

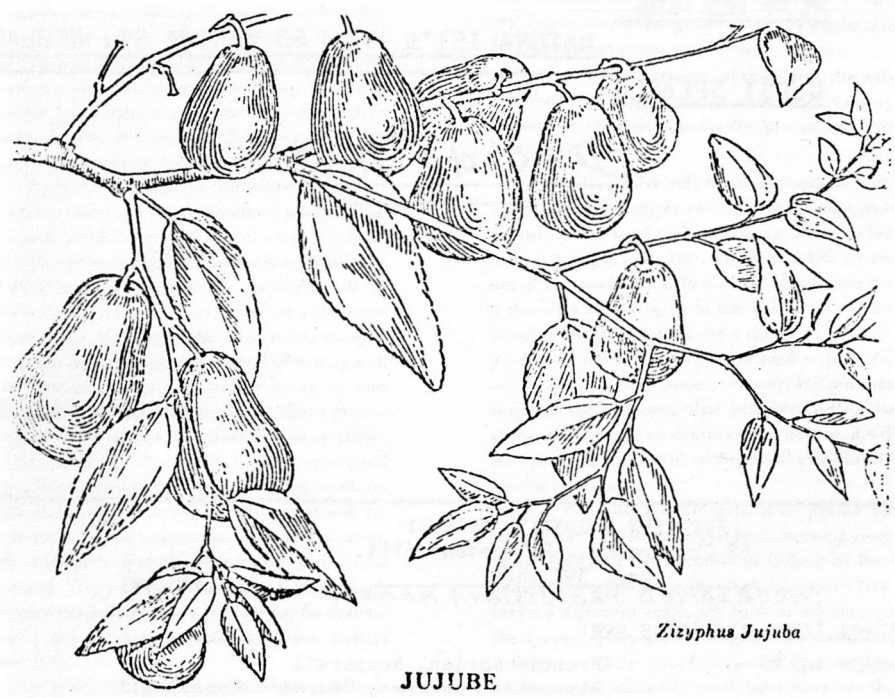
NEWSLETTER

Quandong

WEST AUSTRALIAN NUT AND TREE CROP ASSOCIATION

JULY, 1983 Vol 10 No.2 ISSN 0312 - 8989 Pub No WHB 0868

93



Zizyphus Jujuba

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INDEX

MEETING INFORMATION
JOJOBA
TREE CROPS 84
SNIPPETS
BOOK REVIEW

PROPOSED CONSTITUTION
LETTERS TO THE EDITOR.
SOCIETY INFORMATION

MEETING DATES

General Meetings

3rd August

2nd November

Executive Meeting

20th September

NEXT MEETING

NATURALIST'S HALL 63 MERIWA ST. NEDLANDS

GUEST SPEAKER

David Noel

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(3 varieties). All in containers, ready
March-April 1984.

Jojoba: cautious optimism

by Steve Davidson

Jojoba has been called the superbean. Actually it's not a true bean at all — if anything, the fruit, resembles an acorn — but the name reflects the reverence with which some people regard jojoba.

Some years ago, it was thought jojoba (pronounced ho-ho-ba) could be the salvation of the mighty sperm whale, harvested for its valued oil, but legislation to conserve the whale has somewhat overtaken the development of jojoba as the source of an alternative to sperm whale oil. Both the United States and the United Kingdom have now banned sperm whale oil, yet jojoba still remains far short of its full potential as a commercial oil crop. To give jojoba due credit, though, the publicity it gained in the late 1970s may well have encouraged some governments to ban sperm whale oil, in the knowledge that a potential alternative source of quality oil was available.

Unfortunately, that publicity also prompted many land-owners in Australia to plant jojoba on faith alone, with little idea of the agronomic requirements of the crop or the need for a reasonable acreage to give the enterprise commercial promise. After initial enthusiasm, many such growers became discouraged, for jojoba cultivation is not the way to make a million dollars overnight.

Like many nut crops, jojoba does not bear fruit for several years after planting. Significant yields can be expected only about 4–5 years after sowing. And many other problems, too, have yet to be overcome.

Defining a suitable climate for plantations has been one difficulty. Jojoba is an evergreen perennial shrub, native to the arid regions of southern California, Arizona, and north-western Mexico. It therefore seems a likely candidate for successful cropping in this, the driest, continent. If it survives in the Sonora Desert, why not cultivate it here? Sadly, this line of thinking has sometimes been misleading.

Apart from a few plants introduced to Broken Hill in the 1930s to attempt revegetation of denuded mining land, the first experimental plantings were made in the early 1970s by Departments of Agriculture or Forestry from all States. At this time, Dr John Begg and Mr Bob

Dunstone, of the CSIRO Division of Plant Industry, began researching the biology of jojoba and its potential as a new crop in this country.

They very soon recognized that using the natural distribution of jojoba as a basis for choosing favourable climatic regions for plantations can be a mistake.

In the wild, jojoba only needs favourable rainfall and temperatures two or three times in a century to set seed and reproduce, since its life span is thought to be 100–200 years. The criterion of success in the wild is survival, whereas for a domesticated crop it is the ability to sustain commercial production. As a commercial crop, jojoba will need to yield a lot of seed — preferably more often than twice a century! Put another way, we can't assume that just because jojoba grows in a certain environment in nature, it will also prove a successful commercial crop under similar conditions.

Since the future development of jojoba will depend on improved methods of choosing plantation sites and the selection of improved lines suitable for cultivation, the CSIRO scientists have taken a different approach to domestication of the species. They are seeking to understand the influences that environmental factors like temperature, moisture, and light have on the physiology of the plant — especially the processes of growth and reproduction.

With knowledge of how jojoba plants respond to different environmental conditions, they will be in a better position to predict just where high yields can be expected — that is, which regions are the best bet for plantations.

The researchers are particularly interested in discovering the secret of jojoba's success in desert habitats. How does it tolerate or avoid the heat and water stress that are part and parcel of life in arid zones?

