed, and he became bent on replicating it. That would ultimately lead to the peacotum, but the project would take him almost 30 years.

The first step began with choosing the best parents from Zaiger's bank of 2,200 breeding-stock trees (in this case a peachcot and a plumcot—apricot-peach and apricot-plum hybrids he had already successfully created). Regardless of which parents he selects, Zaiger can never guarantee that the hoped-for characteristics will appear. The permutations are endless; some versions of the finished product could turn out fuzzy, round, and bitter, while others are smooth, heart-shaped, and delicious. "It's like playing cards," Zaiger says. "The numbers are always there, but you're not sure when they'll come up."

For all his experiments Zaiger uses hand-pollination, which requires removing the stamen from one flower—preventing it from self-pollinating and contaminating itself—and applying the pollen of another with an eye-shadow brush. (Zaiger previously tried pencil erasers, but he found they wasted too much pollen; mini-paintbrushes proved too expensive.) When he gets a fruit hybrid he likes, Zaiger plants its seeds in his 40-acre seedling orchard, where the young trees will remain for between one and three years. The plants with the most promise are moved to a secondary orchard for further evaluation, and the rest—some 50,000 a year—are scrapped. "You have to be ruthless," says Zaiger. He won't know for another three to five years whether he has something with commercial potential.

While the peacotum looked attractive from the beginning, the early versions tasted so awful that Zaiger almost had to dare people to try them. "It was so nasty it would lock your jaw," recalls nursery owner Robert Woolley. "Astringent and sour, with a smell that would hang with you like rotten salami." Zaiger went back into the lab to fix the flavor, but he had to try thousands of recrosses before he got the result he wanted.

The process is labor-intensive, but Zaiger's company is a family business in which everyone helps out. Betty Zaiger, 73, keeps the books; the Zaigers' two sons oversee the farming, with Grant, 48, running the embryo lab and Gary, 53, evaluating planted selections. (The latter task requires so much walking around the 160-acre property that Gary says his flat-footedness has gotten worse.) The Zaigers' 51-year-old daughter, Leith Gardner, is general manager. All family members are responsible for coming up with names. The peacotum was named so long ago that family members can't recall who came up with it—most likely an uncle. The first choice was 'pub plum,' named for the fuzz on the fruit, scientifically known as pubescence.

After the Zaigers invent a fruit, they have almost nothing to do with selling it. The

Dave Wilson Nursery, based in Hickman, Calif., a third-generation family business, is the sole licensor and primary grower of Zaiger's varieties in the U.S. It grows nearly a million at a time, which it sells to farmers for their own orchards. The farmers eventually bring the fruit to market. They pay the nursery about $5 for each tree, plus a royalty of $1 to $2.25, most of which goes back to Zaiger. It's not unusual for him to wait more than 15 years to make money from a new variety. After nearly three decades of working on the peacotum, Zaiger hasn't seen any revenue from it. "It's not get-rich-quick," he says.

Because of those economics, his company spent about 30 years in the red, though it is now profitable. He declined to disclose financials, but a back-of-the-envelope calculation would put his annual revenue somewhere between $1 million and $2 million, nearly all from royalties. It costs about $1 million a year to run the operation. He would probably do better if the fruit business were not so prone to intellectual-property theft. The National Licensing Association, based in Seattle, estimates that about one-third of patented fruit trees in the U.S. are planted and grown without proper licensing or payment of royalties. That doesn't count what happens overseas. Zaiger has found his plants in Chile, China, Iran, and Russia. In some countries, Zaiger says, thieves are sent into orchards to steal budwood (a branch from which more trees can be grown). Once Zaiger caught a visiting grower taking a piece of his cherry budwood; another time someone entered the property while the family was on vacation and dug up two full-grown pluot trees.

While the peacotum, as far as the family is aware, has not yet been stolen, it does provoke its own controversy. Craig Ledbetter, a research geneticist at the USDA Agricultural Research Service in Parlier, Calif., calls the peacotum a "fantasy," saying it is extremely rare for a true hybrid of that nature to yield fruit, especially fruit of any quality and quantity. That skepticism likely stems from a dispute a few years back, when the industry's marketing association, the California Tree Fruit Agreement, hired the University of California to perform a DNA test on the pluot, which found that the so-called hybrid didn't contain any apricot traits. Zaiger says the test was not conducted properly. Tests in Spain have corroborated his claim, but the situation is unresolved.

After 30 years of work and 20,000 crosses, there are six commercially viable selections of peacotums. (One has a dark-maroon skin with a yellow flesh, and another, shaped like an old-fashioned wooden top, has red and yellow skin.) A few selections have been released to farmers for an experimental trial, and some could be in supermarket produce sections in three to five years. "It has the flavor to become a winner," says David Karp, a writer specializing in fruit. "The Zaigers have a track record."

