

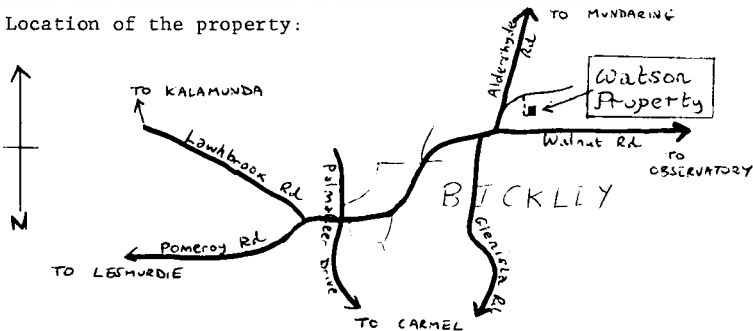


## FIELD TRIP AND PICNIC TO WALNUT ORCHARD

We have been fortunate in being able to arrange a field trip to the WATSON PROPERTY in the Bickley Valley near Perth. The Watsons own the only mature commercial walnut planting in W.A. outside the South West. This includes about 50 trees of the Franquette variety, covering about 2 acres; the trees are around 50 years old. In addition the Watsons have a few trees of the variety Wilson's Wonder, which bears a giant-size walnut, and also macadamia and chestnut trees. Most of the property is devoted to fruit trees, with citrus predominating.

The planting was described by E.L. Neave of the Department of Agriculture, in an article in the 'Journal of Agriculture of Western Australia' for October, 1961. The article was also reprinted as the Department's Bulletin No. 2938. It is now out of print, but may be consulted in some libraries.

Location of the property:



Date of the trip is:

SUNDAY NOVEMBER 26 --- 12.30 PM

Members and friends may drive right into the Watson Property and park there for a picnic, starting at about 12.30. We expect to move off for a tour of the trees at around 2pm. Please park with care and do not leave litter.

This is a unique opportunity to visit this unusual property, which has been in the family for three generations. See you there!



# West Australian Nutmeg Society

**WANS**

225 Onslow Road, Shenton Park, Western Australia.  
Mail Address: P.O. Box 27, Subiaco, W.A. 6008, Australia.

Phone: (09)381 8656

**BOARD OF DIRECTORS:** Peter Good (President), 3414741;  
Paul Sinclair (Vice-President), 3866519; Carolyn Blackwell (Secretary-  
Treasurer), 3975036; David Noel (Publications Director), 3818656;  
Edmund Czechowski, 4476071.

**WANS CONVENORS:**

**Cashew:** Derek White, PO Box 249, Kununurra 6743;

**Investment & Taxation:** Edmund Czechowski

**Little-known Nuts:** David Noel, PO Box 27, Subiaco 6008

**Marketing:** John Mercer, 45 Bridgewater Drive, Kallaroo 6025, tel 4016031

**Nutrition:** Alex Sas, 52 Croydon Rd, Roleystone 6111, tel 3250101, ext 2155

**Seed Supply:** Milan Mirkovic, PO Box 69, West Perth

**Tree Supply:** Tim Lynn-Robinson, 1 Alice Drive, Mullaloo 6025, Tel 4011852

**Walnut:** Tom Speer, PO Box 71, Bridgetown 6255, Tel (097)-611713.

**SOCIETY PUBLICATIONS:**

WANS publishes its newsletter **QUANDONG** 4 times a year. This is devoted to news of meetings and events, details of tree and seed sources, notes about books and pamphlets dealing with nuts, reprinted short articles, notes from members, and other items of interest. The major publication is the annual **WANS YEARBOOK**, which contains articles drawn from Australia and overseas, covering any aspect of nut horticulture and production, and is regarded as an important research journal in this area. Members receive one copy of each WANS publication as a subscription benefit.

**Yearbook Editor:** Dr. B. Dell, School of Environmental & Life Sciences, Murdoch University, Murdoch, W.A. 6153.

**QUANDONG Editor:** David Noel, PO.Box 27, Subiaco, W.A. 6008

**Back Numbers:** WANS began publishing in 1975. Back numbers of publications are still available. Some issues of **QUANDONG** are available only in photocopy form. Cost of each **Yearbook** is \$6.-, cost of a 1-year set of **Quandong**: (3 or 4 issues) is \$2.-. Contact the Secretary for back numbers.

