

Quandong

magazine of the

West Australian Nut & Tree Crop Association (Inc)

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The PILI NUT or JAVA ALMOND (*Canarium commune*)

Next Meeting:**GROWING NUTS AND FRUITS IN NORTHERN WA**

Our speaker at the next meeting is **Wally Edgecombe**, of CALM, the WA Government's Department of Conservation and Land Management.

Wally has been in the tree area for a long time — he started with the Forests Department, one of the two units which were later merged into CALM, in 1963. He spent around 15 years at the department's Research Branch at Dwellingup, in the State Forests south of Perth.

At the beginning of the 1980s Wally was transferred up to run the government nursery at Karratha, in the Pilbara. In this area of the tropics, with pronounced wet/dry seasons, the emphasis was on establishing low water-need trees to soften the harsh landscapes. However, where water is available, the same area has tremendous possibilities for fruit and nut production, and Wally was able to observe some of this potential during his ten years in the Pilbara.

Now stationed back in Perth, where he is an advisor on Trees on Farms, Wally has kindly agreed to talk to us about some of the possibilities for tree cropping in the Northwest. His talk will be illustrated with slides, and promises to be of great interest.. Do come yourself, and bring a friend or give a lift to another member.

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

Time: Wednesday February 20, 7.30 pm

Place: Naturalists Hall, 63 Meriwa Street, Nedlands

Don't Miss our March 17 Field Day!

Together with this issue of *Quandong*, members should receive a pull-out-and-pin-up leaflet about our Field Day north of Perth on March 17.

The Field Day includes three great properties — the only major commercial almond orchard in WA; a first-class avocado plantation, with a range of other exotic fruits and advanced features such as multi-species windbreaks and pest control with guinea fowl; and a novel tree farm operation which uses patented root control bags, a method with the potential for creating 'off-the-shelf' orchards — plant trees and harvest your nuts in the same year!

With this event, we are also offering to arrange lifts for members who would like them — contact Alex Hart on 490 1324.

SOURCEBOOK PUBLISHED!

Together with this issue of *Quandong*, current members of WANATCA will receive their long-awaited copy of the **Australasian Tree Crops Sourcebook**.

These days, producers of every sort of item claim to be 'excited about' their latest product. Although there have been snags along the way, now we have actually got the thing out, I must say that I feel quite excited about it myself!

ATCROS is a book which is literally crammed with useful information about tree crops. The Contents Pages are shown below — over 80 pages of useful tabulated information on tree crops of every sort, especially for members in the Australasian Region.

I hope that the book will be as well received as we anticipate, and that readers will feel it was worth the wait. At the same time, I am conscious that having got this far, it is not timeto sit back forever — there is still scope for improvement in later editions.

One table of special mention for WANATCA members — the membership location guide. We do suggest that you use this guide to locate members in your home area, and perhaps offer them a lift to meetings — not everybody has good transport available.

I would welcome comments of every sort as readers get into the habit of using ATCROS, and start to notice the things they would like which seem to be missing! While we can't promise to include everything, all suggestions would be valued and will be considered carefully. Now go for it!

— David Noël

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[Rural Research, Winter 1989]

Albizia lebbek —

a potentially valuable forage tree for the tropics

Meeting the dry-season feed requirements of cattle and sheep in tropical Australia is a major nutritional challenge. The wet-season flush of plant growth results in a great quantity of available standing hay, but this is mainly grass with a low energy and protein content that deteriorates throughout the 'dry'. In the worst possible scene animals may have full bellies, be standing among shoulder-high grass, but still be wasting away.

The essential imbalance is in the carbon: nitrogen ratio of the feed on offer. The low nitrogen (or protein) content of the feed means that the rumen microbes are restrained in the way they can process the fibrous grass; so the animal must exploit its body protein — or muscle that had been laid down during the previous wet season — in processing the dry-season feed.

Graziers commonly use licks combining molasses and urea, and in more recent years the potential of perennial legume browse species has been promoted, with *Leucaena leucocephala* prominent among the latter.

Unfortunately, leucaena's potential has been severely limited by the arrival of a psyllid pest, and the plant demands a minimum annual rainfall of the order of 800 mm. It is in the drier areas that the dry-season nutritional problems are most severe.

Dr Brian Lowry of the CSIRO Division of Tropical Animal Production, who was involved with Dr Ray Jones of the Division of Tropical Crops and Pastures in overcoming the toxicity problems associated with leucaena, has long been interested in filling that dry-season nutritional gap. Consequently he was interested in the lead provided by Mr John Prinsen of the Queensland Department of Primary Industries,



Maturing pods—a useful feed source

who suggested that *Albizia lebbek* had some potential as a forage tree.

Albizia lebbek (or Indian siris) is a medium to large leguminous tree indigenous to India, South-East Asia, and

the monsoon areas of coastal northern Australia. In the Indian subcontinent it is widely grown for fuel and timber, and is routinely used as a forage. By contrast, Queenslanders view it more as a decorative avenue tree, or as useful because of the shade it provides. However, since it has demonstrated its ability to thrive over a very large portion of Queensland (it will grow in areas receiving as little as 400 mm annual rainfall), is easy to grow, and has indicated potential as a forage legume, this now common tree may prove more valuable.

Dr Lowry took to observing and testing the feed value of the siris trees around Townsville. He found that, while the green leaf had (as expected) a good protein content and digestibility, the annual leaf fall and flowering provided two exceptionally useful feed sources.

The most significant differences between

siris and leucaena are the former's ability to grow in low-rainfall environments and the quantity and quality of fallen leaf, flower, and pod available to the grazing animal.