Right now the next generation of peacotums is lying nascent in the trees, waiting until June to ripen. When that happens, farmers will come to squeeze and taste the fruit and decide whether they want to buy trees. Some of the peacotums will be trucked to local farmers' markets and sold to consumers. In the meantime, the Zaigers are working on crossing their newest hybrid: a peacotum and a cherry. Any guess as to what it will be called?

---Carlye Adler

Suburbia is where the developer bulldozes out the trees, then names the streets after them.

---Bill Vaughan

[Fruit Gardener, Vol 39, No 1]

Offbeat citrus - blood oranges

Blood oranges are varieties of common sweet orange, *Citrus sinensis*, coloured by reddish-purple anthocyanins, water-soluble pigments. 'Blonde' oranges such as navels and Valencias derive their orange colour from carotenoid pigments.

Scientists recently discovered that all sweet oranges have the basic genes to produce anthocyanins, but that the genes are turned on only in blood varieties. Blood orange colouration is part science, part mystery. In general, cold winter nights alternating with mild days favour anthocyanin development in rinds and flesh; shaded areas tend to be darker. To the vexation of growers, red color varies unpredictably from season to season, from tree to tree, and even within clusters of fruit. Not all dark-fleshed fruit have red rinds; a rosy rind is no guarantee of dark flesh, but when a light chocolate-gray tinges the pores of the rind, then the inside is always maroon.

Mutations from blonde to blood oranges have occurred a number of times in various citrus-growing areas of the world, probably first in China, in or near where sweet oranges originated. Of course it is possible to introduce pigmentation into mandarin-like fruits by hybridization, and this is the approach taken by Sicilian breeders. The second generation of crosses are all triploid, and thus seedless, an added bonus.

Sanguinelli, Tarocco and Moro blood oranges. Photo: David Karp

Europeans have long prized their appealing blush, dramatic burgundy flesh, and intense flavour. Americans are split between enthusiastic foodies and the squeamish who recoil at the fruit's sanguinary aura.

The very phytochemicals that give blood oranges their ruddy appearance, rich flavour and health-giving properties, also, paradoxically, render them chemically unstable, thus hindering their marketing. As a result of the peculiar chemical composition of blood oranges, when they are juiced, pasteurization, concentration and storage degrade quality far more than for blonde oranges.

In compensation, blood oranges are exceptionally high in phytochemicals with antioxidant properties, including anthocyanins, hydroxycinnamic acids, hesperidin and vitamin C, all present in greater amounts than in blonde varieties. Studies have shown that these compounds scavenge free radicals that can cause cancer; lower LDL cholesterol, the type that fosters heart disease; and protect against diabetes.

It appears that no single flavour unites all blood orange varieties; each has its own profile, just as a Valencia tastes different from a navel. In fact, blood orange varieties differ among themselves as much as they do from their blonde relatives.

The best-tasting blood oranges have flesh that is either medium burgundy in colour, or lightly streaked with red, according to variety. Though dramatic, superdark fruits usually have lost so much acidity that they

taste flat, and tend to develop an unpleasant musty aroma.

Italy, Sicily, Spain and North Africa are the only places where blood oranges are commercially important today. Some of the best and best-known varieties of blood oranges are Moro, Tarocco, Sanguinelli and Maltese.

---David Karp

[Ed. note: this is a brief extract taken, with permission, from a much more detailed article.]

[New Scientist, 24 February 2007]

Terroir

Literally, this French word means 'soil'. But for wine-makers, terroir is much more slippery. So slippery, in fact, that when oenologists, viticulturists and other interested parties got together to decide on a definition at a conference at the University of California, Davis, last year, they failed.

Conventionally, terroir is a geographical term. It associates the character of a wine with the particular soil and often also with the microclimate in which the grapes were grown. Location is everything.

So-called 'Old World' wine-producers in Europe have clung to the idea that when it comes to Pinot noir grapes, for example, the Burgundy region is peculiarly blessed with the kind of soil and climate that bring out the best in the fruit. The belief has led some Pinot noir growers in the New World - in New Zealand and California, for example - to search for soils and microclimates that match those of Burgundy.

This idea is misguided, say some wine-makers and researchers. They believe that other factors can also determine a wine's character and that terroir should have a broader definition to include them. Producing good Pinot noir wines in locations that differ substantially from Burgundy is then just a question of managing these other factors well. Some say the quality of Pinot noir in New Zealand shows this has already been achieved.