At Canberra, the scientists have been examining the physiological basis of the shrub's ability to survive in deserts by conducting experiments in glasshouses and a controlled-environment laboratory (phytotron). They have supplemented these results with observations at field sites, managed in collaboration with Dr Peter

Milthorpe from the New South Wales Department of Agriculture, and with data published by overseas workers, particularly in Israel, Mexico, and the United States. (More than 10 000 ha are now planted to jojoba in Arizona, California, and Texas — renowned for oil of a different type.)

Drought tolerance

A vigorous tap-root system is one feature that seems to help jojoba survive in regions with little rainfall. In Mexico, the roots of 1-year-old jojobas in the field were found to be 2.1 m long, or seven times the height of the plants. Roots of more mature shrubs have been reported up to 10 m below the soil surface, tapping a huge volume of soil.

In controlled experiments at 27°C, the CSIRO scientists found that, when it emerges from a germinating seed, the fleshy tap root initially grows 2 cm per day and can reach a depth of

50–60 cm before the shoot appears above ground. After this the growth rate drops to 1 cm a day.

Plants grown in long perspex tubes, under glasshouse conditions, developed a tap-root system if the soil was well drained, but produced lateral roots in the wet soil just above an artificial water table. Provided the water table didn't approach the soil surface, it could be moved up or down without killing the plant — an important consideration for growers wishing to irrigate.

While the roots are adapted for efficient water uptake, the shoots have certain characters that minimize water loss. The thick leathery leaves are covered by a waxy cuticle, and sunken pores reduce transpiration. Vertically oriented leaves receive little sunlight during the middle period of the day, when radiation is at peak intensity.

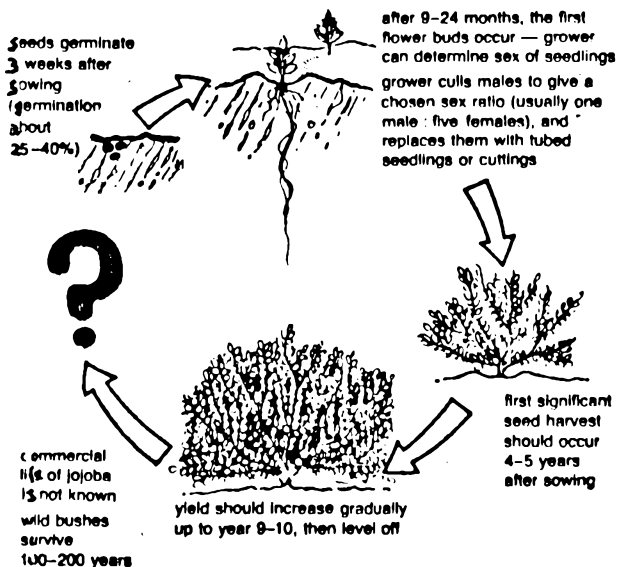
Under desiccating conditions (leaf potential 3.0 MPa), the relative water content of jojoba leaves remains at a comfortable 96%, whereas that of wheat drops to 85% under less severe stress (–2.5 MPa). Research conducted with Dr Howard Rawson and Dr Ross Woodward, of the Division, has demonstrated that jojoba had a transpiration rate under evaporative stress only one-tenth that of wheat or sunflower. Saltbush, a native shrub of the arid zone, had twice the transpiration rate of jojoba. Jojoba also used water more efficiently than wheat did.

Seeds of oil

Jojoba-growers strive for increased seed production, for it's the seed that contains the oil product. Not surprisingly, then, the researchers have given much attention to flower and seed development — the reproductive process — in jojoba.

Male and female flowers are produced on different plants, but jojoba seedlings cannot be sexed until 9–24 months after sowing. The flower buds, which form in the warm months of spring, summer, and autumn, may remain dormant for up to 3 years, opening only after autumn rains and cool weather. Hence the plant requires cool–cold winters, despite the fact that its growth is optimum at 27–30°C. However, in some areas without a cool winter, flowering may be stimulated by rain or irrigation following a dry spell. Most flowers blossom in winter or spring. The

Jojoba happenings, if all goes well



plain green female flowers are wind-pollinated and develop into fruits with one to three seeds, which can be harvested in summer.

By detailed study, the scientists have quantified this knowledge. They found that flower buds usually remained dormant at high temperatures (30°C day/25°C night), but signi-

ficantly more flowers opened when the plants were moved to colder conditions. Percentage flowering increased as temperatures were reduced down to 12°/7°C (day/night) for female flowers, or 15°/10°C for males. But, apart from providing environmental factors that produced rapid growth, they could find no way of reducing the time lapse between sowing and appearance of the first flower bud.

Within experimental limits, the oil content of seeds was independent of temperature — no easy way to improve oil yields here. However, an interesting finding was that fruits with smaller seeds also had more seeds and a greater total seed weight per fruit than those with fewer larger seeds. In other words, the best road to improved yields could be to select for a high number of seeds per fruit rather than for high individual seed weight, as is current practice.

Traps for young players

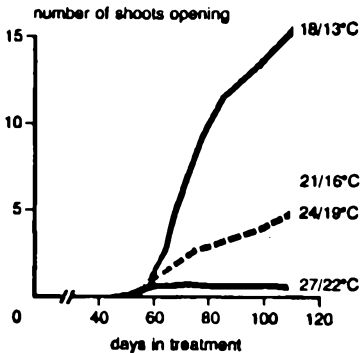
Early attempts to establish plantations in Australia between 1977 and 1980 were mostly unsuccessful. Often growers used fencing that was inadequate to exclude stock, failed to control weeds during establishment, sowed the seeds too deep and in dry soil, or attempted sowing in duplex soils without first ripping through the hard surface pan. Perhaps learning by experience, several have established plantations since 1980 with more success. Plantations exceeding 200 ha in this country probably number less than two dozen but, for economic viability, jojoba-growers need to think in terms of at least 200 ha.