A deciduous tree, *Albizia* drops its leaves over a period extending from July to October, with considerable variability between individual trees. This fallen leaf would not normally be considered as a feed source (since usually a tree withdraws nutrients during the senescing phase), but Dr Lowry measured good protein levels (9.5%) and sheep found it highly palatable. One tree can dump up to 80 kg (dry matter) of leaves.

During the last 3 weeks of October, an apparently pointless flowering event occurs. Many flowers are produced, but only a small fraction go on to produce seed, and a thick mat of fallen flowers forms around the base of the tree. These fallen flowers — up to 50 kg per tree — are valuable as feed, containing on

Comparison of Indian Siris and Leucaena

	leucaena	siris
minimum rainfall requirement	800 mm	400 mm
soil requirements	intolerant of Ca deficiency, low pH	unclear; found over wide range of sites
productivity	high—up to 20 tonnes per ha per year	edible dry matter production unknown; probably not as high as leucaena
time to come into production	1 year	longer; maybe 3 years
leaf fall	non-seasonal, continuous	deciduous in dry season
leaflets	small, unavailable when fallen	large, available from ground
feed quality		
green leaf	very high at all times	not as high as leucaena; varies with season
flowers	no feeding significance	substantial resource during 3-4 weeks of dry season
pods	seeds shed from tree, too hard for cattle; pod no value as feed	seeds retained in pod, large, readily eaten; pod is useful feed
management	needs cutting to keep within reach of animals; withstands hedging	no management; can be cut for green feed but probably intolerant of close repeated cutting

average 23% protein.

The tree's reproductive effort is centred around a less conspicuous flowering in February-March. Long thin pods, containing several seeds, begin to ripen in June, with the majority reaching maturity around leaf fall. Each tree produces about 40 kg of pods, which, at 19% protein, provide another good food source. Importantly, they are only shed gradually, most falling between September and December. Seed is retained in the pod until several cycles of wetting and drying bring about its release; this is important because it means the seed is readily available to the grazing animal.

From the data he has accumulated, Dr Lowry believes that — in the spear-grass country of northern Australia — the leaf, flower, and pods from a single siris tree would be capable of supplying the supplementary energy required for the maintenance of a 150kg steer during the dry season. The protein it supplies would also certainly result in an increased intake of spear grass.

Based on the typical stocking rate in these environments, this means that just one siris tree per 3 ha would be capable of overcoming the dry-season nutritional gap.

Alternatively a siris woodland could be

established. Dr Lowry has noted that the tree's presence encourages the proliferation of the desirable grass, green panic — probably through a combination of better water relations and improved nitrogen nutrition. The woodland could be expected (at a density of 25 trees/ha) to provide 3-4 tonnes of edible dry matter per hectare, while grass production should increase in both quantity and quality. The effect would be to double total feed production and increase animal production to the same degree.

Albizia lebbek clearly has some considerable potential in northern Queensland.

— *Wayne Ralph*

REFERENCES

Albizia lebbek as a source of dry season feed for grazing ruminants in the semi-arid tropics. J.B. Lowry. *Tropical Grasslands*, 1989, 32 (in press).

Potential of *Albizia lebbek* (Mimosaceae) as tropical fodder tree—a review of literature. J. Prinsen. *Tropical Grasslands*, 1986, 29, 78-83.

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varieties, site selection, windbreaks,
nutrition, and tree establishment.*

[West Australian, February 2 1990]

Passionfruit like a sunny outlook

Passionfruit vines are decorative and produce flavoursome fruit which can be used in a variety of ways.

Passiflora edulis — the purple passionfruit — crops in its second year.

Fertilising helps produce good yields of fruit. The usual application of complete fertiliser (NPK) each month from September to December should be followed by a further dressing after harvest in February. A handful per square metre can be applied, watered in well, about half a metre out from the trunk.

Passionfruit need a sunny position, preferably free of cold winds and winter frost. In their first summer a little shading may be required if the weather is very hot. While they will grow in a variety of soils, they must have good drainage.

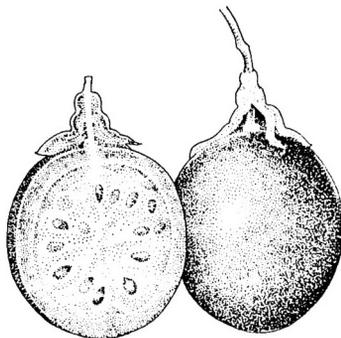
The vines thrive in fertile soil. Poor ground should be enriched with organic matter to help hold moisture and improve the structure. Peat, well rotted compost or leafmould are useful for this purpose. The vine should not be planted in direct contact with manured soil.

Moderate dressings of farm manures are beneficial in sandy soil. These can be used at the rate of 3kg per square metre, kept half a metre from the trunk and lightly raked in. Do not dig in any type of manure.

Watering should be done twice a week in summer on sandy soils. During heatwaves and hot easterly winds the vine should be watered every second day. In heavy soils watering twice a week is adequate.

Continuous soaking must be avoided as it can provide conditions which encourage the

development of root rot and this will cause the vine to decline and die. Good drainage is essential and the soil should never become waterlogged.



Vines bear on the new shoots from the current season's growth. The main pruning is best done at the end of July to produce wood that will bear fruit in summer. Prune all foliage growth along the main laterals back to 25cm. At the ends of the trellis or support, take out a third of the old long laterals.

Light pruning in late summer after harvest will reduce vigorous laterals. Sometimes a light winter crop is produced after summer trimming.

Support for the vine can be a trellis, pergola or strong frame about three metres long and 1.5-2 metres high. It must be able to support heavy loads. If more than one vine is planted, allow four metres between plants. Situate the vine so that it runs north and south to ensure maximum sunlight.

Lack of pollination results in poor fruit set and pulp development. The receptive time for pollen occurs mainly when temperatures are between 20°C and 25°C and lasts for about three hours. Failure to pollinate can be caused through easterly winds drying out the receptive parts of the female flower, and overhead sprinklers which wet flowers during their receptive period — mid-morning to mid-afternoon — render the pollen grains ineffective.