Certainly, there is a growing body of evidence to challenge the conventional wisdom relating to terroir. It has long been said, for instance, that the mineral constituents of a particular soil influence a wine's characteristics. However, research on Sauvignon blancs has pretty much ruled out soil make-up. Instead, researchers think the region's climate is probably responsible.

Then there is the notion that cooler climates make for the best aromatic wines. That is clearly not the case in the Clare Valley in South Australia, which produces internationally acclaimed aromatic Rieslings though temperatures soar in summer. There must be something in the particular combination of fruit, cultivation methods, weather and soil, as well as the way in which the wine is made, that is responsible for its character. All of these factors are part of the terroir, say advocates of a broader definition.

No wonder delegates in California failed to reach a consensus, with some thinking it better not even to try. Nevertheless many wine-producers in Europe, and increasingly in the New World, are sticking to a narrow definition, sometimes equating terroir not only to a geographical region but even to a particular valley. The reason? It boosts their sales.

[https://oa.doria.fi/dspace/bitstream/10024/3244/1/establis.pdf]
[http://msucares.com/nmrec/reports/2001/fruits/etiolation.pdf]
[http://www.rngr.net/Publications/ctnm/Folder.2003-06-11.2354/vol_6_chapter_3.pdf/file]

Rooting 'difficult' hardwood cuttings

This is a brief summary of the use of etiolation for improving the success of rooting hardwood cuttings or airlayers.

Etiolation is the response of a plant to insufficient light. Plants react to dark conditions by growing long internodes and reducing chlorophyll from the tissues. Plants that are etiolated have soft stems and are prone to physical damage or insect attack. Etiolation is sometimes used as a pre-treatment in rooting cuttings.

Certain species are very difficult or impossible to root from cuttings or airlayers. It has been observed that juvenile wood forms roots more easily than older wood, so methods have been developed to force mature stems to revert to a more juvenile stage by manipulating the amount of light they receive. This is called 'blanching'.

'Banding' refers to wrapping the base of the proposed cutting with opaque material (black tape should be covered with aluminium foil to prevent overheating). Alternatively, in late winter, put an opaque tube, aluminium foil, for example---around and extending five or more centimetres beyond the terminal bud of a plant stem. This tube will exclude light from the shoot that grows from the terminal bud until that shoot appears at the end of the tube, at which time the shoot's exposed leaves and stem will develop normally.

In late summer, cut off the leafy shoots with their etiolated (bleached) basal portions and root them as you would any softwood cutting. The etiolated shoot method is so successful because etiolated stems root readily and because these etiolated stems, fed by their deep green parts developing later in light, are not starved for energy reserves.

Adding rooting hormones inside the bottom of the wrapping, or making a cincture around the base of the cutting before wrapping, might improve eventual success. Each species is different in its requirements, and it is a very complex subject!

---Pat

[http://www.stratsplace.com/hawkins/wgg.html]

The Super Gigantic Y2K Winegrape Glossary

An impressive internet database with information about European and American wine grapes, which includes many links to further information. Location, habitat and parentage of many varieties are discussed, along with their qualities, blends and synonyms.

The Wine-grape Glossary contains a clickable INDEX listing and other clickable internal text links, and is designed to aid individuals interested in knowing something about the fruit that is transformed into his or her favorite wine. It can be downloaded in either its ascii or hypertext format.

Because the potential scope is so huge only the more commonly grown or known popular grape-names are referenced. Compiled by a non-specialist for the benefit of non-specialists it is hoped that inaccurate taxonomy references will be overlooked.

[An original article by Ariel Shai]

Growing pawpaws in a temperate climate

Ariel Shai has a MSc in Agriculture from the University of Natal and also a Law degree. During his student years, scholarships took him to many parts of the world, including a year in Australia, where he visited plantations and growers. He has a special interest in pawpaws *(Carica papaya)*.

Since 1987, he has had a small farm in central Israel with 'a small nursery and many exotic seedling trees all around everywhere,' which he runs single-handedly before and after court hours. The nights there are cold and in the hot dry summer there is a cool dry breeze during the day. (The various dates have been converted from the seasons of the northern hemisphere to the southern hemisphere equivalents.)

As a result of better understanding the pawpaw, I could create models for growing it in cool subtropical areas. We cannot grow bisexual pawpaws in temperate regions because the bisexual flower changes with the temperature in its shape, fertility and sterility. Since the male pawpaw plants only produce viable pollen from January until March there are real problems for the female flowers set in December.