The scientists, after close liaison with growers, recommend that ground preparation fulfil the following basic requirements:

- ▶ following to ensure a moist soil profile at sowing time
- ▶ adequate weed control to give seedlings a good start
- ▶ ripping of the soil, if necessary to allow easy water and root penetration
- ▶ a planting system that allows follow-up machinery to track accurately down the rows (4–5 m between rows)

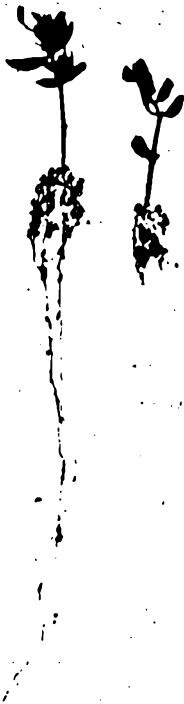
After ripping, tilling with a rotary hoe, and forming a bed, growers either sow seed directly with a precision seeder (depth is critical) or transplant tubed seedlings, previously raised in a glasshouse, into the bed. They should prefer-

Cold breaks flower dormancy



The number of flowers that opened after exposure of female jojoba plants to four different temperature conditions increased with time at low temperatures (especially 18°C day/13°C night), but at higher temperatures (particularly 27/22°C) far fewer flowers had opened by the end of the experiment. Male plants responded similarly, except that low temperatures delayed initial flowering.

Depending on soil-moisture conditions, jojoba cuttings grow either a lengthy tap root or short fibrous roots.



ably sow in spring, when the soil is moist to depth and its temperature exceeds 24°C; at sowing depth (25 mm) for more than 5 hours a day.

Soil conditions for transplanting are less critical, and seedlings in tubes can be planted mechanically and watered at the same time. Survival rates exceeding 90% have been recorded from transplantings. A compromise method employed by some growers overseas is to direct-sow in spring and use tubed seedlings 6–12 months later to replace any unsuccessful sowings.

On present knowledge, the scientists recommend that growers wishing to experiment with jojoba should restrict their plantations to sites with predominantly winter rainfall to minimize root-rot diseases, weed growth, and adverse effects on seed maturation.

Using a computer model known as CROP-EVAL, Mr Henry Nix and Ms June McMahon, of the CSIRO Division of Water and Land Re-

sources, have predicted growth and production of jojoba for a number of climates. They provided the computer with basic physiological data on the response of jojoba to specific environmental factors and the computer obliged with a map of Australia on which areas were rated from 10 down to 1.

Testing of the jojoba model is not yet completed, but at this stage the safest areas for trying jojoba seem to occur west of the Great Dividing Range in New South Wales and southern Queensland, and in the coastal belt of Western Australia between Perth and Geraldton. Rainfall exceeding 400 mm a year and suitable soils of medium texture will improve the chance of good seed-production.

As a commercial crop, jojoba is still in its formative years. Even now, most plantations are still established with seeds originating from wild jojoba plants that may yield poorly and unpredictably. The need to select improved plants is urgent.

Although 'new improved' jojoba lines are emerging on the market, it will be many years before guaranteed domesticated lines are developed. Since the yield from one plant varies greatly from year to year, it must be observed for many seasons just to determine its yield characteristics. Propagation of improved lines by vegetative methods (shoot cuttings or tissue culture) should speed up the process of artificial selection, as these techniques allow many clonal replicates to be propagated and grown simultaneously in field trials. Average yield for the cultivar can then be determined over a much shorter time.

Plants grown from wild seed represent a useful gene bank or store of diverse genetic material — the starting point from which selection for better-adapted cultivars begins. In addition to yield, desirable characters will include synchronous and predictable flowering dates to avoid frost or insect attack and an upright shrub form for ease of machine harvesting and weeding.

Where to from here?

While emphasizing that jojoba is no glamour crop, the CSIRO scientists also believe that it deserves further research as a crop for Australia. It is beautifully adapted to arid conditions, being more resistant to desiccation than the native brigalow, mulga, and spinifex. Good yields have been reported from a small number of rain-fed

jojoba plants in Arizona, which receive similar yearly rainfall (450 mm) to much of the Australian wheat belt.

Seedlings planted at Condobolin, N.S.W., in 1981 tolerated extreme drought coupled with severe frosts and thrived throughout 1982 despite receiving no rain after March of that year, when good rains of 150 mm were recorded. At the same time, wheat crops were practically non-existent due to the harsh drought. It appears that jojoba could tap the water stored deep in the subsoil, whereas the wheat was left high and dry in dusty topsoil.

In view of its drought tolerance, jojoba could possibly slot into wheat-sheep farming operations as a complementary crop — providing auxiliary income in years when the wheat crop fails. As a spin-off, meal produced during oil extraction could, after detoxification, prove a useful protein supplement for sheep.

Jojoba seedlings planted near Condobolin in the spring of 1981 tolerated extreme drought in 1982, whereas wheat crops failed dismally.

No data on seed yield are yet available in this country, as large-scale plantations still comprise only young plants, but overseas experience with unselected material indicates that mature shrubs could yield up to 800–1000 kg per hectare. Productivity should improve with use of selected material. Although jojoba is presently regarded as a valuable commodity with many uses (see the box), the future demand for the product and the likely price it will fetch are impossible to predict.

Apart from the need for rapid genetic improvement of jojoba lines, an important requirement for a flourishing agro-industry will be some agreement between jojoba-growers and oil processors. At present, both groups appear understandably reluctant to invest in the fledgling industry, each waiting for the other side to make the first serious move. That is, there will probably be a market for the product, just as soon as there's a product for the market!

Further reading

Direct seeding of jojoba under dryland conditions in Australia. R.L. Dunstone and J.E. Begg. *Proceedings, 5th International Conference on Jojoba, Tucson, Arizona, 1982* (in press).

Domesticating jojoba. R.L. Dunstone and J.E. Begg. *Australian Natural History*, 1979, 10, 328–35.

