



Quandong

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

Second Quarter 1997 • Vol 23 No 2

ISSN 0312-8989 • \$2.50



The Water Apple (*Syzygium aqueum*) (See: About the Cover, p. 2)

NEXT MEETING: Tuesday May 20: 7.30 pm

At this meeting we will be able to hear and talk with Dave Hardie, of Milligan's Gourmet Gallery. The topic will be:

The Bush Food Industry — \$100 million by 2000?

Australian native plant foods are one of the most promising areas for local developing industries. Come and hear about its potential. NOTE. WANATCA General Meetings are now on Tuesdays, not Wednesdays. *VENUE. WANATCA meetings for 1997 will be at the Kings Park Theatre Room. Full details on the attached leaflet.*

Field Day — Crushing Olives for Oil

At Ioppolo Oils, 108 Pinjar Road, Wanneroo. **Sunday June 1 at 10.30 am.** See the attached leaflet and the article on page 3.

No charge to attend. Visitors Welcome. Queries to Tree Crops Centre on 385 3400.

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About the Cover

The cover illustration shows the species of *Syzygium*, with many useful species native to Australia.

Water Apple, *Syzygium aqueum*, from *Fruits [of Indonesia]*— IBPGR, Rome, 1980. This is one of the 500 odd species native to Australia. See the article on page 30 of this issue of *Quandong*.

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[West Australian / 1997 Apr 2]

Olives: the good oil

It was like a meeting of the old and the new. Mrs Rosa Ioppolo was overseeing the crushing of the olives and their transformation into a wondrous green-gold liquid. Paul and Gail Kordic were watching their fruit undergo the magic process.

The story goes that when Rosa first married husband Carmello arrived home with some olive oil from the local shop with which she was supposed to cook. Her disgust with the product was immediate and her father was consulted. He agreed to allow her to use the family press if she could find a source of olives. The short term was taken care of by begging and other means; planting olive trees on their Wanneroo property was the intended long-term solution.

Years passed and so did the olive press. Rosa and Carmello now had the olives but no press. So, using both local and imported equipment, they built one of the few olive oil presses in WA.

They use it to press their own fruit for oil, but they also press for other people. Locals bring in their fruit and leave with their containers of liquid gold. Sons now do Rosa and Carmello's heavy work, but the question of who is boss is never in question.

I visited them for the pressing of olives for the Chestnut Grove label. The Kordics use olives from mature trees on the family vineyard in Manjimup. Like many vineyard owners, they produce olive oil as an "extra". The trees

enjoy similar growing conditions to vines, are often used as windbreaks and the crush is done away from peak winery times.

The current plantings of olive trees in our wine areas is mind-boggling. We'll soon be bathing in the stuff.

Olives are picked in a combination of ways. Some are shaken from the trees and others are hand-stripped. Traditionally, the



Carlo Ioppolo sorting olives

trees are beaten and the olives collected in big nets, although the damage to the trees can be excessive.

A combination of green and black fruit is preferred—the riper fruit produces more oil but the inclusion of some green fruit gives a lighter colour and a distinct flavour. Fully ripe fruit gives an oil which is full and soft in flavour and golden in colour. The Kordics use about 30 per cent green fruit.

The olives are crushed into a paste by a mincing device. The paste is spread on to round mats which are then stacked on a steel rod (at this stage it looks like the meat on a doner kebab). This big stack enters the press and the oil and juices are squeezed from the mash. The liquid is strained and the oil then separated and allowed to settle before being bottled.

— Margaret Johnson

[Fruit Gardener (California Rare Fruit Growers) / 1997 Mar/Apr]

Fruit of the Conquerors

Here in Southern Florida we are fortunate to live in a climate (zone 10) that allows us to grow many of the outstanding fruits of tropical America. The pineapple and the papaya are among the best known, but my favourite is one that is unfamiliar to most people in the States but highly regarded by most Latin Americans.

This fruit is the Mamey sapote, *Pouteria sapota*. It is native to Central America and was considered an important fruit by most indigenous peoples, especially the Maya.

Legend has it that the Mamey was one of the few foods available to the Spanish conquistador Cortez and his men during their march through Mesoamerica. It has spread throughout tropical America, but seems to be most appreciated by the Cubans.

It is grown commercially in the Homestead, Fla., area, with much of the harvest being consumed locally. In Miami, just about every Cuban restaurant offers Mamey milkshakes on its menu, and during late summer, the fresh fruit is readily available in grocery stores all over South Florida.

The tree is a large, moderate-growing evergreen from the Sapotaceae family with

large thin obovate leaves. Like others from this family, it exudes a milky latex when the bark is injured.

Mamey fruit can be round or football shaped with one pointy end. The outer skin is brown and rather rough, but inside the smooth pulp is a reddish-orange with one or more large shiny dark brown seeds (see cover). These seeds were once rumoured to have a narcotic effect and were handled almost as contraband by early Mamey growers.

The Mamey sapote is sometimes confused with another similar-looking fruit from the American tropics, the Mammee apple, *Mammea americana*. The skin of this round fruit resembles the Mamey sapote in texture and colour, but its dry, crispy, apricot-flavored pulp is very different.

There are many fruit stands along Krome

Avenue in south Dade county that sell locally grown fruits, but it is the Mamey that attracts most people. The quality is usually very good, but it is important to know how to select the best fruit. Buyers should gently scratch away a tiny piece of the bottom of a hard fruit and look for reddish-orange flesh colour which signifies that it is mature and will ripen in a few days. A greenish flesh colour indicates that the fruit



The Mamey Sapote. Photo: Noel Ramos

was picked too early and may not ripen properly.

Once a Mamey turns soft and ripens, it is best chilled before eating. Afterwards the fruit can be cut lengthwise and eaten out of hand. It's especially good when served with a cup of espresso coffee.

Since the USDA does not allow fresh Mamey to be imported into the States, the easiest way for most people outside of Southern Florida to try it is to buy the frozen pulp sold in most Latin American supermarkets. In this form it is best made into milkshakes or ice cream.

The best cultivar currently available in Florida is the Pantin which ripens from July through September. It weighs about two to five pounds and has a delicate vanilla-almond flavour with a hint of caramel that reminds me of the Spanish custard dessert known as flan. The plentiful pulp has the consistency of an avocado but is moist and sweet with little fibre.

Although 'Pantin' is the main cultivar planted in our area, others are available. ('Pantin' is carried by Pacific Tree Farms and Roger and Shirley Meyer in Southern California.) The Pace cultivar from Lam's Farm Nursery in Homestead is one of the best; it has an outstanding flavour and fruits from December through May. It is a medium-sized fruit (1-1.5 kg) with a salmon-coloured pulp and very little fibre. This cultivar has the promise of being the best Mamey for our winter months.

The Magana cultivar is a large fruit (1.5-3 kg) with salmon-coloured pulp that is available during the same time as the Pace, but it is not as good eating as the other two and tends to have hard spots in the pulp due to uneven ripening. The large size of the Magana

also makes the individual fruits very expensive in the retail markets.

Many experimental cultivars are being evaluated by the University of Florida (TREC) in Homestead and by Richard Campbell of Fairchild Tropical Gardens in Miami. Hopefully, some of the better ones from these collections will be made available to the public in the near future.

The Mamey can be easily grown from seeds which germinate in 3 to 4 weeks, but seedling trees can take from 8 to 20 years to produce fruit. Also, since the quality of fruit grown from seeds can be extremely variable, only grafted trees are recommended. After a tree has flowered, it takes between 18 and 24 months in Florida to produce mature fruit, assuming that we do not get hit by any major hurricanes.

For Sale

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or phone

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Bill Napier: 399 6683

Mameys like lots of water, but will not tolerate flooding. They grow well in the limestone soils of our area as long as they are fed with a high nitrogen fertilizer three times a year. Also important is an annual soil-drenching of chelated iron. In addition, they should also be sprayed with minor elements twice a year to combat chlorosis.

My experience with 'Pantin' has shown it to be quite cold hardy after it gets fairly large; however, small trees should be protected during any kind of freeze.

The Mamey has relatively few pest problems in Florida. One of the worst is the

Cuban may beetle. These fierce nocturnal leaf eaters can almost denude a tree if left unchecked, but can be controlled fairly well with Sevin insecticide. Birds and squirrels can also damage fruits, but this type of damage is usually minimal.

The Mamey sapote is easy to grow, provides abundant crops and is one of the best-tasting fresh fruits available. It should be included in every fruit enthusiast's collection. Try growing one in your yard and you, too, may become addicted to the Fruit of the Conquerors.

— Noel Ramos

Get ready for the Bring & Buy

*WANATCA will be holding a
Bring & Buy meeting in September
at the Shenton Park Hotel carpark,
opposite the Tree Crops Centre.*

The date is Sunday, September
14, from 9 - 12 am. There will
be more details in the next issue
of Quandong, but:

Make a start NOW

on potting up or producing your extra
nut, fruit, or other tree crop plants which
you can make available.