**MEMBERSHIP**

Any person or organization interested in the growing or production of nuts may subscribe for membership. Members are welcomed from outside Western Australia and overseas, as well as in W.A. Write to PO Box 27, Subiaco W.A. 6008. Secretary is normally in attendance at 225 Onslow Rd., Shenton Park, each Wednesday from 12 - 3 pm; phone is (09)-3818656. The current membership subscription rate, which runs for a calendar year and covers all publications issued in that year, is \$ 8.-.

**WANS CO-OPERATIVE**

Members of the Society own a limited company, West Australian Nut Supplies Co-operative Limited, a commercial organization set up to buy and sell nuts and nut products. WANS CO operates a retail store and a wholesale business at 225 Onslow Rd, Shenton Park. The retail store, called **SQUIRREL NUTKIN** sells nuts, nut trees, and books about nuts, and is currently open Wednes, to Friday, 9am to 6pm, Saturday 9am to 1pm. Shares in WANS CO must be applied for on the printed form available from the Shenton Park office. Shares cost \$ 1 each; limits are currently being revised, but are expected to be restricted to 50 to 250 shares per person.

## THE SOCIETY'S A.G.M.

Our Annual General Meeting will be held concurrently with that of the WANSO Co-operative, as noted in the Supplement appearing with this issue of QUANDONG. The date, time, and place are:

FRIDAY DECEMBER 15 at 7.30 PM at the Meeting Room,  
Subiaco City Library, corner Bagot & Rokeby Roads, Subiaco.

This is the same place as the last Society meeting, and a plan of the location will be found in the last issue of Quandong.

This is the opportunity for you to air your views on what the Society could or should be doing. Members and guests are welcome.

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## VISIT OF NUT TREE PROPAGATOR

We have the following report from our Propagator Visit Coordinator, Tony Bryant, on the forthcoming visit by the Californian expert Paul Thomson.

"At this stage Paul Thomson's tour (Sept/Oct 1979) will take in New South Wales and South Australia as well as Western Australia. The amount of time scheduled for W.A. will depend on the extent of members' requirements but will be limited to three weeks. At present his schedule in W.A. has been booked for one week. As a definite commitment of his time is necessary, would those members interested please advise in writing not later than 20 December 1978.

If those members interested can raise their own rootstocks, the Society anticipates that it will be able to organise suitable scion wood for pecans, walnuts, macadamias, and chestnuts (provided notice is given) to be available for Paul's visit. As a guideline, the cost is expected to be \$2-\$3 per tree, possibly less if larger quantities are involved. "

Tony Bryant's address: P.O.Box 98, Gosnells, W.A. 6110.

## IN A NUTSHELL (No. 18)

The Ginkgo (*Ginkgo biloba*) is one of the strangest plants in the world. Sometimes called the Maidenhair tree, because its leaves look like those of the Maidenhair fern, it is a true living fossil. In fact for many years it was only known from Coal Age fossils dating back 200 million years. Last century a number of living trees were found in remote parts of China. The seeds of the Ginkgo, sometimes called silver almonds, are sold in shops under the name White Nuts. They have a very distinctive taste and according to Chinese lore are able to promote health and long life. Ginkgos grow slowly to a large size. They are neither a conifer nor a broad-leaf tree, having their own plant sub-division, although closest to the conifers.

## QUANDONG AND SANDALWOOD NUTS

The picture below is a poor reproduction of a superb colour photograph in the "Australian Plants" article reprinted on page 9. The magazine is always crammed with colour photographs of Australian plants, and is excellent value at only \$3.00 per year (address at end of article).

Nuts of both the Quandong and its close relative the Sandalwood are currently on sale at the Squirrel Nutkin Shop. Both are edible, and the Sandalwood in addition is the source of the valuable wood, mostly exported for use in incense.



Photography by E. A. Lawton, C.S.I.R.O.

### SANTALUM ACUMINATUM

—leaves, whole fruit, seeds and kernel.