The effect of atmospheric humidity on photosynthesis, transpiration and water use efficiency of leaves of several plant species. H.M. Rawson, J.E. Begg, and R.G. Woodward. *Planta*, 1977, 134, 5–10.

Jojoba in Australia: where? H. Nix and J. McMahon. *Proceedings, 1st Australian Jojoba Conference, Agricultural Technologists of Australia, Bathurst, 1979*. 86–98.

Jojoba flower buds: temperature and photoperiod effects in breaking dormancy. R.L. Dunstone. *Australian Journal of Agricultural Research*, 1980, 31, 727–37.

WALNUTS

MR FONTANINI OF MANJIMUP HAS WALNUTS FOR SALE AT \$2.00 per KILO- PICK UP YOUR OWN NUTS.



District Office
80 Railway Parade, MIDLAND 6056
Department of Agriculture — Western Australia
Tel. 2745355

Your Ref
Our Ref 514.10
Enquiries Mr Shorter
Date 18 April 1983
MC

Dear Mrs. Budd

Further to your letter concerning Pistachio budwood and my telephone call on this matter I am able to supply the following information for the attention of your committee and members.

All female budwood distributed last year was collected from the variety planting at Muresk Agricultural College on 10 August 1982. The new season shoot growth cut for budwood represented an excellent budwood source for propagation purposes - buds firm and well formed. Budwood supplied the previous year from CSIRO Merbein had been thin and spindly - no doubt a reflection of the vigour of the trees from which it had been cut.

The only wood requested & supplied last year from the CSIRO was a limited amount of male budwood which is in short supply over here.

All budwood collected and later distributed was stored at Stoneville Research Station in sealed polythene bags in accordance with standard procedures for storing budwood and grafting wax.

The holding of dormant bud or grafting stocks in cool storage when suitably wrapped is again a standard practice and we believe it ensures that the wood is held in the best possible condition from the time of collection to the time of distribution. There should be advantages to the interest of all concerned for us to hold and then distribute wood in this way.

I assure you that it is our wish to be of assistance to your association. I hope that the information outlined above will help clarify the position and avoid any misunderstanding from occurring.

Enclosed are a number of copies of new budwood forms being used for all material supplied from the Stoneville Research Station. Additional copies can be obtained from Stoneville or this office.

If your committee and members would prefer, you could co-ordinate the ordering and distribution for your members supplying us with a composite order. We would then forward the material to you as soon as it is collected.

We therefore await your further advice in this matter.

Yours sincerely

(N.H. Shorter) - HORTICULTURAL ADVISER, OFFICER IN CHARGE

From: Victorian Nutgrower
May 1983

TREE CROPS '84

'GROWING UP'

This is the title for the second Australasian Conference on Tree and Nut Crops to be held in Melbourne from 13th - 16th August 1984.

As one of the hosts the Victorian Nut Growers' Association will be looking for assistance with some aspects of the running of this Conference. We anticipate approximately 400 delegates from Australia and Overseas so it will be well worth attending.

More about this as planning progresses but if you can help let me know.

HAZLENUT PLANTS and WALNUT BUDWOOD

Paul Baxter from H.R.I. (Horticultural Research Institute) Knoxfield, Victoria, (03) 2212233 announces the following planting material is available by contacting him.

HAZELNUTS (Limited to 2 plants per customer)

A) Plants of Atlas*, Cosford*, Halls Giant*, Multiflora, Macro carpa, Blumberger, D18, Kentish Cob*, Gunnslebert, Red Avelline*, Wanliss Pride*, Italian.

Only plants with an asterisk are thought to be of some commercial value, others might be OK as pollinators. We will make a nominal charge of \$2 per plant.

B) Seedlings from selected parents ex Oregon. I am interested in distributing about 4 sets of these to different parts of the country to test their adaptability to wide climatic conditions. There is no charge, but they can only go to good well established growers who will look after them as we may require wood from them later.

WALNUTS

Scion wood for grafting will be available in September from the following cultivators.

AHSLEY (Very limited) - AMIGO (Very limited) - EUREKA -
ESTERHAZY II - FRANQUETTE - GEISENHEIM 26 (Late flowering,
fairly resistant to blight) - GEISENHEIM 139 - SERR - TEHAMA
VINA - LOMPOC. We make a charge of \$1 per budstock.

TREES ON THE MENU

WHEN his colleagues at WAIT turned down an invitation to taste samples of native plants, botanist Byron Lamont did the next best thing—he asked his children.

Matthew (8) and Wesley (6) have nibbled and sipped their way through 25 species of banksia, grevillea and dryandra during the past few months.

They have become experts on the best kind of nuts and nectar for the home garden.

The children's enthusiasm has opened up a new line of research for their father and he is now making a systematic study of bush food.

"It's no reflection on my colleagues, but people are very conservative about food," Dr Lamont said yesterday.

"Children seem to be more open-minded about these things."

He said that the plant with the most potential was the white-flowered prickly plume grevillea from the Murchison.

Its seeds contained a creamy kernel that tasted like a mild almond.

Another Murchison plant, the plume grevillea that extended into the South-West land division, could be a useful sheep food during the hot, dry summers, he said.

"The broad-leaved woody pear, found throughout the South West, also has a chance," Dr Lamont said.

By ALEX HARRIS

"But it's variable. Some kernels are quite edible, others are very bitter. It improves if it's roasted in the oven — then it tastes like roasted peanuts."

"The children especially enjoyed their father's nectar tastings.

The banksias and grevilleas in their Willetton garden proved to be heavy producers, though the flavour varied from sweet to insipid.

Some species, however, were dangerous, laced with naturally occurring cyanide.

THE WEST AUSTRALIAN FRIDAY JULY 8 1983

Note Byron Lamont
undertook this work in
preparation of an invited
paper at ACOTANC-WEST/83,
'Australia proteaceae as
food plants'



Dr Byron Lamont and his sons, Matthew (left) and Wesley, sample a dish of grevillea nuts.