This is the opportunity to make some
money and at the same time raise the
number of crop trees planted locally.
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*Queries to Tree Crops Centre,
09-388 1965.*

Exotic fruit marketer joins WANATCA

WANATCA welcomes Daniel Lutman,
Sales & Marketing Manager of Bullfrog
International, to our membership list.

Bullfrog specialize in tropical and exotic
fruits and vegetables. Much of their produce
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other parts of northern Australia, and overseas.

Daniel is a qualified horticulturist with a
keen interest in the potential for these products.
Bullfrog produce a number of consumer
leaflets for items such as Abius, are keen to
export these exotic fruits when local producers
have the supply available, and are happy to
advise local growers on prospects for particular
fruits.

*Contact details: 122 Kewdale Rd, Kewdale
WA 6105, Phone 09-353 1235, fax 353 1187.*

Hazelnut Varieties

Hazelbrook Nut Farm, Balingup WA
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PO Box 15, Subiaco WA 6008
Phone 09-388 1121 (after hours).

Prospects for walnuts

Walnuts have been grown in WA since European settlement, and are well suited to the cooler areas of our Southwest — typical apple country.

Although good producing trees can be found, walnut growing has never reached the status of an important horticultural industry here. In part this may be because 'the times were not right', a phrase also once applied to olives, whose 'time has now come' here.

Perhaps walnuts, too, are now ripe for development as a significant earner here. Certainly comparable areas in California are major world producers of this nut. But there are significant steps needed if we are to get a local walnut industry up to speed.

Perhaps the major needs are two-fold: introduction of the latest spur-fruited varieties, which are precocious and heavy yielders; and introduction or development of suitable rootstocks. And, as ever, there is the need for local research.

*The following items give some flavour to the current world position. In America, most commercial walnuts are grown on black walnut rootstock (*Juglans nigra* or *hindsii*) or on Paradox rootstock — a cross between black walnut and the ordinary walnut (*J. regia*). Some promising work has been done in eastern Australia, on the use of Japanese walnut (*J. sieboldiana*) as rootstock.*

*One walnut area where WA has led is in the use of Andean Black Walnut (*J. neotropica*). This semi-evergreen species, introduced into Australia by WANATCA, extends the walnut range into much hotter areas, and can be used as a rootstock for the commercial walnut.*

[Pacific Nut Producer / 1996 Jul-Aug]

Walnuts Doing Well on "Marginal Soils"

Where once walnuts feared to grow they can now take root and thrive. But those roots should be Paradox.

On marginal lands, which until recently were not considered a wise spot to plant the nut crops, research has unearthed new possibilities. In ongoing research on class two and three soils—traditionally thought to be marginal for walnuts—"consistently good yields are being produced" at the Nickels Soil Laboratory, reports Colusa County farm advisor John Edstrom.

Now in its 11th year, the experimental orchard produced 5.6 to 6.8 t/ha of Howards and Chandlers, Edstrom revealed during an annual field day at the Arbuckle land lab.

"Of all the tests being conducted at Nickels, this is the trial that surprised us all most," said Edstrom, who also heads up the soil laboratory where extension projects abound. "Walnuts and Arbuckle," he said, "usually are not considered to be synonymous," (that is, production of the crop in the area has been avoided because of the soil problems).

The promising planting is in a tight hedgerow system developed with Bill Stuke, owner of Stuke Nursery Company in Gridley. Tree spacing at 3.5 x 5.5 m (between trees and between rows) provides for what Edstrom characterizes as a "very tight" planting. Maybe too tight, he feels.

The trees planted in 1986 are on slip-plowed and non-slip-plowed ground for comparative purposes. Paradox hybrid was also used along with Northern California black rootstocks for additional performance measurements on the Howards and Chandlers (Cisco and Franquette are included as pollinizers).

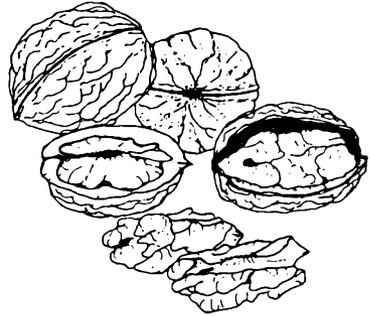
"We use a dual hose drip irrigation system

(a single line was used during the first few years) which applies water one to three times weekly," said Edstrom.

The tree vigour was "inconsistent" during the early years under single-line drip, he recalled, describing the black rootstock trees then as "miserable," while the Paradox trees did somewhat better. "We really wondered if we could grow walnuts here at that point of the test," he said of the gravelly loam that ranges into the class-four soil category.

But after bringing in a second hose — the lines are about four feet from the trunk on either side of the tree-row —and irrigating two to three times a week "the trees literally bounced out of the ground," he said of their 1991 performance.

Nitrogen is at "normal" rates via the drip in monthly applications. A 680 kg/ha potassium sulphate application was also made in fall, 1994. The hedgerow walnuts are trained and pruned into a solid "fruiting wall," Edstrom described, that is now 3 m wide and 5.5 m tall on the north-to-south planting. Mechanical hedgers prune the orchard every winter.



Noting that he is "very pleased" with the yields, he said the Paradox trees did a "marvellous" job compared to the black rootstock-based walnuts. The numbers show that walnuts can do just fine on marginal soils — at least under production conditions used at the Arbuckle site — providing the rootstock is Paradox.

Howards grafted to Paradox seedlings in 1987, for example, exhibited an accumulated yield of 11,161 kg from the 4th through 10 leaf (1989-1995), while Howard walnuts on Northern California (NC) black turned in only a 8048 kg accumulated yield for the seven years. (These and all other trees in the trial except the Paradox Howards were planted in 1986 as grafted trees.)

Chandler on Paradox (10742 kg) also outperformed Chandler on NC black (7865 kg), stated Edstrom.

Looking at the annual performances of both varieties on Paradox, Edstrom said in 1989 (4th leaf) Howards yielded 459 kg/ha and Chandlers, 649; 1990: Howards- 1233 kg/ha, Chandlers- 1113; 1991: Howards- 2663, Chandlers- 2838; 1992: Howards- 4895, Chandlers 3902; 1993: Howards- 6222, Chandlers 5549; 1994: Howards- 6455, Chandlers- 5742 kg/ha.

In their 10th leaf last year, Howards posted a 6011 kg/ha average yield, and Chandlers,

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7094, Edstrom added.

Comparing the slip-plowing trials, he reported "hardly any difference between slip-plowed and non-slip-plowed plots, possibly because of our frequent irrigation program."

Howard on Paradox last year produced a 5851 kg/ha yield on slip-plowed land, compared with an average yield of 6170 on unmodified land, said Edstrom. Chandlers on Paradox also did better on the non-slip-plowed land, where they yielded an average of 7769 kg/ha compared to 6419 on the unmodified planting. Edstrom labelled these seemingly important differences insignificant statistically.

Of special note, he stated that he has not seen "such a dramatic difference in yields between black and Paradox rootstocks" in any other trial.

"Rootstocks have the largest impact on yield," he said, noting that both Howard and Chandler on Paradox hybrid "outperformed those same varieties on black rootstock by some 40 percent for the last five years."

Paradox-rootstock trees "have consistently been larger in size and more vigorous in shoot growth," he added, recognizing that the Arbuckle and Kimball series soils at the site normally limits tree vigour, "particularly with NC black" rootstock.

Regrowth after hedging is also superior — greater and more uniform — among Paradox rootstock trees, he said.

Nut quality also held up well on the marginal soil plantings, Edstrom revealed. "Our kernel quality (graded by Diamond Walnut) compares favourably with the quality found in major growing districts," he said. "For the 1995 crop, Chandlers yielded 75 percent in large size, 47 percent edible, and 45 percent extra light/light categories.

"Howards grades showed 73 percent in the large size group, 45 percent edible, and 45 percent in extra light/light colour."

"Surprisingly," said Edstrom, "this test plot continues to produce respectable yields of desirable quality despite adverse soil conditions." But more study time will be necessary, he added, "to fully evaluate this walnut production strategy in terms of economics."

Horticulturally, he explained, the 5.5 m row width is too close for commercial use. "Under our soil conditions," Edstrom said, "Howard needs at least 6 m between rows, while Chandler would seem to require 6.7 m or more."

Despite these possible adjustments, the real yield from the Nickels close planting marginal soil trial may help farmers use land once thought to be undesirable for walnut production, even if accepting that is to place confidence in a 'paradox'.

— *T J Burnham*

(Original imperial figures converted to metric by 'Quandong')

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[Sun-Diamond Grower, California / 1996 Fall]

[Australian Nutgrower / 1997 Mar-May]

Walnut variety trends

Growers (in California) are moving rapidly toward key varieties that will have a dramatic impact on the industry's future supply.

Past experience shows that planting decisions made today will influence the direction of the walnut industry a decade from now. For a window to the future, growers should look back on shifts in variety plantings over the past 10 years to see the impacts on supply, and what that supply will do to the industry's ability to fill various demands in the market-place. This report examines some of those past trends on an industry wide basis, and based on the best available information makes some predictions — "best guesstimates" — of supply through the turn of

the century.