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### SEED FUND SET UP

At long last the Society's Seed Fund has been set up. The arrangement here is that a quantity of difficult-to-get seed is obtained and offered both to members and to the public to cover as wide an area as possible. Our first offering has been of JOJOBA seed nuts. Advertisements have been placed in the Australian and West Australian newspapers promoting a sample of 10 seeds and a leaflet on the Jojoba (reprinted in this issue of QUANDONG) for \$2.00. Many responses have been received from these advertisements, which are handled by the Squirrel Nutkin shop on behalf of the Society.

Special for Members. Members may obtain TWO packets of 10 seeds instead of one for the sample price of \$2.00. In addition, as long as stocks last, larger quantities can be ordered at the rate of \$6.00 per 100gm. All these prices include postage.

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### SPECIAL NUT PLANTING BAGS

The Squirrel Nutkin shop has special deep plant bags made for it because nut trees have such deep roots. These special bags are now available to members at 10c ea. (\$9.50/100) for 18" bags (trees 1-2 yrs old) and 16c ea. (\$15/100) for 24" bags (trees 2-3 years old).



# West Australian Nutmeggrowing Society

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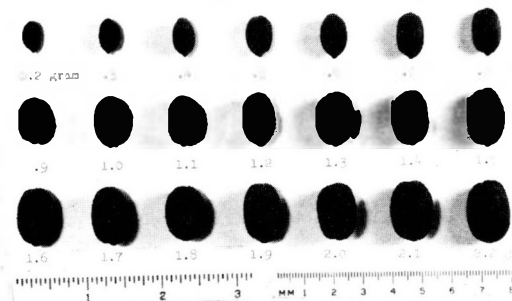
WANS NUT CULTURE LEAFLET NO. 1

## THE JOJOBA

Milan Mirkovic

GENERAL

The Jojoba (*Simmondsia californica* or *Simmondsia chinensis*) is a plant native to arid areas of Mexico and the South-west U.S.A. It has come into prominence recently as the source of valuable oil, able to effectively replace sperm whale oil, and with a number of other uses in its own right. Because of the Jojoba's ability to grow in low-rainfall or desert conditions, it has been suggested as a suitable crop for dry native reserve areas, both in the U.S.A. and in Australia. The name Jojoba is derived from an American Indian word, and is pronounced 'Ho-ho-ba'. The seed or nut has also been called the 'goat nut', and the plant, a relative of the European box plant (*Buxus*), has also been called the 'Desert Box'.



Nuts of the 'Vista' clone, at present the only one named, varying in size from 0.2 of a gram to 2.2 grams, the largest ever found by Paul Thomson. The small nuts were harvested in 1964, a poor year, and the large nuts in 1972, a good year. (Photo - W.T.Borden)

## GROWTH HABIT

The Jojoba is a many-branched shrub or small tree, usually with several stems arising from the base of the plant. It is dioecious (male and female flowers are on separate plants). The seed is about the size of a large peanut; its colour varies from light tan to a deep chocolate brown.

## CLIMATIC CONDITIONS

The Jojoba needs a minimum coldest-month average of 7°C (44°F) and a hottest-month minimum average of 20°C (67°F), and a maximum average of 31°C (88°F). It will survive winter lows of -7°C (20°F) and summer highs of 43°C (110°F), but any temperature drop below -2°C (29°F) should be considered dangerous to young plants.

## SOIL

The soil must be well drained, preferably a coarse sand or gravelly clay. In a loam soil the plant has grown in 200 mm (8 in) rainfall without irrigation. It does not like wet soil.

## FERTILIZATION AND WATER SUPPLY

The plant has shown some response to nitrogen and phosphorus fertilizer, but results of fertilizer trials have been rather inconclusive. Most of the natural Jojoba occurrences are in areas with a rainfall of 300-450 mm (12-18in). The bush will yield without irrigation, but to obtain maximum yields, irrigation is necessary. The exact water requirements of the plants are unknown. Because one good year in 25 is enough to maintain the plant in its native stands, its distribution is not indicative of where it will yield well.

## POLLINATION

The Jojoba is wind-pollinated. The plant is dioecious with male and female flowers found on separate plants. Males should be planted upwind from the females so that the prevailing winds at pollen shedding time will carry the pollen to the females. Under conditions of summer drought and cold winters, the Jojoba flowers in spring. Under other conditions, autumn flowering can occur.