Once the young vine has become established, a number of shoots form at the base. One or two of the strongest should be selected and all other growth removed.

— Joan Hillary

WANATCA 1991 EXECUTIVE

At the Annual General Meeting last November, **Matt Bruekers** and **Pat Scott** were elected as new members of the Executive Committee, and **Amos Machlin** and **Neville Shorter** were re-elected for a further term.

And at the first meeting this year of the Exec, in February, **David Noel** was re-elected as President for a further year, and **Matt Bruekers** became Vice-President.

The Association is fortunate in achieving such a competent and active Committee, and we can look forward to the future with some confidence and pride at this time. But don't let them get complacent, ask for more!

GOOD ENOUGH TO EAT

(VHS/PAL Cassette — Duration 58 min)

"They came to talk — Farmer to Farmer — about Organic Farming, about an Agriculture emerging from dependence upon chemicals"

Many visitors to California make straight for Disneyland, with its excitement and childhood enchantment, whilst others head for the serene Redwoods of the High Sierras, the biggest trees in the world.

But one group of tourists came to California with a purpose all their own. BIOLOGICAL FARM TOURS, a group of 30 innovative farmers all the way from Australia, had come to see organic farming. They came to talk, farmer to farmer. They came to see the crops and walk over the farms. They came to hear about how to implement the principles of an agriculture in harmony with nature — an agriculture emerging from dependence on chemicals — an agriculture to exercise the skills and resourcefulness of the farmer.

Don McFarlane, a Queensland farmer and Nuffield Farming Scholar, had been impressed by what the Californians had achieved. He wanted his fellow Australian farmers to see for themselves. So he arranged a 17-day tour covering 23 farms — a tour that would cover the major farming areas of California, from Chico in the north to the Mexican border in the south, from the foothills of the high Si-

erras in the east to the coastal regions of Santa Barbara and Lompoc in the west.

This program condenses into 58 minutes the essence of what members of California Certified Organic Farmers were doing . . . building soils, compost making, cover cropping, fertilizing, and controlling pests from nematodes and thrips to fungus and diseases. It looks at irrigation, crop rotations and weed control. It covers production ranging from orcharding and cattle ranching to growing field crops of every kind; rice, maize, lucerne hay, carrots, potatoes, lettuce, melons, cotton, strawberries, tomatoes, . . . and a score more besides.

What becomes clear as the farmers tell their story is an attitude and drive that serves the principles of Biological Farming. Whether one lives in California or in a distant part of the world, *Good Enough to Eat* makes sense. Local conditions may vary but the principles hold true. *Good Enough to Eat* is a program to be seen again and again for its wealth of earthy wisdom.

(Available from Granny Smith's Bookshop, \$39.95)

[West Australian, September 18 1990]

A taste of the tropics for the Northwest

Hopes are high that the tropical carambola, or star fruit, may be produced commercially at Carnarvon.

They were boosted by the first significant crop produced this year by Agriculture Department trials.

The fruit is grown at Kununurra, but according to Agriculture Department

Gascoyne research station manager Terry Muller the market is "crying out" for supplies.

He said production of the fruit could be an attractive alternative for Carnarvon horticulturists.

Some growers were showing interest, with limited plantings.

The flavour of the star-shaped carambola, a native of South-East Asia, is described as a cross between a pineapple and a peach.

Mr Muller said the carambola also made an attractive garden plant.

It was a tall evergreen which adapted to a range of climates and produced pink flowers and two fruit crops a year.



Chief Sampler: Gascoyne research station manager Terry Muller tastes a carambola.

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[Fruit Gardener (California Rare Fruit Growers), 1st Qtr 1988]

Growing Mangoes... Down Under

Although our climatic conditions in sub-tropical Lismore, northeast New South Wales, Australia (28°S) may be different from southern California, our problems of mango flowering and fruit set are probably similar.

Mango growers in California may be interested in some of our experimental approaches to overcome these problems, and may wish to experiment with their own trees.

The mango industry is found mainly in the tropical north of Australia. There have been large numbers of plantings in the last seven years, and it has been conservatively estimated that there are half a million trees in Australia. One plantation south of Townsville, north Queensland, has 200,000 trees, while another at Katherine, in the Northern Territory, has 60,000 trees.

The main cultivar grown is Kensington Pride. This was originally imported into Australia in the 1880's from India by horse traders as seed and grown at Bowen, Queensland. Fortunately, it turned out to be a high-quality mango, and as it is polyembryonic, the majority of plantings in Australia are of seedling origin.

Because of this polyembryony, trees are

meant to come true-to-type, but 5 to 10 percent of trees within a plantation are different from the parent. A selection program has been undertaken and superior clones of Kensington Pride have been recognized. Kensington Pride is used as a standard to which all other cultivars are compared, as much as Haden is used as the standard in Florida.

Lismore is recognized as being at the southern limit for commercial production of mango. We receive an average of 50 cm rainfall per annum, but generally our winter and spring periods are dry, this is conducive to good flowering. The two main diseases, anthracnose and bacterial black spot, can be controlled with a regular spray program.

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The mean period of flowering for Kensington at Lismore is generally early October. This period may not be conducive to good fruit set, as low temperatures during flowering often result in reduced yields. It has been suggested that at temperatures of 10°C or below, pollen germination is reduced and pollen tube growth slows down, resulting in reduced fertilization.

Although day temperatures are moderately warm, night temperatures sometimes fall below 10°C in our region. Parthenocarpic or small seedless fruits called "nubbins" are formed which often drop from the tree after four to eight weeks.