Another problem is female flowers set after April which we do not want, as these will result in almost no commercial fruits; they will ripen too late and prevent us cutting back the pawpaw tree. The pawpaw flowers set after March until December should be taken away, as these result in small parthenocarpic fruits and affect the development of the main crop. Therefore we discard all fruitlets set from May - November.

In addition, due to the heat of February, the female flowers drop and/or the males get sterile again - this time because of the heat. In other words, under cold subtropical or temperate climate with winter rainfall, the time for fruit set is limited to January and March - April.

Pawpaw in winter is tricky because all the rootlets die and do not function for almost six months at soil temperatures below 16°C. This is the cause of the infamous Pawpaw Dieback Syndrome which kills full plantations in NSW and south Qld, when the transpiration exceeds the rate of water uptake - because there are no roots to absorb and send up the water. Pawpaw Dieback appears in all subtropical countries, especially in autumn and spring when leaf temperature may rise at noon time to 40-50°C and the root temperature is below 16°C.

A pawpaw leaf has 750 stomata per square millimetre, one of the highest stoma densities, and on all dry days in cool subtropical or temperate countries, pawpaw trees die of acute water stress. Solutions that we tried and that worked are: whitewash spray on the exposed upper leaves and white netting all over the plantation.

Pawpaw cuttings
Photo: Ariel Shai

I grow only male and female types, usually propagated by rooted cuttings. I grow the pawpaws in plastic tunnels because I work by myself with no helpers. I graft them (W graft) on local female and male seedlings and it is amazing how you can improve fruit set by that. However, there is still a need to hand-pollinate

A pawpaw stem with a 'W' Graft
Photo: Ariel Shai

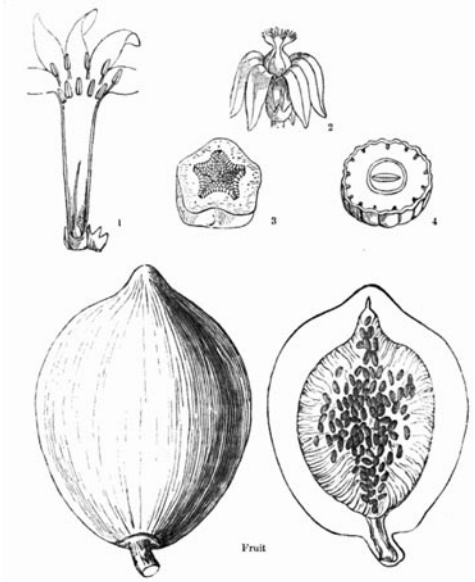
the flowers. This is possible when the plant is short, compact and the first flower starts at 20 cms above ground level and the ripe fruit ends up resting on the soil.

Propagation by cuttings gives uniformity, a ground level fruiting zone, easy pest control, easy harvest, and you can use cheap protective constructions (plastic-covered tunnels)..... which are all absent in seedling pawpaw plantations.

Here are the main points of my system of growing pawpaws:

- One - the sex of the plant - female - is known.
- Two - the time to set a mature flower under favourable conditions is one month from planting if the minimal canopy develops.
- Three - the height of the first flower that will be hand-pollinated is 30 cms - resulting in a fruit length (25 cms) + peduncle (5-30 cms) that will have the fruit touching the ground level.
- Four - due to hand-pollination, the plant is kept in the reproductive cycle and grows slowly. The plant will not run out of control into the vegetative phase which may result in 3m of growth in 6 months without fruits.
- Five - choice of a variety to propagate - it must be a female, with 3-5 fruits per peduncle, final fruit weight of seven hundred grams (the first fruits will be very large, up to 2 kg) and have good shape and a long fruit peduncle (changes with the season).
- Six - the pollination period is limited to the months of January - March. Hand-pollination is done in the late afternoon once a week; in the peak of flowering, twice a week at intervals of 3 days. At the beginning of December, 1-3 flowers will fully develop but will drop off. After that, all pollinated flowers will set fruits if properly hand-pollinated
- Seven - no males are planted in the plastic tunnels - only female plants. The mature male flowers are collected just before the hand-pollination process. The flowers are fully closed but just ready to open. I squeeze the pollen area with the fingers and then take away the 5 sepals and use the actual flower as a brush on the opened female flower stigma. Sometimes I even gently twist the closed but mature female flower, and insert the male flower and leave it there in the female flower. Growing and selecting good males with long flowers and non-sterile pollen is essential.

Within 2 days, a dark green fruitlet is seen developing uniformly. Non-pollinated fruits are light green and do not develop at all (there is a special exception in early spring - parthenocarpic fruits are set without seeds because of high auxin:cytokinin ratio). It should be noted that male flowers are fully developed with viable pollen one month after female flowers are ready to be pollinated - and unless pollen is stored from the previous year or imported, there will be a considerable loss of potential fruits.