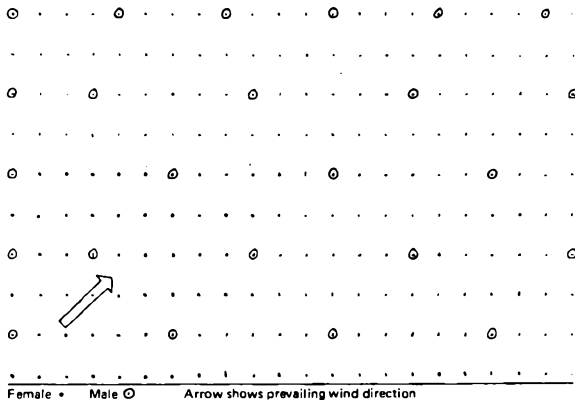


Diagram of orchard layout showing suitable pattern for placement of male and female plants for effective pollination. (Graph - Paul H. Thomson)

# wansco supplement

Issued with QUANDONG Vol.4 No.3 September 1978

## WANSKO SHAREHOLDER'S A.G.M.

All present and prospective shareholders in the WANSKO Co-op are warmly invited to the A.G.M. which will be held in the Meeting Room, Subiaco Library Building, corner Rokeby and Bagot Roads, on Friday December 15 at 7.30 pm. The rest of this issue of the Supplement is devoted to the accounts and statements which are required to be published. WANSKO is a Limited Company incorporated under the Companies (Co-operative) Act, and these statements are required under this act. Shareholders who cannot attend may appoint a proxy using the form at the bottom of this page, or a similar typed statement.

### WEST AUSTRALIAN NUTSUPPLIES CO-OPERATIVE LIMITED

Notice is hereby given that the Second Annual General Meeting of Shareholders will be held at the Meeting Room, Subiaco City Library Building, Bagot Road, Subiaco, on Friday December 15, 1978 at 7:30pm.

#### BUSINESS

1. To receive and consider the balance sheet and profit and loss statement and the reports of the Directors and of the Auditor in respect of the year ending 30th June 1978.
2. To appoint an Auditor and fix his remuneration. Mr C. Hunter has been nominated for the position by Mr. F. Czechowski. The nomination having been accepted Mr C. Hunter is eligible and offers himself for re-appointment.
3. To consider any other business that may lawfully be brought forward.

A.V. Bryant Secretary

By order of the Board  
PERTH 11th November 1978.

### PROXY FORM

I/we . . . . . of  
. . . . . being a member/members of

### WEST AUSTRALIAN NUT SUPPLIES CO-OPERATIVE LIMITED

hereby appoint . . . . . or failing him,  
. . . . . of

as my/our proxy to vote for me/us on my/our behalf at the Annual Meeting of the Company to be held on the Fifteenth day of December 1978, and at any adjournment thereof.

As witness my/out hands this . . . . . day of . . . . . 1978.

Signed by the said: . . . . .

In the presence of: . . . . .

NOTE. To be received at 225 Onslow Road, Shenton Park, Western Australia 6008, not later than 24 hours before the commencement of the meeting.

WEST AUSTRALIAN NUT SUPPLIES  
CO-OPERATIVE LIMITED  
FINANCIAL STATEMENTS  
FOR THE  
YEAR ENDED 30TH JUNE 1978

WEST AUSTRALIAN NUT SUPPLIES CO-OPERATIVE LIMITED  
SOURCE AND APPLICATION OF FUNDS STATEMENT  
for the year ended 30th June 1978

Funds became available from	\$
Decrease in debtors	198
Shares issued	1,825
Provision for depreciation of fixed assets	60
Increase in creditors	884
Loan - WANS	<u>1,621</u>
	4,588
These funds were used for	
Trading loss	2,422
Increase in trading stock	1,037
Pay shareholders loan	500
Increase in cash at bank	146
Cash on hand	50
Purchase plant	110
Purchase fixtures and fittings	<u>323</u>
	4,588

\*\*\*\*\*  
WEST AUSTRALIAN NUT SUPPLIES CO-OPERATIVE LIMITED  
Balance Sheet as at 30th June 1978