In analysing past planting rates and attrition levels and projecting trends over the next five years, one central fact emerges. Whether handlers desire it or not, growers have already begun moving very rapidly toward certain key varieties that will have a dramatic impact on our future supply picture. In many ways, the supply is shifting faster than market demands are.

INSHELL TRENDS

Looking at walnut production and pack-out for the industry during the period 1983-94 we see the total supply increasing, despite some ups and downs to new records set with the 1987, 1991 and 1993 crops. Pack-out for inshell nuts remained relatively flat, while shelled production has trended upward. This demonstrates the industry's attempts to fill inshell demand almost regardless of the size of crop - shelling tends to follow total production. The same trend is shown in terms of walnut utilisation, or how the crop is actually marketed - flat levels for inshell, and shelling levels that more closely follow the total supply.

Inshell sales have remained at 59,000 - 68,000 t over the past decade. At the same time, the industry has seen increasing sales in some European countries, with emerging potential for early and after-season business. The Hartley variety, which offers consistent quality and production, continues to be the leading inshell variety. Europeans' general awareness of the Loma Linda University health studies and other research has helped promote

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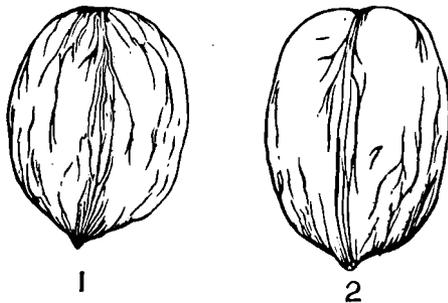
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walnuts as a healthful food product, and there has been considerable effort put forth by the Walnut Marketing Board and the California Walnut Commission to further develop awareness. In some cases, there may be even greater awareness in Europe than here, because of the labelling restrictions that exist in the United States.

To satisfactorily meet the demands of the inshell market, several key quality characteristics are required. One is size; this market is most dependent on "large" and "jumbo" sizes. Insect levels must be less than 5 percent and off-grade including insect, must be less than 6 percent. Split and broken nuts must total less than 10 percent, and minimum colour requirements are 40 percent light and no more than 70 percent light amber. Harvest timing is also important: both early and later harvested nuts are needed to fill early and after-season shipments.

Which varieties best meet these inshell requirements? One of our most dependable performers, as noted earlier, is Hartley, with its large size and consistent quality. Although Franquette has consistent quality, it tends to run a bit smaller than Hartley. These two top varieties are followed by Vina, which tends to be large but of varying quality; both Payne and Ashley which are heat sensitive and of varying quality and size; and finally Eureka, its quality even less dependable because of its tendency toward "peepers" or split ends.

Hartley plantings have remained relatively flat, at slightly more than 20,000 ha. The other varieties, most notable Payne and Franquette, have tended to trend downward, which in turn tightens the supply of those varieties. One minor exception to these general trends is an increased interest in Vina, particularly in the central portion of the state, where it seems to do fairly well in more moderate climate.



Inshell nonbearing acreage followed a similar path during the period 1985-94, with even Hartleys trailing downward rapidly. While many bearing acres of the Ashley variety remain, they have dropped precipitously over the past several years. Based on projections, this downward course will accelerate rapidly, and if current trends continue inshell acreage will total less than 1200 ha by century's end — from slightly more than 3600 ha in 1990. Assuming these predictions do hold true, the only variety to actually increase will be Vina, for the aforementioned reasons.

Inshell bearing area, which stood at approximately 48,000 ha in 1993 and 1994, could drop below 44,000 ha by the year 2000, if forecasts bear out. The bottom line: Even though the supply of inshell nuts is somewhat tight now, it is projected to get even tighter over the next several years.

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SHELLED MARKET TRENDS

Turning to the shelled market side and looking at a number of trends there, we see steady growth and increasing demand for light material. The ingredients market has grown very rapidly over the past 10 years and represents the most demanding segment of the business. The domestic industrial market is not variety-specific but does increasingly demand high-spiced material. "Zero shell" is today the byword of the industry, with shell count followed by freshness, size, colour and low offgrade levels as key characteristics to be met by suppliers. On the other hand, harvest timing is less critical as products go to market on a year round basis, although it is important from a quality standpoint.

Shelled utilisation has shown steady growth during the period 1983-94, increasing from roughly 50,000 shelled tonnes shipped in 1983 to about 68,000 t shelled in 1994 although shipments dropped off in 1992 because of the extremely short crop, which had carryover effects into 1993. Shelling yields (recovered edible yield) grew from roughly 34 percent in 1974 to more than 40 percent in 1994. This difference is due to a shift toward planting varieties with a higher edible yield (such as Chandler, Ashley, Payne and Serr), coupled with the industry's improved ability to recover more of the edible kernel, thanks to advances in technology. So not only are we seeing increased plantings of shelling varieties that produce higher kernel yields, at the same time we have the ability to recover more of the edible kernels through improved plant operations.

The quality characteristics needed to meet the demands of the shelled market include size - the larger the size, the better the crack-out and kernel recovery. A low percentage of off-grade nuts is also key; shipping shelled

nuts as USDA No. 1 requires less than 2 percent serious damage. Colour is yet another important factor as the demand for light material grows. And once the product is cracked out, large pieces are desirable because they afford greater flexibility. High kernel yield helps with overall plant efficiencies, which improves a processor's unit cost. Finally, a thin but sound shell is important for increasing kernel yield but resisting premature cracking.

Which varieties come closest to meeting these qualifications? Chandler ranks highest on the list, followed by Howard and Serr. Both Chandler and Howard have the ability to produce lots of light kernels; they have a high percentage of edible meats, their off-grade is very low and they tend to shell out very easily. Serr ranked behind Howard; although it has a large size and high edible yield, its variability in quality from year to year tends to put it behind the two leading shelling varieties. Sunland ranks behind Serr because although its edible yield can be higher than Serr some years, it has a tendency toward sunburn and shrivel. Finally, there are Chico and Tehama. while Chico's quality can be fairly consistent, it suffers from small sizes. The Tehama is a large size nut but it varies quite a bit from year to year in colour and quality, so it's ranked in the last position.

In terms of acreage changes for shelling bearing area (1985-94), Serr bearing acreage is beginning to trail off as some of the aging orchards are pulled. Another important point is that most of the other varieties - be they Tehama, Howard, Serr or Chico - have either remained flat or are trending downward slightly. The one line that increases dramatically represents Chandler, which had about 4,000 ha bearing in 1994, or about half of the Serr acreage. This upward trend is even

steeper when you examine Chandler nonbearing acreage, which in 1994 topped 4,000 ha. Coupled with bearing acreage, at the end of 1994 Chandler's potential production equalled Serr's. Thus, projecting trends to the year 2000, the lions share of growth is coming from Chandler plantings. This could well taper off, however, as growers encounter logistics problems at harvest-time; nevertheless, some 60-70 percent of all new plantings are Chandlers, following a peak of 80-90 percent a couple of years ago.

While it is not Diamond's position to recommend planting one variety over another, the trends themselves send a strong message to the industry. Economics drives the planting decisions of California walnut growers, who must base them on a number of considerations that range not only from the earning potential

of a particular variety but also the length of time it takes to get an orchard into production, production costs, consistency in production and harvest timing. For a number of reasons, growers are choosing to plant varieties, such as Chandler and Howard, that lend themselves most strongly to the shelled market. At the same time, if the market for inshell walnuts remains at present levels, it will become increasingly difficult for handlers to meet those demands. Reconciling these two facts will certainly be one of the California walnut industry's greatest challenges as the millennium approaches.

— *Sam Keiper*, Vice President of Member Services, Diamond Walnut Growers

(Original imperial figures converted to metric by 'Quandong')

[In-A-Nutshell (University of California/Tulare County Cooperative Extension) / 1997 Mar]

Managing Pistillate Flower Abscission (PFA) in Serr and Chandler

Background

Pistillate flower abscission (PFA) is the condition where, at bloom, female walnut flowers (nutlets) enlarge to 3-5 mm in diameter, become necrotic and fall from the tree. In some cases loss of all flowers in a cluster occurs, while in others only one flower abscises. In some orchards, PFA can result in as much as 80% flower loss of sensitive cultivars such as Serr. Such loss of flowers translates directly into yield loss.

Research in many orchards throughout California during the '90s confirmed PFA was due in large part to excessive pollen load, with PFA being much more severe in close proximity to pollinizer cultivars ironically

placed in the orchard to improve yield. Coincident research with Serr showed that when it shed pollen during its female bloom, PFA was more severe than when Serr catkins shed pollen before female bloom. In all cases, Serr yield was reduced substantially (on average 20%) due to PFA.

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Managing PFA

PFA can be managed by minimizing pollen in the orchard. Here are some commonly asked questions that outline such management practices to minimize pollen load.