Carica papaya. 1. Male flower; 2. Female flower; 3. Section of ovary; 4. Section of seed. (See reference at end.)

• Eight - fruits from flowers that were pollinated in December, will be ripe by mid-March after 3.5 months, with fantastic colouration and high TSS (Total Soluble Solids). Flowers that were pollinated in March will ripen in November -December (8-10 months, with low colouration, low TSS, fungal problems etc.)

• Nine - The leaf number and leaf area decreases from April until next December because there is hardly any growth. Therefore, I stop pollination as from 1st of April and once a month, from May until the following October, I remove all small flowers and fruitlets.

December is the de-apexing month. The top centimetre of the tiny apex on each plant is broken by the fingers, thus stopping the plant from growing and producing any other leaves and flowers.

Leaves are essential for the production of assimilates and we have to maintain them unless they are not productive. This means all yellowing leaves and shaded leaves are cut out and removed. Usually all lower leaves that are at an angle more than 90 degrees to the stem are cut out from June until December at monthly intervals. This is because the roots are not active, the nitrogen does not build up and the lower leaves get yellow first.

• Ten - preparing mature rooted cuttings: there is a need for a mother plant with side branches. I top a selected female plant twice and many side shoots will appear. The mature apical side shoots with flower buds are the ones to be selected and you have to plant enough mother plants to harvest enough side shoots. The mature side shoot is 3 cms wide, 25-30 cms long up to the apex. Two or three top leaves are left and the lower ones are removed. The type of basal cut can be at an angle of 45 degrees. The basal part is dipped in rooting hormone and placed in a heated mist bed. The best temp is 28 to 30ºC and the best medium is a well-drained mixture of sand, peat moss + Osmocote.

The leaves should be wet and no surplus of water should be given because it will result in bacterial rot. To minimize the rots I spray heavily with 1% Copprex and Maneb once a week and leave the spray to enter the medium through the night. A 50% shade cloth is placed over the mist bed.

Rooting time is 30-60 days. The best rooting periods are January to March. This means that the rooted plant will have to wait until November to be planted. In that period it might get extra height which is not desirable. The best plant to be planted is 3-4 cms wide, 35 cms tall, very hardy and compact.

Spacing is 1 to 2m in the row and 2m between the rows. It is common to plant in a triangular way to allow sunlight in during the winter.

By early December all the crop is off and the plant is cut back to 40 cms at a 45 degrees angle, to produce 2-3 side shoots to start the cycle again. Sometimes, I select a side shoot in advance. The thinner and more juvenile the cutting, the easier it will root - but it will take more time to reach the flowering phase.

---Ariel Shai

The source of the botanical drawings of pawpaw is 'Watson, L., and Dallwitz, M.J. 1992 onwards. The families of flowering plants: descriptions, illustrations, identification, and information retrieval. Version: 29th July 2006. http://delta-intkey.com'.

The URL has a useful botanical database:
http://delta-intkey.com/angio/

Ariel and a short pawpaw plant

[http://www.bris.ac.uk/news/2007/5384.html]

Getting dirty may lift your mood

Scientists discover the secret of why gardening makes you feel good.

Treatment of mice with a 'friendly' bacteria, normally found in the soil, altered their behavior in a way similar to that produced by antidepressant drugs, reports research published in the latest issue of Neuroscience.

These findings aid the understanding of why an imbalance in the immune system leaves some individuals vulnerable to mood disorders like depression.

Dr Chris Lowry, lead author on the paper from Bristol University, said: "These studies help us understand how the body communicates with the brain and why a healthy immune system is important for maintaining mental health. They also leave us wondering if we shouldn't all be spending more time playing in the dirt."

Interest in the project arose after human cancer patients being treated with the bacteria *Mycobacterium vaccae* unexpectedly reported increases in their quality of life. Lowry and his colleagues reasoned that this effect could be caused by activation of neurons in the brain that contained serotonin.

When the team looked closely at the brains of mice, they found that treatment with *M. vaccae* activated a group of neurons that produce the brain chemical serotonin. The lack of serotonin in the brain is thought to cause depression in people, thus *M. vaccae's* effects on the behavior of mice may be due to increasing the release of serotonin in parts of the brain that regulate mood.

Future studies will be designed to determine if *M. vaccae*, other bacteria, or pharmaceutical compounds have antidepressant properties through activation of this group of serotonin neurons.

[www.hawaiifruit.net/hoshigaki.jpg]

Hoshigaki!