A solution to this would be to grow a cultivar that has its main flowering at a later time when the minimum night temperatures are higher. The majority of cultivars tend to start flowering at the same time, but we have observed that a few tend to have their mean period of flowering later than Kensington.

The Florida cultivar Sensation generally has its main period of flowering about one month later than Kensington. It has proved to be a regular and heavy bearer in our region. It is a medium-sized, late mango, with a brilliant red blush, but does not have as acceptable a flavor as Kensington. Some describe the flavor as being very bland. In addition, a large proportion of fruit have been reported to have internal breakdown problems after harvest.

A short-term solution would be to delay flowering to a more acceptable period. Flower panicles can be deblossomed by

breaking off the inflorescence at its base, before 10 percent of the flowers on the tree have opened. This should result in a second flowering with up to five axillary panicles on each deblossomed shoot being formed.

Those new inflorescences generally are shorter than the deblossomed ones, but have been found to have a higher percentage of perfect flowers, increasing the chance of fruit set. Florida cultivars appear to respond well

to this treatment. The later the treatment is attempted, the lesser the re-flowering response.

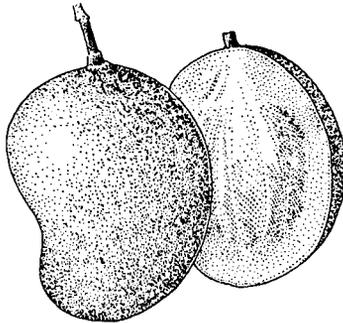
Some recent research in South Africa with the cultivar Haden, which is notorious for setting "nubbins", has shown that final yield was increased by five times compared with control trees when this

technique was used. Harvest of fruit was delayed by one month. It is possible that this treatment may tend to make trees go into a biannual bearing pattern.

This technique could be experimented with on a small scale, but a chemical treatment is required for a commercial situation, as the technique would be too labour-intensive. Research in Australia and elsewhere has not found a consistent, reliable chemical treatment for delaying inflorescence emergence and development, or for deblossoming.

I would be happy to correspond with people who try this technique or who wish to learn further details.

— David Wallace, Rosebank Road, Rosebank, NSW 2480.

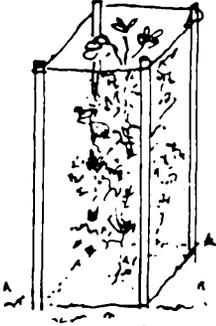


[Organic Grower (WA), June 1989]

WINTER SURVIVAL OF EXOTIC FRUITS

Many plants from tropic and sub-tropic climes need protection during their first two or three winters before they can go it alone. Lychees and pawpaws are two such plants.

More of these plants perish through cold 'wet feet', leading to root-rotting fungal infection, than are lost through frost.



Help to keep the plant warm and protect it from wind damage in winter

Frost will severely damage or even kill young lychees and white sapotes, yet mature trees can smile through -1°C and -4°C respectively.

FROST PROTECTION

Areas of frost susceptibility do exist around the Perth metropolitan area. A lean-to or cover of shade cloth, hessian or clear plastic film will help. If using clear plastic allow generous ventilation at the top. Hessian or shadecloth may be used provided the covering is not so close as to exclude all light. A large paper or plastic bag placed over the tree traps warm air around the foliage.

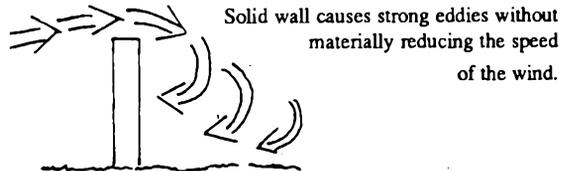
Protect the roots from frost damage by spreading a finely textured mulch around the base of the tree. Even newspaper works well as a frost protecting mulch. A film of water over the foliage helps too, so at first sign of frost turn the sprinklers on your trees.

If your plants are hit by frost, most damage occurs as they thaw out, particularly if this happens rapidly, say as the sun's first rays heat them up. If you can shade your plants during this time you will reduce damage considerably.

Another frost-foiling strategy relies upon planting susceptible plants near buildings or established trees. These larger bodies radiate some heat through the night. Alternatively you can plant these intolerant kinds into tubs which can be moved to a shaded spot, or even indoors, in frosty times.

WIND BREAKS

Cool or cold winds quickly strip warmth



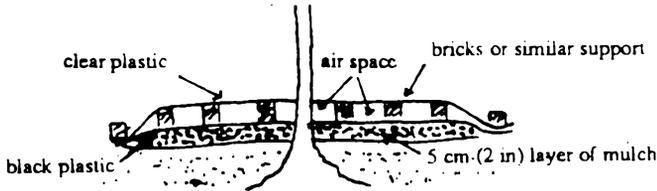
A staggered planting of shrubs works well.

from plants. Windbreaks can really make a huge improvement in the environment for your warm climate plants.

The most effective windbreaks are those that deflect and dissipate a wind, rather than say a solid wall which will create

sheeting down with bricks, stones or wooden blocks of about 10 cm diameter and thickness. Stretch a heavy duty clear plastic sheet over the stones and weight down the edges with more bricks or with soil.

You have created a solar heat trap that



Protecting plant from cold wet feet

turbulence, sometimes more damaging than the full blast of wind. A staggered planting of fast growing bushy native shrubs deflects and breaks up the wind into small minor eddies, offering protection for an area up to 15 times the height of the screen.

Recommended plants include melaleuca 'Revolution Green', *M. nesophila*, the honey myrtle, bottlebrush 'Kings Park Special', and some of the low growing gums like *Eucalyptus lehmanni* (the bushy yate) and *E. platypus*.

Shadecloth and hessian both make excellent windbreaks for the same reasons. During the winter months a surround of either of those materials will cut wind damage and help keep the plant warmer at the same time.