What situations should I be concerned about?

Serr orchards with established pollinizers are at most risk, especially those rows close to the pollen source. As well, in those years when Serr pollen shed overlaps its own female bloom excessive PFA will occur. Other poor cropping orchards, especially Chandler, should be observed for PFA.

What about other cultivars?

Although PFA has been noted to some extent in most cultivars, most problems have been measured in Serr. Of concern is Chandler, especially in the San Joaquin Valley. It exhibits moderate PFA when excess pollen conditions are optimal (i.e. next to pollinizer trees); up to 20% - 40% of its flowers can abscise with reduction in yield. Each Chandler orchard should be evaluated for PFA, especially those trees close to pollinizers. All low yielding orchards should be investigated as to occurrence of PFA.

How do I minimize pollen load contributed by pollinizers?

There are two ways:

1) Catkin removal from pollinator cultivars, by shaking trees as catkins enlarge (before pollen shed), has been shown to reduce their pollen load and reduce Serr and Chandler PFA to improve yield in the field. Two years' data shaking catkins from Franquette pollinizer rows in a Chandler orchard with modest PFA also resulted in reduced PFA and higher production than that put in of the orchard where pollen was allowed to remain.

2) Where single rows or scattered pollinizers exist, their removal is

recommended in those orchards with chronic PFA. Removing pollinizer rows dramatically reduced Serr PFA and improved yield. These data suggest that pollinizer rows should be removed, especially in young orchards demonstrating PFA, as they add minimal value to orchards with high PFA potential.

In older, mature orchards this strategy should be viewed with more caution. Pollinizers contribute to the per acre yields and their removal eliminates that yield potential. We generally suggest that catkins be shaken from the pollinizer rows in a mature orchard to reduce pollen load. By simply shaking catkins, the pollinizer yield is maintained while pollen load is reduced to the main variety. However, removal may be appropriate in those older orchards where the pollinizer's yield is quite low due to crowding,



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or they are difficult to farm (harvest especially) because of their position in the orchard. In isolated orchards, removal of all pollinizers is not recommended; leave enough pollinizer trees to approximate 2% of the total trees.

What about shaking catkins (pollen) from my main cultivar, in addition to pollinizer trees?

Walnut trees exhibit dichogamy. That is, usually there is some degree of separation between pollen shed and the female bloom. When separation in the main cultivar is pronounced, little PFA occurs. When overlap occurs, degree of PFA is dependent upon the cultivar's sensitivity to PFA and the extent of overlap. Growers should observe bloom development, especially in Serr, and when overlap is expected, catkins should be removed (shaken) from those trees as well. The degree to which this is problematic in Chandler (i.e. high PFA due to its own pollen) is unknown.

When should I shake catkins for best removal?

Catkins need to be shaken before pollen shed occurs. Shaking is best timed when the first catkin naturally falls in the orchard; that's the beginning of pollen shed. At that time, most catkins are enlarging, stiff, and easy to shake.

If I remove the catkins from pollinizers, will it adversely affect yield of my main variety?

No! You will not remove all of the catkins with light shaking. We have not observed or measured a yield loss of Serr (and Chandler in the San Joaquin Valley) that is not offset by yield gain by reducing PFA. Indeed, yields have improved with this practice.

If only a small percentage of catkins are removed by shaking, should I reshake the trees?

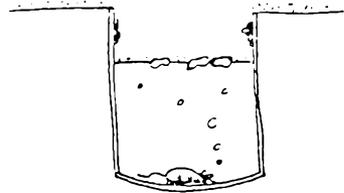
Growers have done this and have been pleased with the results as additional catkin/pollen removal occurs.

— G. Steven Sibbett, Farm Adviser

[EDN (Echo Development Notes) / 1997 Jan]

Simple rat trap lets rodents take the plunge

ECHO has had some success catching rats in a bucket sunken into the ground with the top flush with the surface. Barry Rands is reported in 'Amaranth to Zai Holes' p. 213 as having caught 150 mice in one night in four such traps.



The trap is filled to within 8 cm of the top with water. Each evening fresh sweepings from a millet threshing floor are floated on the surface to provide both camouflage and bait.

Rodents apparently see the floating bait, assume it is a solid surface, and jump in. We find it works best if the bucket fits loosely enough that it can be removed and the water replaced frequently.

— Martin L Price

[West Australian / 1997 Mar 18]

Macadamia nut find may boost other crops

A protein found in macadamia nuts may be the key to developing disease-resistant varieties of bananas, sugar cane and sunflowers, according to University of Queensland researchers.

The research team tested 250 Australian native plant seeds to identify proteins offering broad-range resistance to crop diseases.

Spokesman John Manners said a protein from the macadamia plant contained excellent antifungal and antibacterial properties against a number of diseases that affected tropical crops.

[WA Horticulture / 1997 Mar]

Grower has faith in nuts

For lawyer Nic Dobree growing macadamias is more than a form of relaxation away from the stress of the office. Mr Dobree has been growing the nut trees with varying degrees of success for nine years but has so much faith in their future he has installed the state's first macadamia processing unit.

Mr Dobree, who has 2500 trees on his Baldvis property, is the first to admit he still has a lot to learn about growing macadamias.

But he is confident the nuts are ideal for WA. "There is no reason why they should not grow successfully in WA," he said.

"The main difference between WA and northern NSW where they originate is the rainfall pattern, which we can work around with irrigation, and soil quality, which we can tackle with mulch and a proper fertiliser regime.

"They can tolerate hot summers, but they do not like frost so there are many parts of the state that should suit them well."

Mr Dobree said the trees were big consumers of water, young trees each using about 30 litres of water a day and bigger ones 70 litres.

Keeping the soil around the trees moist

during summer was vital and Mr Dobree found that a mulch of barley and lupins grown inter-row and then slashed worked well.

Care of young trees was important to the success of a macadamia nut tree farm as it was in the-early stages of growth that the plantings were most vulnerable to set backs.

Macadamias are susceptible to wind damage so a sheltered site and native trees planted as windbreaks are important. With young trees, individual wind guards made from ringlock and windbreak material gave the trees a chance to establish themselves.

Staking the trees was an option, Mr Dobree said, but he had heard conflicting advice about its merit and had swayed away from the practice.

Mr Dobree said finding quality, young macadamia trees was difficult in WA and as a consequence he had bought supplies in from



Nick Dobree checks the blossom on his macadamia trees at Baldvis

the eastern States. But loss rates had been high. From one eastern States consignment, Mr Dobree lost 33 per cent of his trees.

"Because the trees were coming in from the eastern States, they had to be sprayed under quarantine regulations, and I believe that was the substantial cause of the loss," he said.

"The position is improving however with at least two local nurseries now specialising in macadamia tree production for would-be growers."

Mr Dobree said that over the first few years there was a good deal of trial and error in care of the trees, especially in fertilising and watering techniques.

He believed it was important that he establish a processing plant now while the industry was still in its early stages.

Currently, WA macadamia growers typically sold their product in its shell.

"I believe growers need the encouragement of a local plant now that their trees are maturing," he said.

Mr Dobree said that his plant was now operating and he would welcome contacts from growers interested in selling their nuts during the season just starting, and could be contacted on (09) 524 1016.

Australian Nutgrower

A quarterly journal for almond, chestnut, hazelnut, pistachio and walnut growers.

*Send your annual subscription of \$40 to the
Australian Nut Industry Council,
PO Box 394, Yarra Glen, Victoria 3775*

Macadamias: the facts

HISTORY—The first known use of the nut we know as the Macadamia was as a food source for Aborigines in the coastal rainforest of southern Queensland and northern NSW.

The different tribes called the nut by names such as Kindal-Kindal (Kyndl) and Boombera but botanists have given it the name Macadamia.

TREE NUMBERS — The Australian macadamia industry has estimated that there are 3.5 million grafted trees in plantations and the current rate of new planting is estimated at 250,000 trees per year.

INDUSTRY SIZE — The Australian macadamia industry comprises about 500 commercial growers, eight commercial processing plants and five cottage processors.

It also supports about 50 commercial service operators who supply management, pest and plant nutritional advice, specialised machinery manufacture, planting material and contract horticultural services.

ORCHARD SIZE— Orchards range in size from 500 to 120,000 trees with a typical commercial orchard averaging between 5000 and 10,000 trees.

Orchard planting density has increased from 10 m x 5 m in the 1960s to 10 m x 4 m in the 1970s to 7 m x 3.5 m in the 1980s, and in the 1990s, some people are planting 6 m x 3 m as new varieties become available.

PLANTING MATERIAL—The production of macadamia planting material is conducted in nurseries in the growing regions that have scion material available to suit the industry's needs.

Most nurseries produce rootstocks which they side graft or punch bud to the desired variety.