Gesundheit! These Japanese treats are simple to make. An excellent use for firm persimmons, either astringent ones like Hachiya or non-astringent ones such as Fuyu. In Japan, the dried fruit is enclosed in waxed paper sacks or plastic wrap to allow the sugar to condense on the skin through perspiration, causing the characteristic white, crystalline coating on the surface.

How to make Hoshigaki

The written history of dried persimmons, or as the Japanese call them, hoshigaki, dates back more than 700 years. Enjoyed throughout northern Asia, hoshigaki brings out the natural fruit sugars and healthy attributes of the fruit. North American Indians also enjoyed a variety of persimmons that dried on the trees.

All you need besides firm persimmons is a piece of string, a knife and a shears or scissors to prune the stem.

Trim the top of the persimmon so that it is easy to tie the string around the top. If the stem is broken off, cut a small groove in the top of the fruit so that the string can be attached.

Peel the fruit completely.

Tie the string around each stem of the peeled persimmons. Make sure they do not touch each other. Usually the string is hung under the eaves of houses or sheds where the rain or dew does not affect it. Depending on heat and sun, it can take up to 5 weeks before you are ready to enjoy this sweet treat. Hoshigaki can be kept in the freezer for up to a year. Perfectly dried fruit will form white sugar crystals around a dark, leathery skin.

---Ken Love

Persimmons can be sliced and dried in other ways, also - on racks in the sun or in commercial drying machines.

[Illinois Nut Tree Association, Fall 2005]

Instant stratification: sprouting hazelnuts in just ten days

Stratification of deciduous nuts is a lengthy process. Tom Potts, a founding member and the first and current president of the New York Nut Growers Association, found a short cut. [Calendar dates are for the northern hemisphere. - Ed]

Every fall I select the best hazelnuts from my most productive trees, with the hope of developing cultivars that perform well in my area. These nuts are then cold-stratified over the winter in order to induce the nuts to sprout. I usually start this process in early October, using fresh nuts that have not dried out.

The nuts are placed in damp (not wet) peat moss in a Ziploc plastic bag. A few holes are punched in the bag to allow for ventilation. The bag is then placed in the refrigerator at 2-4°C. The bag is checked every two weeks to maintain dampness and to see if sprouting has started. The appearance of a small rootlet at the end of the shell signals the start of sprouting. After planting the nuts, shoots will emerge in one to two weeks, depending on the temperature.

This process of stratification is necessary to sprout the seeds of many temperate plants. I have used it to sprout acorns, chestnuts, and hickory nuts. The stratification requirements of many tree seeds can be found in the book *Seeds of Woody Plants of North America* by James and Cheryl Young.

The problem

So what's the problem? Well, hazelnuts take at least several months to sprout and some times as long as 8-9 months. Last year, some of the nuts that I started stratifying in October began sprouting at the end of June. This allowed for only three months of growth before frost. Consequently, these small seedlings may not survive the winter.

This problem was in the back of my mind when I visited Cornell's Mann Library last spring to read up on hazelnut culture where I read *Micropropagation of Filberts, Corylus avellana* by Wilbur Anderson. I found that he didn't use a stratification procedure to grow seedlings. He exposed nut kernels to a solution of the plant hormone Gibberellic Acid-3 for four hours, and then planted them out. He didn't say how long it took to get sprouts.

The solution

I decided to try this technique in the fall. I set up an account with Sigma Chemical Co. in St. Louis, Missouri, so that I could purchase Gibberellic Acid-3, and a scale to weigh it on. This took more time than I had anticipated (3 months). So, I couldn't start the experiment until December. The nuts were kept from drying out by keeping them refrigerated in plastic bags with damp paper towels.

I obtained a large pressure cooker to sterilize all of the materials and instruments used in cracking the nuts and planting the kernels. The nuts were washed in 5% Clorox solution for 10 min., cracked out, and the kernels placed in a solution of 50 mg. Gibberellic Acid-3 per litre. Each kernel was placed in a separate sterile container (ice cube tray) to prevent cross-contamination by any kernels infected with bacteria or fungi.

The kernels were left in the solution for 4 hours at room temperature. Twenty kernels were then removed to sterile seed starter mix, watered with sterile water, and covered with a layer of plastic film. The containers were incubated at 70°F for 12 hrs/day (fluorescent grow lights) and at 60°F for 12 hrs/night.

To my surprise, five sprouts were observed

emerging from the soil after only 10 days, and 19 of the 20 kernels had spouted after 17 days. It's now 34 days since planting the kernels. That's 6 months earlier than last year! The 19 seedlings range in size from 5 to 11 inches tall. They're now ready to be moved into larger containers. They'll be field planted in late May.