<u>AUTHORISED CAPITAL</u>	<u>1978</u>	<u>1977</u>
20,000 ORDINARY SHARES OF \$1.00	20,000	20,000
<u>ISSUED AND PAID UP CAPITAL</u>		
ORDINARY SHARES OF \$1.00	4,210	2,385
<u>REVENUE RESERVES</u>		
ACCUMULATED LOSSES	<u>(3,254)</u>	<u>(832)</u>
<u>TOTAL CAPITAL &amp; RESERVES</u>	<u>956</u>	<u>1,553</u>

Represented by:

<u>CURRENT ASSETS</u>		
CASH ON HAND	50	-
CASH AT BANK	668	522
DEBTORS	76	274
DEPOSIT AT CALL	9	9
STOCK AT COST	<u>2,197</u>	<u>1,160</u>
	3,000	1,965

<u>FIXED ASSETS AT COST</u>	<u>1978</u>	<u>1977</u>
FIXTURES AND FITTINGS	501	178
Less PROVISION FOR DEPRECIATION	(45)	(5)
PLANT	205	95
Less PROVISION FOR DEPRECIATION	(25)	(5)
	<u>636</u>	<u>263</u>
<u>TOTAL ASSETS</u>	<u>3,636</u>	<u>2,228</u>

<u>Less CURRENT LIABILITIES</u>		
LOAN - W.A.N.S.	1,621	-
CREDITORS	1,059	175
LOAN - SHAREHOLDER	-	500
	<u>2,680</u>	<u>675</u>
<u>TOTAL LIABILITIES</u>	<u>2,680</u>	<u>675</u>
<u>NET ASSETS</u>	<u>956</u>	<u>1,553</u>

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Profit and Loss Statement for the year ended		
30th June 1978		
	<u>1978</u>	<u>1977</u>
<u>Turnover</u>		
Nuts and associated products	10,568	2,864
<u>Income</u>		
Gross profit from trading	3,077	693
<u>Less: Expenses incurred in the operation of the business</u>		
Wages	3,075	606
Rent	1,031	240
Depreciation of fixed assets	60	10
Printing, stationery and postages	147	161
Repairs and maintenance	1	25
All other expenses	<u>1,185</u>	<u>283</u>
	<u>5,499</u>	<u>1,325</u>
Net loss incurred	2,422	632
Trading bonus for Members	Nil	Nil
Dividends declared	Nil	Nil

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Directors' Certificate

We, ANTHONY BRYANT and DAVID GEOFFREY NOEL, being two of the Directors of West Australian Nut Supplies Co-operative Limited, do hereby certify that, in our opinion, the Balance Sheet appearing here is true and correct and is properly drawn up so as to exhibit a correct view of the Company's affairs.

Dated this TENTH day of NOVEMBER 1978

ANTHONY BRYANT

D. G. NOEL

Auditor's Report

I report that I have examined the books and accounts of West Australian Nut Supplies Co-operative Limited and have obtained all the information and explanations I have required and that in my opinion:

1. The foregoing Balance Sheet is properly drawn up and exhibits a true and correct view of the state of the Company's affairs as at the 30th of June 1978, and the accompanying Profit and Loss Statement is properly drawn up so as to exhibit a true and correct view of the results of the business for the period ended 30th of June 1978, according to the best of my information and the explanations given to me, and as shown by the books of the Company.
2. Having regard to the nature of the business, sufficient provision has been made for Depreciation.
3. The register of Members, and other records which the Company is, by the Companies ((Co-operative) Act, 1953-1959, and amendments, or by its Articles, required to keep, have been properly kept.

C. HUNTER  
PUBLIC ACCOUNTANT  
PERTH, W.A.

WEST AUSTRALIAN NUT SUPPLIES CO-OPERATIVE LIMITED

Statement of significant Accounting Policies

- (a) Companies (Co-operative) Act  
The company is incorporated under the Companies (Co-operative) Act 1943-1959 and as such is bound by the disclosure requirements of that Act. However, an endeavour has been made to comply with the more important aspects of the uniform Companies Act where these do not conflict.
- (b) Depreciation of fixed assets  
Depreciation is provided on a reducing balance basis so as to write off the cost of each asset over its anticipated useful life.
- (c) Tax effect accounting  
The company has not adopted the concept of tax effect accounting. However, the estimated future tax benefits have been calculated at 30th June and appear in Note 2.