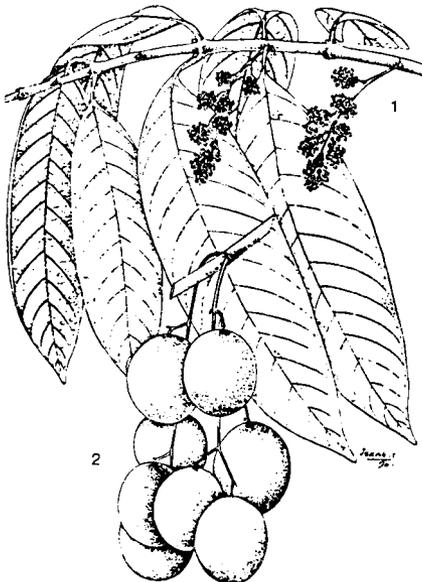
Book Reviews

by David Noël

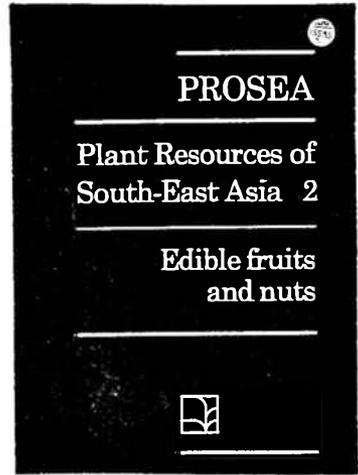
Fruits & Nuts

Plant Resources of South-East Asia, No. 2: EDIBLE FRUITS & NUTS. E.W.M Verheij & R E Coronel (Editors). Published by PUDOC, Netherlands, 1991. 447p. Hardback ed, \$155.95*; Paperback, \$112.95*

The PROSEA Foundation, its name an acronym for Plant Resources Of South-East Asia, was set up as an international effort to research and document the region's plant resources of every type. Legally based in Bogor, Indonesia (the site of one of the two great botanic gardens set up by Sir Stamford Raffles), the Foundation had research-based participants from Malaysia, Indonesia, Papua New Guinea, Philippines, Thailand, and the Netherlands (Wageningen Agricultural University, which acted as the Prosea Publication Office).



The Gandaria, Bouea macrophylla



Working mainly over an 11-year period from 1985 to 1995, Prosea carried through an international project of massive scope, one which may be unmatched anywhere else. The region in question, a tropical zone formed at the boundary of the two great biological megacontinents of Gondwanaland and Laurasia, is an incredibly rich and diverse one as far as useful plants are concerned.

The publishing outcomes of the project are indeed impressive. While many of the sectional volumes produced, such as those on Timber Trees, Rattans, Bamboos, and Dye and Tannin Plants may be of interest to readers of 'Quandong', volume No.2, on Edible Fruits and Nuts, will be of most interest.

This book is, I believe, the most comprehensive, detailed, scholarly, and useful book on the fruits and nuts of a major world region ever published.

Not only fruits native to the region, but also introduced ones, are included among the 1600 or so plant species mentioned. Just over half the book is devoted to detailed write-ups of about

110 'Major Fruits'.

For each of these is given: Vernacular Names, Origin & Geographic Distribution, Uses, Production & International Trade, Fruit Properties, Botany, Ecology, Agronomy, Prospects, and Literature references. Most have first-class line drawings. For many of these species, this work will contain the most detailed information currently available.

About 300 'Minor Species' are also covered in less detail.

This wonderful book is available in both hard-cover and paperback versions. While the price is quite high, the information contained does make it worthwhile. Highly recommended.

The Macadamia

The MACADAMIA: From the Seed to the Supermarket. *Peter Kermond & Barbara Baumgart.* Privately published, Australia, 1996. 80p. Pb. \$41.95*.

Here is a highly useful, but different, book about macadamias. Privately produced by a grower and marketer of macadamia nuts, it gives a very readable and lavishly-presented account of macadamia growing, including aspects seldom covered (eg an interview account of growing macadamias organically). I rate it as an excellent introduction to all aspects of the Macadamia industry, covering history, plant botany, physiology, orchard design, propagation, nutrition, and varieties.

Bush Foods of WA

USEFUL BUSH PLANTS. *Peter Bindon.* Published by the Western Australian Museum, 1997. 286p. Pb. \$34.95*.

BUSH TUCKER Plants of the SOUTH-WEST. *Brad Daw, Trevor Walley, & Greg Keighery.* Published by Department of Conservation & Land Management, 1997. 64p. Pb. \$5.95*.

While a number of books on Australian native food plants have been published, none of them, until now, have had any emphasis on West Australian plants.

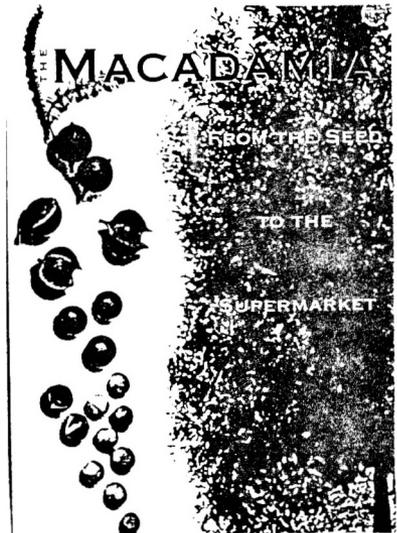
Peter Bindon's book remedies this. Until recently Head of the Anthropology Department of the WA Museum, Peter is well known to WANATCA members for his knowledge of WA bush foods (and for his other love, bamboos!).

Covering over 200 WA species (many extending to other states), each with colour photos and distribution maps, this book also includes plants with medicinal and other uses. A highly recommended source book.

(See photo and article on page 20)

By coincidence, WA's CALM Department have also just produced a pleasant little booklet on local bush foods, with information on about 65 species.

* Current prices at Granny Smith's Bookshop (see ad. page 31)



[West Australian / 1997 Mar 15]

Bush bounty listed

The bush is usually seen as a great place to visit but hardly one offering the comfort and convenience of a city hotel.

Not so, according to anthropologist Peter Bindon whose new book, *Useful Bush Plants*, shows that Australian bush offers 24-hour dining and all the pharmaceutical products you are likely to need — free.

Pigface, the succulent plant known for its proliferation on WA beaches, has an edible fruit. Some seeds of acacias are nutritious and the gum from tuarts makes an effective antiseptic mouthwash.

"Not only do these plants look good, but they have stood the test of time," he said. "The wisdom that acknowledged their value — as food or medicine — is as relevant today as it was in ancient times."

Even the army takes his advice. Mr Bindon has taught military units how to live off the land for up to eight days on gruelling 200 km treks.

His knowledge of bush tucker helped save his life when he was marooned for 10 days on an island off Esperance after his boat sank.



Natural snack: Author Peter Bindon with his book and beach pigface that he mentions. Picture: Ron D'Raine

The book is the result of more than 20 years of study and work with Aborigines, bushmen and farmers.

— *Kirstyn Thomson*

[Kentucky Colonel's Kernel (Kentucky Nut Growing Association) / 1997 Spring]

All you ever wanted to know about pawpaws & more! (Asimoyas — *Asimina triloba*)

The pawpaw fruit is sometimes called the Indiana Banana. It is, however, native to 21 Eastern states and can withstand minus 34 degrees C. The bloom is usually under 5 cm in diameter with 6 purple petals in two sets of three.

Pollination is always a problem. Corwin Davis says pollination is accomplished by the blue bottle fly. Other scientists say more than one variety is required since the tree is protogynous (pollen shed after pistillate is receptive). The fruit may weigh from 90 to 650 gm (180-240 gm average) with a light

yellowish green skin. There are normally 6 to 12 huge, flat, dark brown seeds inside of the fruit.

The custard like flesh varies from white to orange/yellow. Different people's tastes will vary as to which tastes the best, but most agree that they taste good! They ripen late in August

through September.

The tree has a natural pyramid to conical shape up to about 8 m tall with leaves that are sometimes 45 cm long, but average 25 cm in length. This, I think, makes a very pretty yard tree for partially shaded and moist areas.

ASIMOYAS NEED BACTERIA IN SOIL

The tree does not transplant readily, so the most success comes from planting seed where the tree is desired. Bacteria from soil where Pawpaws have grown is needed if transplanted. A balled tree is generally required to get these bacteria if you transplant.

There is a well funded joint research program going on in Arkansas, Georgia, Indiana (Purdue has 600 trees and 40 varieties) and Kentucky to breed better fruit and easier to grow trees. Why would people spend a lot of research dollars on trees that God put here before the 'Mayflower' came over from England? I'll tell you why.

It has been found that extracts (over 40 are being investigated) from the bark of the tree work as anti-cancer drugs and natural organic pesticides. The cancer fighting extracts are said to be one Million times as strong as the anti-cancer drug Adiamycin. Some people are wanting to raise the trees in plantations to supply the bark and leaves needed in the extractions for anti-cancer and insecticide formulae. By the time the scientists want the extracts, the suppliers may not want to give up their food source. (Or they may have invented artificial or chemical substitutes by then!)

Our own Jerry Lehman has hand pollinated some crosses of pawpaws and several of us have the seeds stratified and planted to see if we get that ultra-super-fragelistic pawpaw!