---Tom Potts

[ISIS (Institute of Science in Society) Press Release 26/04/07]

Mystery of disappearing honeybees

The first alarm was sounded in autumn 2006. Honeybees are disappearing across the United States, with half of the States affected and beekeepers losing 30 to 90 percent of colonies. The problem began more than two years ago and has intensified in recent months. The bees simply vanish relatively suddenly. In cases where the colony appears to be actively collapsing, the workforce seems to be made up of young adult bees, insufficient to feed the brood, but are reluctant to consume provided feed. This "colony collapse disorder" (CCD) is particularly devastating for growers of fruits and vegetables, as they depend on insect pollinators.

Since then, CCD has been reported from Germany, Switzerland, Spain, Portugal, Italy, Greece, and the UK, where one of the biggest beekeepers lost 23 of his 40 hives.

CCD has baffled scientists, because no one knows what causes it; ongoing efforts are being made to identify possible pathogens in the bees and chemical residues in pollen, honey and bees. Viruses, fungal diseases, parasitic mites, pesticides, or chemical designed to control mites have been considered by the authorities, as have GM crops such as those containing the Bt gene, and mobile phones.

Parasites reduce bee immunity

Parasitic mites such as *Varroa destructor* and *Acarapis woodi* cannot explain colony collapse disorder as there is no evidence that mite infestation is directly involved, but they do reduce the immune response of the bees, causing them to be prone to infection with virus, bacteria or fungi. Honeybees seem to have limited immune flexibility, which may make them more sensitive to devastating pathogens.

Foul brood disease

Paenibacillus larvae is the most serious pathogen of honeybees. It causes American Foul Brood disease (AFB), a disease of the honeybee larvae. It is highly virulent and easily spread among colonies, and generally fatal if untreated. But as in the case of parasitic mites, foul brood disease is not associated with colony collapse disorder.

Pesticides

The use of pesticides, especially insecticides on crops, is known to kill or weaken thousands of honeybee colonies in the US each year, and local bee kills have occurred sporadically for decades. However, the National Academy of Sciences report considered it unlikely that this has "contributed significantly" to the recent decline. The report stated: "Most pesticide-caused honey bee kills are the result of accidents, careless application, or failure to adhere to label recommendations and warnings." It has obviously ignored sub-lethal effects, particularly of new pesticides that may turn out to be one of the most significant single factors contributing to the current honeybee decline.

Pesticides disrupts bee behaviour at sub-lethal levels

Numerous pesticides have been found to disrupt bee behaviour following sub-lethal exposures. A wide array of pesticides including fluvalinate (the chemical used to treat hives to eliminate parasites) disrupted the behaviour of honeybees leading to feeding and navigation problems. Bees suffering from sub-lethal pesticide intoxication resembled the behaviour of bees described by observers of the colony collapse disorder. Sub-lethal doses of fipronil (a veterinary insecticide) impaired the olfactory memory process of honeybees. Spinosad, a prominent and much used natural insecticide fed to bumble bees in pollen slowed down their foraging behaviour while a higher dose caused colony death within two to four weeks, more evidence that sub-lethal effects of pesticides may be the single most important factor contributing to disappearing honeybees.

Genetically modified (GM) crops may have sub-lethal effects on bees

The timing of the honeybee decline appears to coincide with the widespread deployment of GM crops. GM crops are engineered to tolerate herbicides, especially gyphosate, or to contain biopesticides (the Bt Cry toxins from *Bacillus thuringiensis*), or both. The biopesticide toxins produced in Bt crops are not highly or acutely toxic to bees, but are toxic to butterflies, moths and beetles. Nevertheless, in some instances, the toxins can kill bees or modify their behaviour.

The Bt toxin Cry1Ab caused reduced foraging activity in bees after they were fed with syrup containing the toxin. But sub-lethal effects on the bees were not recorded in those experiments.

Another limitation of the experiments so far is that they were carried out with toxins derived from bacteria, not transgenic toxin derived from the Bt crops, which are known to have very different properties.

Transgenic glyphosate-tolerant canola pollen was reported to pose no threat to honeybees. However, when organic, conventional, and herbicide-tolerant canola were compared with regard to pollination by wild bees in Alberta, Canada, the herbicide tolerant canola plots had the greatest pollination deficit, while conventional and organic plots were equally well served by the wild bees .

Clearly, the existing evidence calls for much fuller investigations on the sub-lethal impacts of GM crops on bees, such as learning and feeding behaviour, and immunity to disease.