Notes to and forming part of the Accounts:

1. Issued and paid-up capital  
1825 ordinary shares of \$1.00 fully paid have been issued since 30th June 1977.
2. Tax Provisions

Tax loss available	\$ 2,480
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Based on present income tax rates of 46% if the company had adopted tax effect accounting the future income tax benefit would amount to: 1,141
3. Directors' Emoluments  
The directors have not received any payment for services.
4. Auditor's Remuneration  
The auditor has not received any remuneration for services. The auditor has not received any other benefit.

Secretary's Certificate

I, ANTHONY BRYANT, Secretary of West Australian Nut Supplies Co-operative limited, hereby certify:

That the reserves and accumulated profits and losses are used in the business. That the foregoing Balance Sheet and Profit and Loss Statement are, to the best of my knowledge and belief, true in every particular.

That the names, addresses and occupations of persons who are Directors of this company are:  
ANTHONY BRYANT, MADDINGTON, ACCOUNTANT, and  
EDMUND CZECHOWSKI, DUNCRAIG, ACCOUNTANT, (now in Darwin), and  
DAVID GEOFFREY NOEL, SHENTON PARK, System Designer and Nutgrower.

Dated at Perth in the State of Western Australia this <sup>TENTH</sup> day  
of November 1978

  
ANTHONY BRYANT

SPECIAL CHRISTMAS SALES TO SOCIAL CLUBS

This year Squirrel Nutkin has made special arrangements to supply combined orders to Social Clubs at very competitive prices. If you are a member of a Social Club, ask your Secretary to contact the shop for details. The telephonenumber is 381 8656.

## PLANTING

The current trend in planting is to grow in hedgerows. Plants are placed 1.2-1.5m (4-5ft) apart in the rows, and rows about 4m (12-13ft) apart. This allows for future mechanical harvesting. If planting seed directly into the ground, four or five seeds are placed at each planting position. From these, two or three trees should result. The tree of the desired sex is kept after flowering and the others removed. When planting seedlings, two seedlings are placed 30cm (1ft) apart at the planting position. After flowering the plant of the desired sex is left and the other removed. The ratio of male to female plants from seed varies from 50% male:50% female to as high as 75% male:25% female. Satisfactory pollination can be obtained with as few as one male to nine female plants.

## HARVESTING

At present, harvesting is being done by hand. However, this is impractical for large areas, and harvesting machines are currently being developed in America. By planting rows 4m (13ft) apart, mechanical harvesting is allowed for at a future time.

## YIELDS

Planting 1.5m (5ft) apart and 4m (13ft) between rows gives 1625 plants per hectare. With one male for every seven females, this is equal to 1421 females per hectare. Current yields in America are about 2 kg (4.4lb) per bush, without cultivation, for mature bushes. Yields of up to 5kg per bush are not unreasonable under intense cultivation. A yield of 1.5 kg per bush in the seventh year can be expected. At 1.5 kg per bush and 1421 females per hectare the yield should be about 2121 kg/ha (1725 lb/acre). Approximately half the weight of the seed is oil, so the oil yield would be half of that quoted for the nuts.



Eighteen-year-old bush about 5 feet high and an 8 feet spread.  
(Photo - Paul Thomson).

## TRANSPLANTING

Soil around the roots of seedlings should not be disturbed during the transplanting to avoid exposure and resulting transplant shock. Plants should be transplanted before they are old enough to bloom. It is recommended that 12-18 month-old plants be used. Older plants suffer a greater transplant shock. Transplanted seedlings should be watered thoroughly after planting and the soil kept moist for several days. According to various studies, it is beneficial to plant container-grown Jojobas in the same orientation (N-S) as they were grown under.

## PROPAGATION

Jojoba can be propagated by cuttings. However, in Australia there are two problems. First, there are no Jojoba cultivars to choose from, to obtain cuttings. Secondly, cuttings produce a fibrous root system rather than a tap root system, so their drought resistance is likely to be poorer.

## PRUNING

Bushes seem to generate new growth after light pruning. Pruning is undertaken to produce a single-stemmed bush, but the yield advantages of a single stem bush over multiple stems are unknown.

## FUTURE

There is a high demand for Jojoba oil and the Jojoba industry will grow and develop. However, the Jojoba is still basically a wild plant, much work has still to be done to domesticate it. Compared to other oil and nut crops, little is known about how to grow it and the best plantation practices. While there is an assured market for Jojoba oil, unknown factors in cultivation and cropping practices mean that current plantings must be regarded as experimental.