Some well known varieties are: Overleese, Sunflower and Taytwo.

— *A W Heiman*, Ohio Nut Growers Association

(Original imperial figures converted to metric by 'Quandong')

Thanks to David Brown

Following his recent resignation from the WANATCA Executive Committee, we would like to thank David Brown for all his work for the Association over many years.

In particular, David has worked hard at making meetings more productive, by working with speakers and participants to achieve maximum 'information transfer'. Behind the scenes, he has also done sterling work on the WANATCA Constitution and on achieving a more defined and structured organization for us.

David intends to remain an active member of the Association.

Date of ACOTANC-98 fixed

News has come through that the next Australasian Conference on Tree and Nut Crops, ACOTANC-98, will be held in Nelson, New Zealand around the ANZAC day weekend (April 25-26).

ACOTANC is a network organization whose participants are the various organizations concerned with tree crops in Australasia. WANATCA is an ACOTANC participant.

Actual conferences, staged at 3-year intervals, are hosted by individual participant organizations. Principal host for ACOTANC-98 is the New Zealand Tree Crops Association.

More details should be available in the next Quandong, and should also be available on the Web soon.

WANATCA is expecting to host ACOTANC-2001: (A Nut Odyssey?).

The Bee Happy feature

Routine use of bee pollination to increase yields of tree crops is taking off in WA.

An especially promising local development has been the use of Bee Tubes or Disposable Pollination Units (DPUs).

Spectacular increase

Recent research results, released only a few days ago, showed an almost 3-fold increase in a trellised cherry crop, using individual DPUs distributed along the trellis, compared to similar rows without DPUs.

This feature reports this advance in more detail, with a comment on a foreseen shortage of pollination bees.

Also reported is an advance from France on a new method of hive construction, which also uses cylindrical hives.

Secretary of the Pollination Association of WA. "Work by Rob Manning of AgWest, and by beekeeper members of our Association, has verified this".

"The growing acceptance of the method, and the cost advantages of using the DPUs, makes it very likely that there will not be enough bees available to meet all the demand this season", he said. "We recommend that growers intending to use pollinator bees in 1997 should contact the Pollination Association immediately to be put in touch with a beekeeper, if they have not yet done so".

Contact: John Smith on 09-450 2912 or John Silcock on 09-276 7847.

DPU success may mean bee supply shortfall

Orchardists are showing increasing acceptance of the advantages of using honeybees for pollinating their crops.

Local trials have given a factual basis to the value of this management technique, in particular the use of Disposable Pollination Units based on cardboard cylinders to hold the bees.

"Last year, growers obtained better fruit set and increased yields", said John Smith,

[Permaculture Activist / 1997 Mar]

Breakthrough in Beekeeping

I recently had occasion to visit an elderly bee-keeper living on the outskirts of Tours in France. Gilbert Veuille has kept bees all his life, even when living in Paris!

In 1986 the varroa parasite all but exterminated his colonies. This catastrophe caused him to ponder the question of the health of bees that are housed in the standard fashion; i.e. in square wooden boxes. He realized that drastic action was called for, in order to reinforce the general health of the hives, and to keep this problem in check.

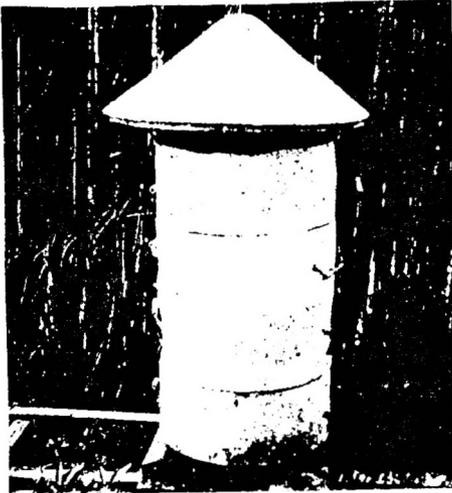
It became obvious to him that wooden boxes are a far-from ideal habitat for bees. There are too many dank nooks and crannies, and damp cracks, where moulds and pathogens can develop. What bees need is living space where they can develop their own defences.

Honeybee Pollination Increases crop yields

Contact the W.A. Pollination Association Inc
for Beekeeper pollinators
Ph (09) 450 2912 or (09) 276 7847

They need hives where the space unoccupied by the colony is reduced to a minimum, and where the brood chamber section can be changed easily and often.

Eventually Gilbert Veuille hit upon the



A bee hive with 4 parts. The stand is about 50 cm off the ground

solution of a round, divisible hive, consisting of an outer cylinder made of chopped straw bound with plaster. This he calls a rucheton - a small hive. The dimensions are as follows:

- inside diameter - 36 cm
- height - 18 cm
- thickness of walls - 3 cm
- weight - approximately 5 kg

BEE POLLINATION SERVICES

Increase yields of most fruit, nut, and tree crops!

From \$60 per hive

Bee Tubes from \$40 each

JOHN SILCOCK

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Phone 09-276 7847

Within the cylinder are eight removable wooden battens from each of which is suspended a honeycomb. Depending upon the requirements of the colony, more cylinders can be added at the top or at the bottom (under the brood-chamber).

Round hives are superior

If one considers the requirements of the bees, it will be seen that a hive of circular section is the most appropriate. For example:

1. The rounded form is a decisive factor in maintaining a constant temperature in the hive; the brood combs have the same shape — they too are round.

2. The plaster/chopped straw mixture used in construction possesses excellent insulating properties against hot and cold weather conditions, and, thanks to its porosity, minimizes condensation.

3. The rectangular-section honeycomb battens are only 3 to 4 mm thick and are placed on edge in notches cut into the top edge of the cylinder. Inserted in this way they have adequate strength to resist the weight of the combs, and do not impede movement of the bees. Irrespective of the number of cylinders stacked one upon the other (sometimes as many as eight) it never happens that the combs break up. As a matter of fact, comb-building proceeds in a very uniform manner.

4. The biennial renewal of the brood chamber's wax combs is effected easily and without problem. Each year (around early March in temperate climates) a cylinder furnished with empty wax combs is placed under the cylinder containing the brood chamber. The bees rapidly build the combs to completion, and the queen then commences to fill them with her progeny. This regular renewal of the brood-chamber wax is a prophylactic measure against bee diseases.

Proof of the pudding

Mr. Veuille has now been using this type of hive four years, and this is what he has observed:

a. total disappearance of fungal infections.

b. total absence of foul-brood;

c. the varroa attacks seem less virulent

d. excellent wintering conditions: the colony hibernates within a hot air bubble, free from draughts and without empty spaces needing to be heated; such favourable conditions mean the bees expend less energy and hence do not consume so much honey.

e. spring-time resurgence: as a consequence of early and efficient egg-laying, the hive quickly develops a strong colony.

f. If swarming occurs, this also takes place very early (end of April or early May); hence the parent hive can quickly rebuild its numbers, and the swarm has time to develop into a strong colony in the same season.

g. Besides the health-promoting qualities inherent in this type of hive, its construction is an easy do-it-yourself project and the cost ridiculously low (about \$2 per cylinder). The good news regarding this cheap and easy way to produce hives is that it is now practicable to utilize the Juxtaposition System of bee-keeping developed by Marc Bonfils.

Gilbert Veuille has written a booklet giving construction and management details for this style of beekeeping. You can contact him (in French) at his address: 99, rue S. Pitard, F-37000 Tours, France. I am currently translating this booklet into English. Let me know if you would be interested in obtaining a copy.

— *Emilia Hazelip*

Emilia may be contacted at Permaculture Pyrenees, B P 217, F-11300 Limoux, France
Phone & Fax: +33-68-31 5111.

Bee Tubes: a new pollination system for high density orchards

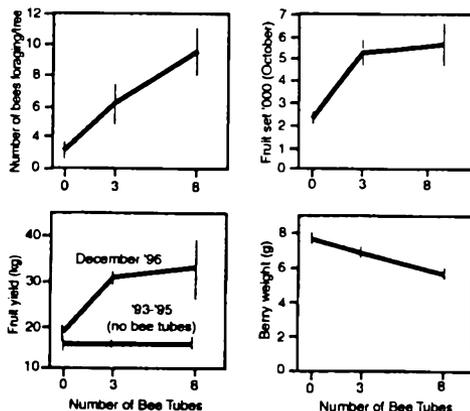
Current planting densities in orchards, with their elaborate structures for trellising and hail or bird netting, make it very difficult to carry out traditional honey bee pollination services.

A specific-sized, lightweight cardboard tube containing about 1 kg (or 9000) bees was successfully tested in four orchards to allow bees to be easily handled and managed in high density orchards. This 'Bee Tube' was developed in August 1996.

An experiment using Bee Tubes in three rows of 13 year old Tatura-trellised cherry trees at Stoneville Research Station was carried out in 1 October 1996. The first 3 7-tree row contained eight Bee Tubes, the second row contained no Bee Tubes, and the third row contained three Bee Tubes.