PROTECTION FROM COLD WET FEET

Spread a layer of mulch approximately 5-10 cm in depth around the base of the tree, then spread a layer of black plastic sheeting over the soil and mulch. Weight this

will keep the soil and rootzone warm and relatively dry. It's better to pull the mulch and plastic a few centimetres away from the collar or base of the stem to avoid 'collar rot'. Just make sure that the plastic slopes away from the stem so that excessive rain water is not directed to the plant. Come spring, remove this device and replace with an organic mulch.

As the tree grows older it adapts and becomes more hardy to this otherwise cooler, alien environment. By modifying the environment, particularly in the early years, using this method you can grow an amazing variety of warm climate plants.

Some examples are: canistel, countess fruit, babaco, soursop, tamarind, acerola, wax jambu, ice cream bean, jackfruit, star apple, carambola, pawpaw, lychee, longan, custard apple, mango, white sapote, black sapote, avocado. There are many more.

— *Neville Passmore*, Blossoms Garden Centre, Perth.

Letter from Hawaii

(From member Hugh Carroll to David Noel, October 17 1990)

In the vernacular of the Islands, "Howzit?". Springtime in WA should find all your horticultural horticultural projects up and sprouting.

It's fall here and getting a little wetter, but seasons are not such a large item here, we simply plant year-round. These even, warm temperatures result in denitrification of even the best soils here, so legumes inoculated with the right strains of Rhizobia are the order of the day, not only as cover crops, but tree legumes for shelter too.

I am using alfalfa on the sort of hopeless soils with good results. We are looking to establish ten-year lifespans with 2 m roots on these stands as semi-permanent plantings. We can cut the N-rich stems to mulch trees and veggies.

The N becomes soluble on site, through the action of microbes and invertebrates. Cows, horses, etc are great denitrifiers themselves, so this green manuring gives more to the plants, we feel, than does manure.

Led largely by a groundswell of

USEFUL TREE SEEDS FROM CHILE

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

Gondwana Seeds
Casilla 53027, Correo Central,
Santiago 1, Chile

consumer demand in California for unpoisoned produce and uncontaminated groundwater, a demand now echoed right across the US, the concept of organic and sustainable agriculture has received an incredible resurrection. Using the initiative ballot, voters have outlawed the use of whole groups of ag chemicals, and conventional growers are scurrying about for alternatives.

There was keen interest in this subject in a recent conference on Maui. I am sending along a summary. Dirt farmers were mixed there with scientists, and I tried to reach the spectrum.

Of special interest here might be the notion of 'training' all of of Perth's fireplaces to produce clean wood ash to boost the fertility and reclaim scarce and precious minerals for Perth's sands.

WA probably does not have the space problems we do here, and on the mainland, for locating landfill dumps — but we all literally full up, all the way round.

30% of this refuse is nothing more than dead plants, all of which we could hope to reclaim for soil fertility.

Have a great growing season. I am finally beginning to talk some of Maui's property owners into planting Hass avocados. At this date they are selling for \$2.00-3.69 each in the supermarket chains here.

I used wood ashes to great advantage with this crop to prevent biennial bearing and set heavy crops of fruit in California.

— **Hugh Carroll**, PO Box 1717,
Makawao HI 96768 USA

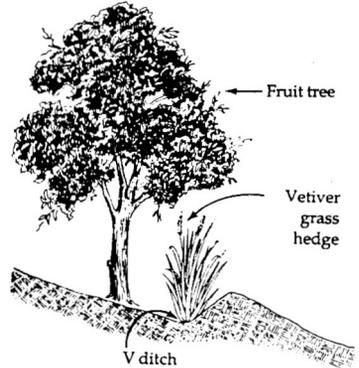
ABOUT VETIVER GRASS — THE HEDGE AGAINST EROSION

(Why Vetiver Grass Is the Ideal Plant for the Vegetative System of Soil and Moisture Conservation)

Although many grasses and trees have been tried over the years as measures to prevent erosion, to date only vetiver grass has stood the test of time.

As made clear by the following list of its characteristics — derived from observations of *Vetiveria zizanioides* throughout the world — this truly remarkable plant is ideally suited for the vegetative system of soil and moisture conservation. No other grass is known to rival its hardiness or diversity.

- When planted correctly, *V. zizanioides* will quickly form a dense, permanent hedge.
- It has a strong fibrous root system that penetrates and binds the soil to a depth of up to 3 metres and can withstand the effects of tunnelling and cracking.
- It is perennial and requires minimal maintenance.
- It is practically sterile, and because it produces no stolons or rhizomes it will not become a weed.
- Its crown is below the surface, which protects the plant against fire and overgrazing.



Nurturing Trees

- Its sharp leaves and aromatic roots repel rodents, snakes, and similar pests.
- Its leaves and roots have demonstrated a resistance to most diseases.
- Once established, it is generally unpalatable to livestock. The young leaves, however, are palatable and can be used for

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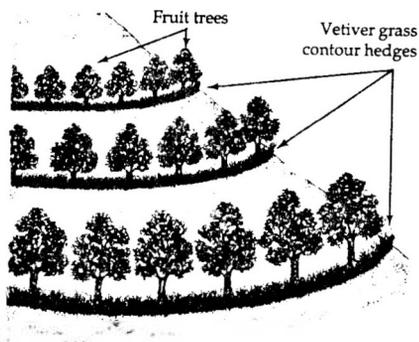
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fodder. (In Karnataka, India, a cultivar of *V. zizanioides* selected by farmers has softer leaves and is more palatable to livestock. This cultivar is also more dense, less woody, and more resistant to drought than some of the other available cultivars.)

- It is both a xerophyte and a hydrophyte, and once established it can withstand drought, flood, and long periods of waterlogging.