BOOK REVIEW

WESTERN FRUIT BERRIES & NUTS : How to select, grow and enjoy. Robert L Stebbins and Lance Walheim. HP Books, Arizona, 1981. 192 pages. ISBN 0-89586-078-3.

This is one of the best introductions to the practical business of raising tree crops which has been produced in recent years. Written for the 11 western States of the U.S., bounded by Washington in the NW, Montana in the NE, New Mexico in the SE, and California in the SW, it provides a close analogue for growers in Australia from the tropic of Capricorn south, down to and including Tasmania.

HP Books have built up a fine reputation for beautifully produced books on horticulture which are packed with useful information and yet are sold at comparatively low prices. Some readers will know an earlier title in the series, "Citrus", which has been widely commended.

The book uses a system under which the area is divided up into 19 Growing Zones. The climate and character of each zone is described, so Australian readers will be able to match their local conditions with one of these zones. Suppose that the reader finds himself in the equivalent of zone 12, he can look up the nectarine variety 'Goldmine' in the table of 21 nectarines, and find that it is recommended for zones 5 and 7-13. The table also shows that 'Goldmine' is a late harvest type, it originated in New Zealand, has a low chilling requirement, and makes a vigorous, productive tree with a large, white-fleshed, red-skinned fruit of good flavour.

The whole book is packed with useful tables and clear photographs in colour. About two-thirds deals with the individual tree fruits, berries, nuts, and subtropicals; coverage is very wide and good. Other sections deal with Climate and Fruit Behaviour, Planting container and bare-root trees, Pests, Propagating, Pruning, and Growing in small spaces.

This book is strongly recommended. It is a large format book with a soft cover. Apparently the Australian distributors of HP Books thought it was too local in content to sell in Australia, but it has been specially imported by Granny Smith's Bookshop, who are selling it at \$9.95.

David Noel

CONSTITUTION OF THE WEST AUSTRALIAN NUT & TREE CROP ASSOCIATION (Inc)

1. NAME OF ASSOCIATION

The Association shall be named the West Australian Nut & Tree Crop Association (Inc).

2. OBJECTS

- (a) To promote interest in nut and tree crop bearing plants.
- (b) To encourage research into their breeding and culture.
- (c) To disseminate information on their culture and treatment.
- (d) To maintain liason with the W.A. Department of Agriculture, CSIRO, and other bodies or organizations with common or similar interests.
- (e) To organize and promote field days, seminars, lectures, and conferences.
- (f) To promote publications in the Association's area of interest.

3. ELECTION OF OFFICERS

An Annual General Meeting shall be held each year, at which the members of the Association shall elect members of the Executive Committee.

4. EXECUTIVE COMMITTEE

- (a) The Executive Committee shall consist of ten elected members plus the Secretary-Treasurer.
- (b) All Committee Members shall be elected for two years only. Each year five of the members shall retire in rotation, but shall be eligible for re-election.
- (c) At each Annual General Meeting, the members of the Association shall elect persons to fill all vacancies on the Executive Committee from among their numbers.
- (d) At the next meeting of the Executive Committee following the Annual General Meeting, the members shall elect a President and a Vice-President from among their number.
- (e) The Committee shall appoint the Secretary-Treasurer, the Yearbook Editor, and the Newsletter Editor at such times as they deem fit.
- (f) The Committee shall have the power to fill any casual vacancy in their number caused by death, resignation, or removal from office due to absence from three consecutive Committee Meetings without good cause. Such casual members appointed shall hold office only up to the time of the next Annual General Meeting.
- (g) All Office Bearers except the Secretary-Treasurer shall act in an honorary capacity. The Committee shall determine the amount of any honorarium for the Secretary Treasurer from time to time.

5. QUORUM

- (a) At Committee Meetings, four members shall form a quorum.
- (b) At General Meetings, ten members shall form a quorum. If, within fifteen minutes from the time appointed for a meeting, a quorum is not present, the meeting shall be abandoned for official business until a time and place to be determined by the Committee.

6. MEMBERSHIP

- (a) Any person or organization interested in the purposes of this Association may, upon application, be elected to membership.
- (b) Classes of membership shall be: Full Members; Student Members; Honorary Members; and Life Members.
- (c) Fees shall be payable at the time application for membership is made, and thereafter shall be due on January 1 each year. Upon election, a new member shall be entitled to all publications of the Association for the calendar year in which the member is elected.
- (d) Life members shall pay no fees and shall be entitled to all privileges of Full members. They shall be members whose outstanding service in furthering the aims of the Association have earned such recognition. Life members shall bear the unanimous recommendation of the Executive

Committee and the approval of two-thirds of the members present at a General Meeting.

- (e) Only members whose dues have been paid shall be entitled to vote in the elections or meetings of the Association, and only such shall be eligible to hold office.
- (f) The membership of any members may be terminated for cause by a two-thirds vote of the Committee, the accused having been given opportunity for a hearing before action is taken.

7. MEETINGS

- (a) The Annual General Meeting shall be held in the last quarter of each year.
- (b) A Special General Meeting may be summoned by the Executive Committee or may be called upon the written request of twenty or more members. All members must be notified of a Special General Meeting at least fourteen days before the date of such meeting.
- (c) The President shall preside at all meetings of the Association and of the Executive Committee. In the absence of the President, the Vice-President shall assume his duties, and in the event of the Vice-President being absent also, the meeting shall appoint its own Chairman from among those present.

8. FINANCE

- (a) Membership fees shall be determined by the Executive Committee.
- (b) Resignation shall not entitle a member to a refund of fees.
- (c) The Secretary-Treasurer shall keep the financial records of the Association, shall receive and deposit all monies in approved accounts, and shall pay by cheque all accounts authorized by the Committee.
- (d) All cheques issued on behalf of the Association shall be signed by two persons authorized by the Committee.
- (e) The income and property of the Association whencesoever derived shall be applied solely towards the promotion of its objects as set forth in this constitution and no portion thereof shall be paid or transferred directly or indirectly by way of dividend, bonus or otherwise howsoever to its members, provided that nothing herein shall prevent the payment in good faith of remuneration to any officer or servant of the Association for services actually rendered to the Association.