Thirty cherry trees (10 in each row) were selected so that one in row 1 had the same yield as a tree in row 2 and one in row 3, and so on until all 10 trees were matched across rows using past data collected from the orchard.

The results showed a spectacular 167 to 176 per cent increase in cherry production



with the use of Bee Tubes, particularly since traditional hives had been used previously in the orchard (1993 to 1995). The dramatic effect on cherry yield showed Bee Tubes, placed at one tube per eight productive trees (cv Van) or one per 12 trees with every third a pollinizer (cv Bing), to be an outstanding alternative to traditional bee hives.

— **Rob Manning**, Research Officer, Animal Research and Development Services, Agriculture Western Australia, South Perth (phone (09) 368 3567; fax (09) 474 2479).

(Copies of this 1-page leaflet, with colour photos, available from Granny Smith as Leaflet L77B)

In-row grafting of pollenizer varieties

Honey bees follow a minimum-effort approach when gathering nectar or pollen from an orchard planting. They also tend to work a given source until it is exhausted, then switch to the nearest alternative.

The bees tend to work down rows of a given variety, say 'Granny Smith' apple, then move the minimum distance to the next row. In macadamias, better yields are obtained from tree rows adjacent to another macadamia variety, than they are from trees surrounded by rows of the same variety.

Local bee-pollination expert John Silcock explained that the nearer the pollinizer variety, the better the result. "Mixing the varieties in the same row gives very good results, grafting a branch of a pollenizer variety into a tree gives an even better one", he said. "A pollenizer branch is treated by the bees as part of the whole tree, giving excellent cross-pollination".

"The only drawback is when fruit of the two varieties can be confused, say if both varieties give similar red apples, maturing at the same time. But this would not matter with macadamias".

[EDN / 1997 Jan]

Using the Web in the Desert

I just returned from the annual conference of AERDO (the Association of Evangelical Relief and Development Agencies). A highlight was a technologies update by Paul Lay of MAF (Mission Aviation Fellowship, a Christian organization which has done much to bring electronic communication to missionaries). Many in our network who live far from the nearest phone have recently begun corresponding with ECHO by e-mail because of the radio-operated e-mail and computer system MAF has installed in many countries. Thanks MAF!

By the time you read this, MAF expects to be distributing a briefcase-size telephone that can call via satellite from anywhere in the world for US\$3 per minute. The unit costs about US\$3000. For information contact Paul Lay at MAF (P.O. Box 3202, Redlands, CA 92373, USA; phone: 909794-1151, fax: 909-794-3016, e-mail: MAFUS@maf.org).

Paul said that the US Agency for International Development is sponsoring a major thrust to have direct Internet access (enabling use of the worldwide web) available in the capital city of every country in Africa by early 1997. This will mean that our web page will become a resource for many more people.

Dan Sonke, ECHO's technical resource specialist, gave a live demonstration at our Agricultural Missions Conference of agricultural resources on the web. You could hear "Oooh's" and "Aaah's" from people who had never before accessed the web. Over the course of a few minutes we viewed documents at Cornell University, the Asian Vegetable Research and Development Center in Taiwan, ECHO, and the International Development Resource Center (IDRC) in Canada. Our cost is \$20 per month for 300 hours of use. I must admit that I am still at that "I can't believe it" stage myself. If you are in a situation where you do not have access to the web, take advantage of the opportunity as soon as it comes your way. This is revolutionary.

— **Martin L Price**

Watering the TV set

Wouldn't it be nice if, when you bought a TV set, it came with a little cube in one corner which, if watered and looked after over the months, expanded and grew into another new TV set? Particularly if the new set came ready-tuned to your local TV channels.

Well, that is not likely to happen with TV sets, but it can happen with many of the exotic fruits which are now appearing in Perth outlets.

In February this year we were privileged to have a visit from David Karp of New York (see his blood orange article on page 27). David and I made two visits to a Roe Street fruit store, and we were both impressed with the range of fruits available. Later I found out that many of these had been brought in by Bullfrog International (mentioned on page 6).

Fruits on sale included Abiu, Santol, Mamey Sapote (see page 4), Jakfruit, Bellfruit, Longan, Lychee, Pulasan, Rambutan, Mangosteen, English Gooseberries, fresh Coconuts, as well as the now more familiar

fruits such as mango, papaya, and blood orange. Naturally David and I bought up big to sample some of these rarities, and naturally I tried planting some of the seeds. Many have since germinated and grown vigorously.

The successes included Abiu, Santol, Mamey Sapote, Longan, and Lychee, all growing well. Perhaps the most noteworthy species has been seed of Jakfruit, from fruit bought late in 1996. These seeds gave 100% germination and six months later have grown into vigorous plants, 30 cm or more high, without a pause. From past experience I know that jakfruit will survive Perth winters, but none of the plants I have had before have shown the same vigour as these.



David Karp studies exotic fruit display in a Perth store

There is a lot to be said for growing unusual fruit trees from seed taken from imported fruits. Those which grow well have shown self-selection, they are obviously suited to your local conditions, while an imported grafted variety of the same fruit is just not

adapted in the same way, and of course will cost big money.

Evolution in action, and you get to enjoy the fruit first as well!

— David Noël

Blood Oranges Italian Style

Blood oranges flourish in many western Mediterranean lands, but reach perfection in an arc around Catania, far surpassing blander blond (i.e., non-blood) oranges in both flavour and popularity.

Five to twenty miles from the sea, hot summers bring the fruit sweetness; cold winter nights alternating with mild days favour the development in rinds and flesh of anthocyanins, red pigments that give blood oranges their distinctive berry-like taste and colour. Citrus connoisseurs consider Sicilian 'arance rosse' among the world's finest dessert oranges for their intense flavour, ideal balance of acidity and sweetness, and complex, lingering aftertaste.

Blond sour oranges reached Sicily from Asia by the fourth century A.D., when these "red citrons" were depicted in the famous mosaics at Piazza Armerina in central Sicily. In 1002 a prince of Salerno, besieged by Saracens, sent a gift of oranges that enticed the Normans to conquer Southern Italy and Sicily. A 12th-century poet praised a garden near Palermo where "the oranges of the island are like blazing fire amongst the emerald boughs." But these were probably still sour oranges, used for perfume and seasoning; the first sweet oranges arrived in the 1400s. Some time in the following centuries, perhaps near Paterno, southwest of Etna, blood oranges arose from a spontaneous mutation. These early Sanguigne ("sanguigno" can refer both to blood oranges in general, and to the oldest variety, "Sanguigno Semplice") small and seedy, fetched low prices at local markets, but

better varieties led to expanded cultivation by the late 19th century, as exports to America and northern Europe flourished.

For many years, the leading variety was the Sanguinello, typically round and medium-size, its flesh lightly streaked with red. A larger and sweeter relative, the Sanguinello Moscato, tastes a bit like a muscat grape; both mature late, from mid-February through April.

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(See article in Quandong Vol 22 No 1)

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The Tarocco, named for its resemblance to a toy top - it often has a "neck", like a Minneola tangelo - appeared at the turn of the century. Today, as the favourite variety in Sicily, it is hailed as the supreme "arancia da tavola," or table orange. Medium to large in size, with a relatively loose peel, tender flesh, and a rich but delicate flavour, the Tarocco, harvested from January to May, now represents 65 percent of Italian blood orange production. The Moro ("Moor"), the most recently developed variety, currently second in importance at 21 percent of production, is prized for its reddish rind and dark, juicy flesh, which ranges from burgundy to almost black.

Sicilians traditionally eat their blood oranges at the end of a meal. They rarely serve them in restaurant dishes, except for dessert, but at home Sicilians love blood oranges in a salad with red onions, olive oil, salt, pepper, and often, fresh fennel.

The bounty of Sicilian blood oranges is not good news for everyone. As we toured the groves, growers lamented the "crisi degli agrumi" "citrus crisis". Italy produces more than three billion pounds of blood oranges yearly, far exceeding domestic demand. Most farms are small (under three acres on average), and wages are high, so production costs are twice Spain's, ten times Morocco's. The result is that cheap foreign blonds are beating out the Italian bloods on export markets.

But Italians are rolling up their sleeves to fight. For years commercial processing of blood orange juice was infeasible, because it turned brown and lost flavour, but with recent advances, supermarkets now offer cartons of chilled "spremuta". In addition, an Italian company has developed a vending machine that automatically squeezes fresh juice. At

last, producers can sell their small and blemished fruit to processors.

For the fresh market, Italian citrus scientists have introduced promising new clones and hybrids to enhance productivity and appeal to consumers; over the past 20 years, growers have replanted more than half of their trees with better varieties.

We learned about rootstocks: in the 1960s citrange was popular, but today blood oranges are mostly grafted onto sour orange rootstock, while researchers look for varieties better resistant to salinity. A postharvest specialist, Dr. Lanza, noted that blood oranges are more vulnerable than their blond kin to chilling injury, while the relatively delicate peels of Tarocchi are especially susceptible to blue-green mould.