- It will not compete with the crop plants it is used to protect. Vetiver grass hedges have been shown to have no negative effect on — and may in fact boost — the yield of neighbouring food crops.



Stabilizing Tree Crops

- It is suspected to have associated nitrogen-fixing mycorrhiza, which would explain its green growth throughout the year.

- It is cheap and easy to establish as a hedge and to maintain — as well as to remove if it is no longer wanted.

- It will grow in all types of soil, regardless of fertility, pH, or salinity. This includes sands, shales, gravels, and even soils with aluminium toxicity.

- It will grow in a wide range of climates. It is known to grow in areas with average annual rainfall between 200 and 6,000 mm

and with temperatures ranging from -9° to 45° Centigrade.

- It is a climax plant, and therefore even when all surrounding plants have been destroyed by drought, flood, pests, disease, fire, or other adversity, the vetiver will remain to protect the ground from the onslaught of the next rains.

Growing tree crops on hillsides

Vetiver's stabilizing influence is especially useful in steep and rolling country, where the distribution of moisture cannot be controlled. Unsuitable for the cultivation of cereal or other annual crops, such areas can be successfully planted to perennial tree crops on the contour when stabilized by vetiver grass.

Most attempts to grow tree crops on steep hillsides are abandoned because the resulting poor, uneven stands are not worth the cost of maintenance. The figures show a method of establishing tree crops on such hills using contour vetiver hedges.

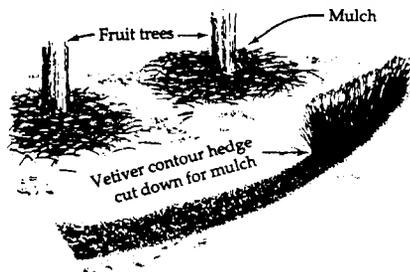
First the contours of the hill are pegged out. Next, by hand or with a bulldozer and ripper unit, the farmer digs shallow V ditches along the contour lines. A row of trees is planted close to the edge of each ditch, and vetiver grass is planted in the ditches.

Under this arrangement of planting, the runoff between one row of trees and the next one down the slope collects in the vetiver-lined ditches. (There is usually sufficient drainage on the slopes to preclude the possibility of waterlogging.) Thanks to the effects of such water harvesting, the rows of trees do not have to be planted as close together as the trees within a row. Initially, the V ditch will provide a measure of runoff control, thereby increasing the soil's moisture content, and both the vetiver and the planted

trees will benefit.

By the time the ditch "melts" away after a couple of years, the vetiver hedge will be established and performing its function of increasing the infiltration of runoff, halting the loss of soil and soil nutrients, and creating a natural terrace.

Because the collection of runoff in the contour ditches has the effect of doubling or tripling the amount of effective rainfall, fruit trees planted by this method need no irrigation in the first three years of establishment. The whole system is stabilized by the vetiver grass lines.



Vetiver as Mulch

After the vetiver hedges have properly established, the vetiver grass can be cut down to ground level when the dry season sets in and its leaves used as a mulch at the base of the fruit trees to help retain stored moisture (see figure). The advantage of using vetiver for this purpose is that its leaves harbor few insects and last well as a mulch.

Vetiver hedges also protect the young trees in the hot summer months by providing some indirect shade, and in the colder winter months by acting as windbreaks.

Forest trees should be planted by the same method. Where this has been done, the results have been spectacular: more than 90 percent of the seedlings so planted survived the 1987

drought in Andhra Pradesh, India, whereas 70 percent of the other seedlings died.

From *Vetiver Grass, the hedge against erosion*. 3rd ed. World Bank, 1990. Available from Granny Smith's Bookshop at \$9.95.

Tree Crops Centre welcomes Jane Price

The Tree Crops Centre is pleased to announce that Jane Price will be helping with its operations in the future.

Jane comes to the Centre with a strong publishing background, and will be most active in the Centre's publishing and typesetting operations, Cornucopia Press and Personal Publishing Press Services. However, she will endeavour to assist with other matters in the absence of David Noel.

Her assistance means that the Centre can normally be staffed each weekday from 9 am to 5 pm.

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[Growing Today (NZTCA) June 1990]

Frustrating Hazels and Fast-growing Walnuts

South America is not known for its nut trees, with the exception perhaps of the Brazil nut, harvested in the wild in the jungles of the Amazon basin.

There are though, other nut species, some of them growing in the mountainous regions of the Andes. Locally esteemed, they are practically unknown outside their native regions. Two species with potential can both be found in the Andes mountains - yet geographically they grow five hours flying time apart.

The Chilean hazel is native to Southern Chile at a latitude 35 degrees to 50 degrees south. The climate here is quite cold with temperatures often below zero in winter.

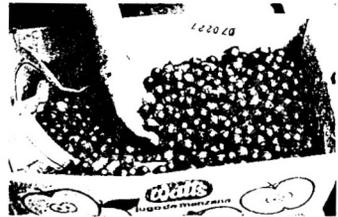
The Andean walnut grows naturally in Colombia and Ecuador at a latitude above and below the Equator but only at altitudes above 2500 metres. The climate in this region is cool although frosts do occur at times.

At our farm in Oratia we have both these species growing side by side. A feat only possible in New Zealand where we have such an equitable, mild marine climate.

The Chilean hazel, *Gevuina avellana* (Molin) - common name in Chile "Avellano" - is not a hazel at all. It is a member of the plant family Proteaceae, the same family to which the Macadamia belongs. Often reaching a height of 10 metres or more, the tree has a broad spreading canopy. It's an evergreen with glossy dark green leaves, pinnately compound, the leaflets are ovate in shape and their blades have toothed margins, not unlike the leaves of the holly.

The flowers are similar to the

inflorescence of the macadamia, pure white or cream. When the tree is in flower, the flower recimes are carried outside the leaf canopy making a striking display. Flowering occurs in the early summer with nuts forming soon after flowering has finished.