## GARDEN PLANTING

The Jojoba is an interesting, unusual and attractive plant, and small plantings scattered over as wide a range of conditions as possible are desirable to give an indication of its performance and potential in different areas. Small plantings are best done by sowing the seeds directly in the soil in Spring or early summer, about 30 cm apart. Under dry summer conditions, watering is advised for the first and second year.

### Further Reading:

1. Thomson, P. "The Jojoba". West Australian Nutgrowing Society Yearbook/1:6, 1975.
2. Begg, J. "Jojoba in Australia". West Australian Nutgrowing Society Yearbook/3:26, 1977.
3. "The Jojoba Handbook" California Rare Fruit Growers; Vista, Cal.; 1976.
4. "Jojoba Happenings" (Periodical). Office of Arid Land Studies, University of Arizona.

September 1978

# Australian Plants

Registered for posting as a periodical  
—Category B

June, 1978—Vol. 9, No. 75 75c

## Santalum Fruit

DOMESTICATION OF THE QUANDONG, *SANTALUM ACUMINATUM*  
(R.Br.) A.DC.

By W. J. R. Grant and M. S. Buttrose, CSIRO, Division of Horticultural Research,  
G.P.O. Box 330, Adelaide, South Australia, 5001

The macadamia nut (*Macadamia integrifolia* Maiden and Betche, and *M. tetraphylla* L. Johnson) is often quoted as the only fruit of an indigenous Australian plant which is of economic importance. There are a number of other fruits which are edible (Cribb and Cribb, 1974) but their quality precludes their being economically significant in their wild form. One of these is the quandong or native peach, *Santalum acuminatum* (R.Br.) A.DC. This plant with its fruits was familiar to early settlers over the whole southern half of the continent, and trees are still found from south central Queensland to northern Victoria, across South Australia and across the southern half of Western Australia. The thin flesh of the ripe fruit has a characteristic acidity and astringency, although sweetness can vary, and is still prized by many country people for jam, pies and stewed fruit dish. Less attention is given to the fresh fruit and to the kernel, both of which are edible. The tree itself is especially attractive when carrying ripe fruit.

Almost all present-day commercially produced fruits have originated as small, thin fleshed wild fruits, and over many centuries have been improved by selection of outstanding specimens and by breeding. The quandong is worth improving as an edible fruit for the following reasons. The plant will grow and fruit in semi-arid, as well as better-watered areas of southern Australia. As water for irrigation becomes scarcer and of lower quality due to salinity, the production of a fresh fruit without irrigation in dry areas could become more important. The flesh of the quandong is nutritionally valuable due to a high content of vitamin C (approximately double that of oranges for equal fresh weights), while the kernel is a rich food with approximately 25% protein and 70% oil. As well, the flavour and astringency of the fruit are attractive to many people.

Variation in growth and fruit characteristics exist. Before starting a selection and breeding programme we have had to understand and overcome some of the obstacles in establishing plants. In his book, Blombery (1973) states that quandong seeds can be categorized as "frequently difficult to germinate" and Lord (1972) comments that the quandong is "difficult of cultivation". In an article in this journal, Curtis (1974) contended that germination and cultivation is not difficult provided that the stone is nicked, a host plant supplied and adequate watering undertaken. Our recommendations, after trying a number of different techniques, at the present time are as follows.

### Germination

Seeds will germinate within a couple of months of removing from ripe fruit, but germination is better with one-year-old seeds and possibly still better with yet older seeds. Crack the stone in a steel vice and remove the kernel. The brown parchment-like layer which normally still covers the actual kernel is also cracked by hand or knife and split off. Take a small clean plastic bag (e.g. 15 cm by 18 cm) and place inside it two handfuls of moist vermiculite or fresh clean woodshavings. Vermiculite can be purchased from nursery suppliers, but for many people woodshavings (or coarse sawdust) will be easier to obtain. If possible, the medium should be sterilised. Both can be pasteurised in a moist state by heating to 60°C for half an hour in an oven. When filling the bag, the vermiculite or shavings must not be so wet that water can drain out, but just moist to the feel (approximately 40 ml boiled water per half-filled bag as described above). This bag is good both for seed germination and harmful fungal growth, so care must be taken to keep the bag sterile, e.g. hands must be thoroughly washed before removing seed. Any rotting seed must be removed. Kernels should preferably be surface sterilised before being placed in the bag. Firstly, immerse the kernels for 30 minutes in household chlorinated bleach (e.g. White King) diluted to one-tenth strength and to which has been added 10 drops of detergent per litre of solution. Then drain off the bleach solution and wash three times in cold boiled water. Finally, dust the kernels with a general purpose fungicide, e.g. Captan, Thiram or Zineb, and place within the vermiculite inside the bag. Clip the bag shut to prevent moisture loss. The bag must now be held in a cool place out of the light. The optimum temperature for germination appears to be between 16° and 20°C (61° to 68°F). Germination is very