9. COMMON SEAL

The seal of the Association shall be affixed on the authority of a resolution of the Committee in the presence of the members of that Committee. The President shall have custody of the seal.

10. ALTERATION TO THE CONSTITUTION

Notice in writing of any proposed alteration to the Constitution shall be given to the Secretary-Treasurer at least 28 days before the Annual General Meeting. Such notice shall be signed by at least four members. Any alteration approved by a two-thirds majority of members present at the Annual General Meeting shall be placed into effect.

11. AUDITS

An Auditor shall be appointed at the Annual General Meeting. He shall carry out an audit of the books of accounts and vouchers on a yearly basis. The Secretary-Treasurer shall give to the Auditor, at all reasonable times, full access to the Association's books and vouchers and afford him every facility for the purpose of making a true audit of the Association's financial affairs.

12. DISSOLUTION

The Association may be dissolved or wound up by a resolution of any general or extraordinary meeting called for such purpose. In the event of a motion for dissolution being carried, the assets of the Association shall be distributed to the University of Western Australia for horticultural research or as determined by a Judge of the Supreme Court of Western Australia.

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NEWS FROM GRANNY

Granny Smith's Bookshop has moved its office to a new central location, and the office will be open to callers. It is at 257 Adelaide Terrace, Perth (above the R&I Bank) and you can call in and inspect stock between 9.00am and 5.00pm Monday to Friday. The new telephone number is (09) 325 4427 (same as Ken Rawlings & Associates).

BOOKLIST NO. 5

APRIL 1983

(***** denotes new item in this list)

- ABOUT NUTS AND DRIED FRUIT. P.E.Norris (Thorsens, 1974). 63p. Pb. An interesting little 'health food' book which includes a list of unusual nuts, and tables of chemical compositions. \$2.25
- ABOUT TROPICAL FRUITS. Helen Jeans (Thorsens, 1972). 64p. Pb. Descriptions, histories, uses of 13 fruits, from Acerola to Pomegranate. \$2.25.
- ARID LAND PLANT RESOURCES: Proceedings of the International Arid Lands Conference on Plant Resources, Texas, 1979. 724p. Pb. Fortynine papers on exploitation of plants from and in arid areas. Includes papers on jojoba, guayule rubber, salt-tolerant crops, mongongo nuts. Massive source book. \$22.50.
- THE AVOCADO COOKBOOK. Hensley Spain (Wellington Lane, 1977). 146p. Pb. An eye-opener to new ways of serving avocados. \$5.95.
- THE AUSTRALIAN GARDENER'S GUIDE TO GROWING FRUIT. Pax Lindsay. (Reed, 1980). 72p. Pb. A nice little book for the backyard fruit grower, particularly good for recommending varieties. \$4.95.
- BLACK WALNUT FOR PROFIT. Thompson (Oregon, 1976). 285p. Pb. 22 chapters on all aspects of black walnut culture. \$16.40.
- ***** THE CAROB COOKBOOK. L.Whitehead (UK, 1981). Pb. \$2.75.
- A CHECKLIST OF ECONOMIC PLANTS IN AUSTRALIA. W.Hartley (CSIRO, 1979). 214p. Pb. Comprehensive reference work, botanical and common name indexes, pointers to detailed information. \$5.00.
- ***** CHRISTCHURCH 1982; 21 papers from 8th N.Z. Tree Crop Assn. Conference, including walnut propagation, Asian pear, etc. (1982). 84p. Pb. Leaflet available. \$5.95.
- CITRUS: How to Select, Grow, and Enjoy. Ray & Walheim (HP, Arizona, 1980). 176p. Pb. A professional handbook on all aspects of citrus culture. Profusely illustrated in colour. Very good coverage of species and varieties. Recommended. \$9.95.
- COMMONSENSE GARDENING IN AUSTRALIA: organic growing for all gardeners. (Panorama Books, 1982). 104p. Pb. Great new West Australian book, lavishly produced, authoritatively written by 12 experts. Recommended. \$4.95.
- THE COMPLETE BOOK OF FRUIT. Johns & Stevenson. (Angus Robertson, 1979). 309p. Hb. Informative, well-illustrated, comprehensive review of tropical and temperate fruits from all over the World; includes such things as naranjilla, grumichana, woolmi, as well as familiar fruits. Highly recommended. New stocks arrived, still at SPECIAL price of \$9.95.