Ripe Avellano Nuts

As the nuts develop they increase in size, change in colour from green to bright red and at maturity, almost twelve months later, turn almost black. They fall off the tree to be collected from the ground. The nut is ovoid to globose and nutlike in appearance with a hard indehiscent pericarp enclosing a single seed. Nut size varies from tree to tree but average about 12 mm in diameter.

The nuts are much sought after in Chile where they are sold roasted or may be eaten fresh. The taste is not unlike the hazel, hence the name. The yields per tree varies between 5 to 8 kg. The crack out makes up 35 to 40% of the nut.

The Chilean hazel has been around in New Zealand for at least 40 years. The nursery firm of Duncan and Davies in New

Plymouth is said to have sold these nuts during the early fifties. Some trees of this importation I believe are still to be found in areas around Taranaki and Nelson.

Later seed introductions have been made to DSIR. I do not know what happened to the trees that were raised from this source. The writer obtained seed from Chile in 1976 - only two trees have survived.

The raising of the Chilean hazel is a rather frustrating experience. The seeds germinate readily but after the two leaf stage is reached, the seedlings suddenly turn brown and die. Some plants will grow to about two metres high, and then simply die. There seems no real answer to the question why they succumb but I suspect that our soil lacks a mychorizal fungus needed for the tree's survival.

On the other hand, some trees do survive and even flourish. One tree is growing well in a shady situation in an almost bush-like position, while in contrast the other is growing in full sun. The latter was raised from a cutting and is no taller than 2.5 metres, yet it crops heavily. The seedling tree is only twice as tall yet only sparingly sets fruit.

Looking to learn more about the *Gevuina*

avellana I visited the Osorno region of Southern Chile in 1982. The foothills of the Andes are forested - not unlike the lower slopes of our Southern Alps. In some ways



Avellano bearing nuts on the Endt's farm at Oratia, Auckland

the vegetation is similar, the beeches as we know them here are also common in the Osorno region and the area experiences high rainfall.

We followed some tracks in the bush but initially failed to find any hazels. Only when

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we had spotted our first did we find more as our eyes became attuned to their appearance. It was a rather disappointing sight as most specimens were straggly understory trees. The best trees were seen near the stream edges where better light prevailed. A feature of recognition were the brilliant red berries displayed amongst the glossy green leaves.

Small seedlings were numerous on the forest floor but it looked like few would make it to the canopy. The Avallano is fairly common in the forest and much of the harvest



An Andean Walnut growing on Great Barrier Island, New Zealand. The trees in the foreground are tamarillos.

of the nuts offered for sale are collected in the wild. On the farmland west of the Andean foothills isolated stands of the Avallano can be seen, either in hedgerows or plantings on waste corners. These cultivated trees were at least 10 m or more high and in good health.

According to the export company Pro-Chile, the total estimated yields of the Avallano is 50,000 tons. Because of the properties of the kernel, an oil is extracted for use in cosmetics.

The Andean walnut (*Juglans neotropica*), also known as Tocte and Nogal, is a prized tree in Ecuador and Colombia. The large black, deeply furrowed nuts, the size of a golf ball, are freely available in the towns and villages of the highlands.

The nutmeats, although difficult to extract, are highly valued by the Indians who prepare the nuts to make sweetmeat, especially the famous Nogada de Ibarra. The timber of the Tocte tree is also commonly used for furniture making and carving. In recent times, the increased demand for the timber has resulted in the removal of most of the sizeable trees in Ecuador.

The Andean Walnut is not unlike the north American Black Walnut to which it is related, but it is very much faster growing. In New Zealand the growing season extends from September when the flower buds burst until July when the leaves are shed.

On young seedling the leaves will remain throughout the year. The growth rates are phenomenal - two metres per year are not uncommon. The tree produces nuts in six years from planting out.

It is not really known how frost hardy this species is. In Ecuador some of the places I have seen the Tocte grow are cold, high altitude sites. We get little frost here in Oratia and I have not seen frost damage on our trees. I would think heavy frosts would not be tolerated by this species.

It is also tolerant of heavy wet soils. We lost a number of our trees after excessive rains a few years ago. The best trees I have seen are

growing on Great Barrier Island, on a well drained site in a relatively frost free area. By now, a number of trees have been sold from our nursery to many parts of the country. It would be interesting to me to get some feedback on the performance of these plants.

The nuts are harvested during May to July. The thick fleshy husk sticks to the nuts. In order to salvage the nut, the husks are allowed to rot off after which the kernel can be removed easily. The seeds may be sown immediately. Germination takes place about late October. In the early years of its growth the young tree is susceptible to wind damage as the rapidly growing shoots are quite brittle. It is not recommended to plant solid plantations of this nut species. In nature they always occur in isolated stands.

While the nuts represent a potential commercial crop, probably of most interest are the possibilities for high quality timber. Very similar to the North American black walnut, the Andean walnut could reasonably be expected to fetch similar prices for its timber, perhaps as much as \$1,500 per cubic metre.

Given a growth rate of two metres per year, that could be a much more viable proposition than the long rotation normally required for walnut.

— Dick Endt

[PAWA Newsletter, August 1990]

The Chinese Water Chestnut, *Eleocharis dulcis*

Although there are many forms of *Eleocharis dulcis* throughout the world, Hon Matai is the one extensively used commercially. The original corms were imported to the USA from southern China and underwent extensive trials. Ten of these corms were imported to Western Australia and the ones currently available for sale are from the first batch grown in Western Australia.

The variety is the only one grown in the USA and is grown as an annual cash crop. It has been successful in the southern states of the USA, and in southern China, and is therefore climatically suited to Australia.