I met Dr. Francesco Russo, the dean of blood orange researchers, who retired in 1990. "In the old days," recalled Russo, "Tarocchi came mostly from Francofonte, Sanguinelli from Paterno, and Mori from Eentini". Among these three main varieties, there are many clones, especially of Tarocchi, including the "Rosso," with very red rind, and the "del Muso," with a pronounced neck.

Russo was the father of research on modern nucellar Tarocco strains, which are much improved and more stable in their characteristics. For years he searched for cultivars with desired large size, good colour and flavour, productivity, hardiness, lack of thorns, and range of harvest dates. Later I tasted these new strains on a tour of the experimental grove at Palazelli.

In 1989, to enhance the prestige of Sicilian blood oranges, Princess Maria Carla Borgese (whose husband was the founder of the Association of Sicilian Blood Orange Producers) started a program called "Le

Arance della Salute" - "Oranges of Health." The Tarocco is highest in vitamin C of all citrus, and Italian researchers firmly believe that the anthocyanins in blood oranges strengthen the circulatory system, cure ulcers, and scavenge free radicals that may cause cancer. To Sicilians, the power of their 'arance rosse' is fact.

Blood Oranges, California Style

Although Sicily ships a few blood oranges to Northeastern American cities, most of the nation's supply comes from California's Central Valley. Italian and Spanish immigrants introduced the rosy fruit a century ago, but only in the last decade has it become widely available, at supermarkets as well as specialty stores. In California the Moro is the dominant variety, because it reddens most reliably. The Tarocco is rare, hindered by the prevalence of inferior strains, with thorny, unproductive trees and poorly coloured fruit, but scientists at the University of California at Riverside have imported better clones from Italy, which should be cleaned up and released before too long. The introduction of better Italian varieties would be most welcome, for though the Moro is magnificent at peak maturity, in December it tends to be sour, and at the end of the season it often dries up and develops 'nusty' flavours - my notes from last April include a Moro that tasted like "medicine, chocolate, and old sneakers." Don't disdain small fruit: I fondly remember golf ball-sized Mori from a farm stand near Vista, Ca., that rivalled the finest Sicilians in intensity, with skins so thin I ate them like kumquats.

— *David Karp*, 335 East 82nd Street, New York, NY 10028. Tel. (212) 535-2835

This is an extract only from David Karp's article. The full version, with an excellent list of references and sources, appears in the May-June 1997 issue of the CRFG magazine 'Fruit Gardener'.

Indexes for Quandong and WANATCA Yearbook

Indexes have been made of all the articles which appeared in this magazine from its beginnings in 1975 up to the end of 1996.

WANATCA Exec member Marcus Vigilante carried through this project, and a similar one for our Yearbook. Many grateful thanks to Marcus for his efforts.

These indexes have been compiled on a Macintosh as Claris Works 4.0 database files. Members who would like their own copies of one or both of these indexes can get them by sending a 3.5 inch computer disc (Macintosh or IBM) to the Tree Crops Centre, for copying.

The indexes can be copied either as Claris Works files or as text files, with the database fields delimited by tabs. The latter format can be read in by most word processor and database programs.

If the demand is there, these indexes could also be mounted on the WANATCA web site (www.AOI.com/wanataca/). Back copies of most WANATCA Yearbooks can be obtained from the Tree Crops Centre, but we are unable to provide photocopies of articles from Quandong or the Yearbook. ¥

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‘Lilly-Pilly’ Carter on the small screen

WANATCA member Oliver Carter, perhaps Australia’s foremost expert on the *Syzygium* or Lilly-Pilly family, featured in the TV programme ‘Totally Wild’ on March 28 this year.

This family is huge and grossly underused. According to the Census of Australian Vascular Plants, there are some 62 species native species of *Syzygium*, plus another 10 or 12 close relatives now classed in *Acmena*, *Waterhousia*, and *Eugenia* (all were once placed in *Eugenia*, but have since been separated off, leaving Australia with a single native *Eugenia* species).

All these species are believed to have edible fruits, though some are not very tasty. They show a dazzling range of size, colour, and shape — the book *Fruits of the Rainforest* has some fine pictures of many of them.

Then there are the rest of the *Syzygium* species (about 500 worldwide), the majority in Southeast Asia, though the genus extends over to Africa and into the South Pacific. Some of these are now cultivated in Australia (eg Bell Fruit, *S. samaranguensis*; Rose Apple,

S. jambos). Cloves used for flavouring are the buds of *S. aromaticum*, native to the Moluccas.

There are many mixups with names in this family. I bought a plant called ‘Java Plum’ in Perth, according to references this is *S. cumini* (also called Jambolan). This plant has since flowered (see photo), and has been identified by Oliver Carter — “no doubt that this is *S. jambos*”. The common lilly-pilly which grows all round Perth is *S. paniculatum*, more correctly called Brush Cherry or Magenta Cherry, whereas in the Eastern States, ‘Lilly-Pilly’ normally refers to *Acmena smithii*.

Breeding *Syzygiums*

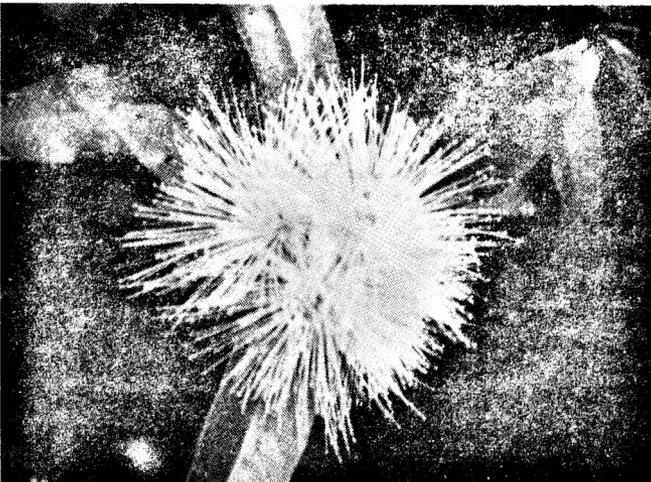
Oliver Carter has also been working for a long time on interbreeding *Syzygium* species and on doubling their chromosome numbers with colchicine. He says:

“I rate *S. jambos* fruits to be one of the best. Mainly for this reason, I have been

trying to cross this species with the two or three other species which produce quite good, though small, blue-coloured fruits. The object is a hybrid with large blue fruit.”

“So far no success, but I do have the cross *S. eucalyptioides* X *S. jambos*. This is encouraging”.

“Recently I have learned that the basic chromosome number for *Syzygium* is 11. That is to say $2N=22$ [chromosomes] for all ordinary plant cells. However



Syzygium jambos, the Rose Apple

S. jambos is a tetraploid, ie $4N=44$. This fact is no doubt the reason for lack of success so far”.

“The cross *S. eucalyptoides* X *S. jambos* is of course a triploid ($3N=33$) and therefore sterile. I should be able to restore a measure of fertility to this plant by doubling it to a hexaploid ($6N=66$). I now have more than 12 *Syzygium* hybrids”.

— David Noël

Sandalwood, Wattle studies at Mulga Research Centre

The Mulga Research Centre at Curtin University, Perth, continues to investigate the ecology and uses of local plant species.

Their latest Journal (Vol. 12, 1995) has detailed technical information on ‘Kernel Compositions of Sandalwood Seeds’ and four papers on ecological characteristics of various *Acacia* species.

The MRC has been studying sandalwood for many years, and has paid particular attention to propagation. Although Sandalwood (*Santalum spicatum*) is best known for its aromatic wood and oil, there is believed to be a good potential market for its nuts, said to be better flavoured than those of its close relative Quandong.

The four local wattle species studied were *Acacia acuminata*, *A. saligna*, *A. tetragonophylla*, and *A. victoriae*. The first is best known as a common local host for the semi-parasitic Quandong, while *Saligna* Wattle is finding worldwide application (eg in Chile) as an animal fodder and pioneer reclamation species. In fact it may be the most far-ranging of WA’s migrated native plant species.

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CALENDAR OF FORTHCOMING EVENTS

Deadline for next issue: Jul 20

1997

- May 20 Tue General Meeting (Dave Hardie - The Bush Food Industry -
— \$100 million by 2000?
- Jun 1 Sun Field Day: Olive Crushing, Wanneroo
- Jul 8 Tue Executive Committee Meeting
- Aug 19 Tue General Meeting
- Sep 14 Sun Bring & Buy Event, Subiaco/Shenton Park
- Nov 18 Tue Annual General Meeting

1998

Apr 25-26 *ACOTANC-98, Nelson, New Zealand

!!WANATCA General Meetings are now on TUESDAYS!!

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

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

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

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

Quandong is produced by the Tree Crops Centre, PO Box 27, Subiaco, WA 6008.

Phone: 09-388 1965. Fax: 09-388 1852. E-mail: treecrop@AOI.com.au

Advertising Rates: Whole page, \$80; Half page, \$45; Quarter page, \$25;

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