Mobile phones and bee decline

There have been widespread reports in the mainstream media that mobile phones may be responsible for the decline of honeybees. The results are indeed startling, and should be considered in the context of the increasingly clear evidence that weak radiation from mobile phones and base stations does have harmful effects on the health of human beings and wildlife. Studies show that this kind of radiation disrupts the navigation systems of bees; possibly they are not able to find their way back to their hives.

Some other possibilities

Bee colonies experience stress when moved about frequently by truck, which may weaken their immune systems. These bees may suffer from a diet that includes artificial supplements, concoctions akin to energy drinks and power bars.

The mystery remains

The mystery of disappearing honeybees is far from solved. The greatest suspects so far are pesticides and radiation from mobile phone base stations. However, it is likely that sub-lethal effects due to GM crops, mites infestations and other factors which alter the bees' behaviour, affect their memory and learning process or compromise their health and immunity will all have a role to play.

Honeybees may be our most sensitive indicator species for all the environmental pollution and dangerous technologies we perpetrate. Their distress has implications for all of us.

And now it is time to speak of some serious stuff. We must all make important decisions about the future of WANATCA. Attendance at meetings and field days has been falling steadily for the last few years, to the point that the Executive Committee has become very disheartened.

We hope that members will come to this meeting to discuss our options and the directions we need to take; we welcome your thoughts and ideas.

---Pat

A message from David Noel, founder of WANATCA...

WANATCA heading for semi-retirement?

Decision to be made at May 22 meeting.

Over the last few years, membership levels in your Association have steadily declined. Income is no longer sufficient to meet costs of maintaining current services.

The Executive have therefore had to consider some radical changes. Our principal expense nowadays is the cost of compiling, editing, typesetting, and mailing out our magazine 'Quandong'. We have some cash reserves, but these would soon be burnt up if we continue as now.

Our constitution does allow us to shut down WANATCA and pass on any surplus funds to the University of Western Australia. Rather than do this, we would like members to consider the alternative of a 'planned hibernation' where low-cost activities such as our extensive Internet websites are maintained, while day-to-day control is cut back to the minimum level of just ticking over.

In practice, this means that individual member services, in particular 'Quandong', would cease. Membership subscriptions and membership lists would also cease. The Association would reduce to a non-subscription-funded tree-crop interest group with minimum activity. However, a more active structure could be revived in the future if an alternative funding source, say research grants, became available. In the meantime, responsibility for WANATCA matters would pass to a single Administrator.

Since its founding, the Association has sought to promote interest in nut and tree crops, in particular through publications and other methods of information generation and exchange. We were one of the first in this area to stake out an area of the Internet, with our own website, the on-line version of ATCROS (the Australian Tree Crops Sourcebook), and on-line versions of material from the ACOTANC series of conferences, which we initiated in 1982. More recently we have been adding on-line versions of our invaluable Yearbooks, and more recently, on-line versions of 'Quandong'.

As the founder of the Association, I am naturally sorry to see its decline, but it is a change being experienced by similar organizations all over the world. The easy availability of information over the Internet has itself played a major part here, as has declining general interest in local or special-interest groups, which have mostly moved entirely onto cyberspace or have folded.

Our next meeting, on May 22, 2007, will therefore be an Extraordinary General Meeting at which members will be able to vote on a scheme like that outlined above, or put forward alternatives. If the hibernation proposal goes ahead, WANATCA will operate as normal till the end of 2007 (except that subscriptions will no longer be accepted), then put itself into the garage and switch off.

---David Noel
2007 May 1

A message from Stanley Parkinson, President of WANATCA...

WANATCA heading for the future

WANATCA needs new directions, new leadership.

Perhaps the present executive is heading for retirement. Surely WANATCA can enter the new electronic world without being put into semiretirement with an administrator. This is the view I would like to espouse.

Many older societies now put their magazines on-line and WANATCA and Quandong are already half-way there.

I want as many members as possible to come and make the new direction for us to travel.

---Stanley Parkinson, President

On the WANATCA Website

http://www.wanatca.org.au

Yearbook 5, 1979, is now on-line.

Table of Contents:

A particular feature of Yearbook 5 is the Glossary of Nut Names. The first and largest part of the list is an alphabetic arrangement of the binomial scientific names of many plants with edible parts, and not just nuts. Associated common names and local, native names are given, as well as five-letter codes which can be a useful shortcut to the scientific names. This is followed by an alphabetical list that cross-references the native or common names to the associated scientific names.

You can see a listing of all on-line publications without being a member, but to view or download full articles, you will need a password. Each quarter, the password will change. You will receive a new password by e-mail each quarter or you can find the password printed at the bottom left of the address panel on the mail slip sent with the current issue of Quandong. Members will be supplied with a new password each quarter as long as they are current.