With the popularity of chinese cooking and the lack of fresh chestnuts on the market, with a little ingenuity this crop could be a winner. At home, Hon Matai can be grown very successfully in a bucket or large container on a verandah, provided a water level of 8 to 15cm can be maintained. As a pond plant, it produces an ornamental reed of up to a metre in length, plus the added bonus of a cash crop at the end of the year.

Water Chestnuts are crunchy and, when cooked, do not lose their texture. They contain an antibiotic called PUNCHIN.

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How To Grow

a) Handle corms and plants carefully — do not damage the shoots.

b) Prepare a sandy-type soil with a good amount of balanced fertiliser, on well-rotted manure.

c) Fill a large container or bucket with the prepared soil, dampen, plant the corms with their shoots facing upwards then cover them with 5cm of soil or heavy sand. (Note: If you have purchased corms sprouting in a perforated black grow bag, do not disturb the plant. Just plant the whole bag and cover with 2cm of heavy sand.)

d) Keep the plants damp or wet until the shoots are 10-20cm tall, then either top up the container with 8cm of water or, if the plant is in a pond, lower the container deeper with at least 8-15cm of water cover.

e) **DO NOT ALLOW THE PLANTS TO DRY OUT.**

f) First growth will be runners developing into a 1m tall ornamental reed. Second growth will be the development of corms under the soil. Regular feeding, preferably in the evening, will increase the crop.

g) After 210 frost-free days, lift the container and drain then stand dry for approximately 1 month or until needed. This gives immature corms time to mature.

h) Harvest the crop. Eat the large corms (approximately 60%), whilst the small corms make good chook food.

i) Corms can be stored in an air-tight container, in the refrigerator, until needed.

j) Retain some corms for replanting next season. The leaves can be used as fodder or mulch.

A Good Guide To Planting

Plant from the end of August until November. They will grow through until April through July. Harvest from June until the end of August and grow again. In cooler areas, corms can be started in a pot, in warmer areas they can be planted anytime.

For Commercial Use

For commercial use, plant corms 75cm apart, and 10-12cm deep, in well-fertilised soil. After planting, the field should be flooded, then allowed to drain naturally.

When the shoots are 20cm high the field should be flooded with 10-12cm of water; grown for 210 frostfree days; drained; allowed to mature for 1 month then harvested. Fertilise regularly throughout the growing season.

— Jean Higginson

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Men of the Trees Announce 1991 Field Day

Following their very successful field day last year, the Men of the Trees are to hold this year's event at St Barbe Grove, Hazelmere, on Saturday April 27.

All the local rational land-use groups will be represented, including the Organic Growers, Permaculture Association, Greening Australia, Land Management Society, Conservation Volunteers, Tree Society, and, of course, WANATCA.

There will be presentations on topics such as 'Sandalwood and Quandong Growing', 'How Trees Improve Spoils', 'Trees in the Farming Economy', and 'Mycorrhiza and Tree Root Development'. Also Action Displays on such things as Grafting and Rejuvenation of a giant Flooded Gum.

There will be a range of stalls with herbs, crafts, books, etc so please bring your money! Also light lunches, teas, drinks, and icecreams will be on sale. There will be supervised activities for Children throughout the day.

For the public, the Field Day will be open from 10.30 am till late afternoon. Stall holders can set up from 8.00 am. Entrance is free for everybody.

St Barbe Grove is situated at Lot 2 Stirling Crescent, Hazelmere 6056. All enquiries should be directed to Men of the Trees, phone number 09-250 1888.

WANATCA Video Library increases stock

Over the years, the Association has built up a useful library of video tapes on topics of interest to tree croppers. These videos are available for hire by members, from the Tree Crops Centre in Claremont.

Cost of hire is \$2 per tape, for a loan period of 3 days. We prefer it if tapes can be picked up and returned personally. However, for distant members unable to do this, the Tree Crops Centre will try to arrange mail loans.

These will cost \$4 postage per tape, which includes both outward mail to the member and a prepaid envelope for its return. This service is only available within Australia.

Recent additions of interest include the two 'Bush Tucker Man' tapes from the very popular ABC-TV series, and David Noel's tape on the Bunya Pine Nut. The list of items currently available is printed below.

The Tree Crops Centre is in the WA Gardener Building at the Claremont Showgrounds. Its phone number is 09-385 3400.

List of tapes

- Australian Mango Industry. 20 min
- Budding & Grafting Nut & Fruit Trees. 108 min
- The Bunya, an Australian Nut with Potential. 20 min
- Bush Tucker Man, Vols 1 & 2. Each 120 min
- Buying the Farm for Horticulture. 12 min.
- Money Can Grow on Trees. 30 min
- Pecan harvesting in WA. 8 min
- The Tagasaste Story. 30 min
- Wheat Today, What Tomorrow. 34 min

West Australian Nut & Tree Crop Association (Inc)

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

CALENDAR OF FORTHCOMING EVENTS

1991

- Feb 20 Wed *General Meeting (Wally Edgecombe — Growing fruits & nuts in northern WA)
- Mar 17 Sun Field Day, Gingin
- Apr 9 Tue Executive Committee Meeting
- Apr 27 Sat §Men of the Trees Field Day, Hazelmere
- May 15 Wed *General Meeting
- May 19? Sun Field Day, Medina?
- Jul 23 Tue Executive Committee Meeting
- Aug 21 Wed *General Meeting
- Sep 30 - Oct 3 §'Role of Trees in Sustainable Agriculture' Conf, Albury
- Oct 15 Tue Executive Committee Meeting
- Nov 22 Wed *General Meeting

1992

Mar 27-29 §ACOTANC-92: Whakatane, Bay of Plenty, New Zealand

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

These meetings usually include a current magazine display.

§ For contact details refer to the Tree Crops Centre

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

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