- DESERT GARDENING. (Sunset, 1974). 96p. Pb. A useful guide from California on growing trees and other plants under arid and saline conditions. \$3.95.
- DRYING AND PROCESSING TREE FRUITS. D.M.McBean (CSIRO, 1976). 20p. Pb. Good practical summary of the topic. Recommended. \$1.00.
- EDIBLE NUTS OF THE WORLD. Edwin Menninger. (1977). 175p. Hb. Profusely illustrated compendium of information gathered from all over the world (including us!) on hundreds of different species of nut plants. Written in a racy, journalistic style, this is not a growers' handbook but rather an unmatched source of interest and enjoyment for the potential developer of new and valuable tree crops. Very highly recommended. \$16.50.
- ***** FANTASTIC TREES. E.Manninger (U.S., 1975). 304p. Hb. Most interesting descriptions of tree species with strange habits - underground fruits, living fossils, bat pollination etc. \$13.95.
- FOCUS ON FARM TREES: Proceedings of a Melbourne Conference. (1980). 149p. Pb. Problems of tree loss and decline in the rural landscape, and solutions to reverse these problems. \$9.00.
- FOOD PLANTS OF THE SOUTH PACIFIC. Massal and Barrau (South Pacific Commission, Noumea, 1956). A well-illustrated review of native and introduced food plants in the Pacific Islands. Information on many nut species is not available elsewhere. Recommended. \$4.00.
- ***** FRUIT GARDENING IN NEW ZEALAND. R. Bellinger (Christchurch, 1981). 120p. Pb. Thorough, well illustrated review of growing over 40 species of fruits and nuts in cooler climates, including subtropicals. Highly recommended. Super value at \$5.95.
- ***** FRUIT GROWING IN WARM CLIMATES. Paxton & Cull (Aust., 1982). 80p. Hb. Good coverage of avocado, litchi, custard apple, macadamia, papaya, and 3 other species. Recommended. \$7.95.
- FRUITS AND BERRIES FOR THE HOME GARDEN. Lewis Hill (Garden Way, 1980). 272p. Pb. A very sensible, useful American handbook on growing and propagating temperate fruits and nuts. \$12.95.
- FRUITS FOR SOUTHERN FLORIDA. Sturrock (Florida, 1980). 190p. Pb. Valuable guide to subtropical fruit culture. Highly recommended. \$8.50.
- ***** GROW THE BEST STRAWBERRIES. Riotta (USA, 1977). 31p. Pb. \$2.50.
- ***** GROWING AND COOKING BERRIES. Cornog (USA, 1980). 144p. Pb. Half on culture, half recipes. \$9.95.
- GROWING FRUIT IN AUSTRALIA. Paul Baxter (Nelson, 1981). 200p. Hb. The professional fruit and nut grower's guide to temperate tree crops, likely to become the standard handbook in Australia. Recommended. \$25.00.
- INTEGRATING AGRICULTURE AND FORESTRY. (CSIRO, 1978). 238p. Pb. Over 40 far-ranging papers from a W.A. conference. \$6.00
- AN INTRODUCTION TO PISTACHIO GROWING IN AUSTRALIA. D.H.Maggs (CSIRO, 1982). 36p. Pb. An excellent summary by the pioneer. Highly recommended. \$3.50.
- ***** JOJOBA HANDBOOK. Paul Thomson. 3rd ed (USA, 1982). 162p. Pb. A must for anyone growing jojoba. \$13.40.
- MACADAMIA POWER IN A NUTSHELL. J.Power (Queensland, 1982). 120p. Pb. Roughly half on macadamia recipes, rest on history, present figures and practices in the industry, e.g. CSR, Hault & Braham, grafting, macadamia trellising etc. \$6.40.
- MANUAL OF TROPICAL AND SUBTROPICAL FRUITS. Wilson Popenoe (USA, 1973). 474p. Hb. Reprinted after 50 years, still the most important source book on tropicals. Highly recommended. \$18.00.
- MAJOR WINE GRAPE VARIETIES OF AUSTRALIA. A.J.Antcliff (CSIRO, 1979). 62p. Pb. About 30 varieties described and illustrated. \$3.50.
- NEW SUNSET WESTERN GARDEN BOOK. (California, 1979). 512p. Pb. Not a glossy coffee-table book, but a real encyclopaedia of information on plant growing in the 7 Western United States, closely comparable to Australia below the tropics. The ONLY general gardening book we sell and recommend. \$11.95.
- ***** NEW ZEALAND KIWI FRUIT COOKBOOK. Bilton (Auckland, 1981). 64p. Pb. \$4.95.
- NUT TREE CULTURE IN NORTH AMERICA. Ed. Richard Jaynes (Northern Nut Growers Assoc., 1979). 466p. Hb. The "Nutgrower's Bible". A handbook compiled by experts, on growing all the temperate nuts (some 20 species). A wealth of invaluable cultural information. Very highly recommended. \$18.00.
- NUTS AND SEEDS, THE NATURAL SNACKS. Joanne Moyer (Rodale, 1973). Pb. A good introduction to growing and using nut and seed plants, with emphasis on health aspects. Tables of nutritional values. \$6.50.
- NUTS FOR THE FOOD GARDENER. Louise Riotta (Garden Way, 1975). 179p. Pb. An excellent introduction to growing and using nuts, written for temperate North America, but applicable to southern Australia. Includes chapters on pecan, butternut, heartnut, the walnuts, chestnut, hazelnuts, almond, hickories, peanut, and pine nut. Highly recommended. \$8.95.

..... THE PEANUT COOKBOOK. Dorothy Frank Potter, 1976). 110p. Hb. A well-presented, hardbound book of peanut recipes (including "Jimmy Carter's favorite"). Would make a nice present. Good value at \$3.95.

***** PERMACULTURE ONE : A Perennial Agriculture for Human Settlements. Mollison & Holmgren (Aust., 1978). 128p. Pb. Bill Mollison is the originator of permaculture, the tree-based method of land use on a self-renewing basis. His sane, practical ideas have found world-wide acceptance. Recommended. \$9.95.

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..... PERSIMMONS FOR EVERYONE. Eugene & Mary Griffith (NAFEX, 1982). 145p. Pb. All about growing and using the various persimmon species. Includes wide range of recipes. Recommended. \$10.75.

..... PLANTS FOR DRY CLIMATES. Duffield & Jones. (HP Books, Arizona, 1981). 176p. Pb. A very well produced book on the subject, coloured photos throughout, good index. Recommended. \$10.50.

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..... SOME TREE FRUITS FOR TROPICAL AUSTRALIA. D.M.Alexander (CSIRO, 1982). 56p. Pb. First-class summary information and colour illustrations of 20 species, from avocado to west indian lime. \$5.00.

..... SOME WINE GRAPE VARIETIES OF AUSTRALIA. A.J.Antcliff (CSIRO, 1976). 50p. Spiral bound. About 24 newer varieties covered. \$2.50.

..... SQUIRREL NUTKIN'S FIRST RECIPE BOOK. (Wansco, 1977). 18p. Pb. Published by the West Australian Nut Supplies Cooperative; when it ran the Squirrel Nutkin store. Now interesting for its adverts -- the list of nuts available includes many now unprocurable. \$0.45.

..... SUCCESSFUL BERRY GROWING. Gene Logsdon (Rodale, 1974). 200p. Pb. Useful American book on 10 commercial species and 20 less common ones. \$6.50.