poor at 25°C and still worse at 30°C. We inspect the bags once each week and remove germinated seeds. These are readily seen because of the thick white root which often appears against the clear polythene. The first seeds usually germinate at three weeks, the last ones may take several months. With this technique we are achieving about 80% germination.

### Planting

In common with other members of the Santalaceae the quandong is a root parasite. When a quandong root comes in contact with a root of some other plant a pad-like growth proliferates from the quandong and partly surrounds the host root at that point. Root tissues from the quandong invade the host and a direct root connection is established. It is not known what the quandong requires from a host, nor whether it requires a host for its whole life span, although we are studying these questions. The host range appears to be wide — *Eucalyptus*, *Acacia* and *Casuarina* to mention a few natives, also any backyard fruit tree or shrub, and perennial grasses and even annual plants. With our interest in establishing orchard plantations, we are experimenting with kikuyu grass and lucerne as host plants. These could be kept mown or grazed.

We commonly take a germinated seed with 5 cm (2 inches) long root and plant into a 15 cm (6 inch) pot or polybag with potting soil. Probably any well drained sandy soil would be suitable. Some lucerne seeds or a slip of kikuyu are planted into the same container and the pot kept well watered. Regularly each fortnight we apply a commercial soluble fertiliser (Aquasol, Thrive etc.) and at monthly intervals a small supplement of super-phosphate and of iron chelate (a level teaspoon of each/gallon/month) until the plants are ready for field planting. Hirano and Lyon (1977) have had encouraging results using iron chelate with some other *Santalum* species. Late autumn or winter are probably the best times for transplanting to a permanent site. Plants must be watered in well at planting, and there must be adequate water until the roots grow out well. For the home gardener freshly germinated seeds can be planted directly into position adjacent to a suitable established host plant, preferably in late autumn. Seedlings must be protected against snails and in country areas against rabbits. A tree that grows vigorously will flower in its third year and have its first few fruit by four years old.

Many people are disappointed that small quandong "seedlings" that they find adjacent to established trees will not transplant. One reason is that many of these small plants are actually root suckers, and in digging them out they are deprived of an adequate root system. Another common fallacy is that quandongs do not need a host because there is not another plant within, say, 50 metres of an old tree. Although it has not yet been proved that a host is absolutely essential, such observations certainly do not provide this proof because there is bound to be some plant life near the quandong, perhaps some *Triodia* or other perennial (or annual) grass, or else some very small woody perennials. In addition, it must not be forgotten that roots can grow very long distances, and after all, if a host root grows 25 metres and a quandong also 25 metres there could be parasitism with two trees 50 metres apart.

To summarise, there are six important steps to success:

1. Crack the stone in a vice and remove the remaining parchment cover from the kernel.
2. Sterilise the seeds with bleach and fungicide.
3. Prepare a moist sterile germination mixture in clean plastic bags.
4. Place seed in bag at optimum temperature (16-20°C).
5. Remove germinated seed when the root is approximately 5 cm (2 inches) long and plant either directly in the ground near a host or in a pot with a host.
6. Water and nourish the plants regularly and protect from snails whilst seedlings are succulent.

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## LIST OF NEW WANS MEMBERS

A warm welcome to the following new members, who joined the Society in the first half of 1978.

The list includes our second United States member based in the U.S. But we have many American members living in Australia -- the U.S.A. has many valuable native nuts (pecan, black walnut, hickory) and an enormous nut-growing industry, so these members have often been familiar with nut growing since their childhood.

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