..... TEXAS PECAN HANDBOOK. McEachern (1982). 275p. Pb. Comprehensive handbook on pecan culture, best currently available. Recommended. \$16.00.

..... TREE CROPS: A Permanent Agriculture. J.Russell Smith (Harper, 1978). 408p. Pb. A fascinating, almost inspirational book, as easy to read as a novel. Written in 1950 by one of the first to realize the global importance of tree crops to food production, land use, and the environment. We would like every legislator to have a copy! Very highly recommended. \$12.95.

..... TREE CROPS: The 3rd Component (Cormacopia, 1982). 232p. Pb. The 32 state-of-the-art papers from the highly successful ACOTANC-1 conference held in Perth in 1982. Recommended. \$22.00.

..... USEFUL & EDIBLE WILD PLANTS OF NORTH AMERICA. C.F.Saunders. (Tutor Press, 1978). 275p. Pb. A facsimile reprint of a famous 1920's book on resource plants. Includes jojoba, asimina, apios, and many obscure or little-known food plants. Many line drawings. Recommended. \$8.75.

..... USEFUL WILD PLANTS IN AUSTRALIA. A.B.& J.W.Cribb. (Fontana, 1982). 269p. Pb. The companion to 'Wild Food', native plants useful for oils, tanning, dyes, gums, timbers, honey, grazing etc. Recommended. Only \$5.95.

***** 101 WAYS OF USING PAWPAWS. Annemie Endt (Auckland, 1981) 115p. Spiral. Invaluable guide, with brief notes on culture, on unexploited Carica species - babaco, toronchi, mountain pawpaw, and chamburo, as well as papaya. Unique and recommended. \$6.00.

***** WESTERN FRUITS, BERRIES, AND NUTS. Walheim & Stebbins (Arizona, 1982) 192p. Pb. Great new book written for the western USA, very similar to southern Australia. First class photos, tables, descriptions. Specially imported by us, not available elsewhere. Highly recommended. \$9.95.

..... WHAT TREE IS THAT? Stirling Macoboy (Ure Smith, 1979). 272p. Hb. A first-class Australian book, emphasis on warm-climate, southern hemisphere trees, many fruit and nut trees included. Packed with colour photos, informative text, plus mini-encyclopedia of 1200 species, good index. Highly recommended. \$18.00.

..... WILD FOOD IN AUSTRALIA. A.B.& J.W.Cribb (Fontana, 1982). 240p. Pb. Important resource book on our edible native plants, includes many fruits and nuts, good illustrations. Highly recommended. Only \$5.95.

..... WILD FRUITS AND NUTS. Eley (U.K., 1976). 72p. Pb. A British book describing over 30 edible species. \$4.95.

..... WILDFLOWERS OF TROPICAL QUEENSLAND. Bill & Betty Hinton (1980). 69p. Pb. Superb colour photos of spectacular N. Queensland natives, includes several fruits rarely described, e.g. Australian cashew, native passionfruit. \$6.00.

***** OUT OF PRINT AND SINGLE COPY LIST *****

- AUSTRALIAN RAIN-Forest TREES. W.D.Francis (AGPS, 1981). 468p. Pb. Government reprint of this major work, first published 1929. Our rainforests are the focus of generation of an extremely rich tree flora. Botanically oriented, photos throughout. Some nut trees described, including bunya, macadamia, candlenut, johnstone river almond. A basic reference work. \$22.50.
- PALMS OF THE WORLD. J.C.McCurrach (Harper, 1980). 290p. Hb. Classic guide to the most important tree crop family of all. New. \$22.00.
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- THE TOXIC PLANTS OF WESTERN AUSTRALIA. Gardner & Bennetts (W.A. Newspapers, 1956). 253p. Hb. The classic work on the subject, now long out of print. new condition. A bargain at \$7.50.
- TREES FOR DARWIN AND NORTHERN AUSTRALIA. D.A.Hearne (AGPS, 1975). 174p. Hb. Good practical guide, includes about 50 tropical fruits and nuts, well illustrated. Recommended. As new. \$8.20.
- THE USE OF TREES AND SHRUBS IN THE DRY COUNTRY OF AUSTRALIA. Norman Hall (Dept. National Development, 1972). 558p. Hb. Monumental work on every aspect of uses and values of over 175 species of trees on dryland farms and other arid areas. Super value at \$12.00.

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23.4.83

Dear Editor,

As many members will know, I have been a member or office-bearer in the following similarly-oriented organisations since their inauguration (or soon thereafter), and still am:-

Permaculture Association of W.A.
Avocado Growers' Association of W.A.
Organic Growers' Association of W.A.
Conservation Farming Society
W.A. Nut and Tree Crop Association
ATACE (Alternative Technology Development Group) W.A.

Before coming to Perth from the Eastern States ten years ago, I was a member of other similar bodies, e.g., Ecology Action.

I am convinced that the work of such groups is vital, especially for the longer term survival of humanity, and my remarks should be read in this context.

To come to the point, I am alarmed at the proliferation of such bodies. A current Conservation Council of W.A. brochure indicates that only one of the above groups of which I am a member is among the 34 shown as being affiliated with the Council, which makes me wonder how many other such groups exist. I am experiencing increasing difficulty in making a worthwhile contribution, much as I would like to sit on committees, attend meetings and field days or contribute articles, I find that I have less and less time for each group and, indeed, also for the groups as a whole, which embarrasses me. I have made this point to a number of members over the years, and know that many agree. (One option would be to resign from some - but which?)

We all know that specialist groups have a role. We also know that individuals join groups for various motives, mostly quite praiseworthy. Nevertheless, I believe that the time is over-ripe for change: many issues are becoming increasingly politicised and ultimately, strength and numbers usually prevail. I, therefore, urge members to consider reviewing their Associations' objectives with a view to reducing overlaps and achieving amalgamations where appropriate.

Paul Sinclair

West Australian Nut & Tree Crop Association

Incorporating the West Australian Nutgrowing Society

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