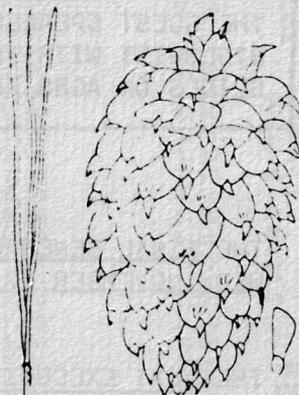
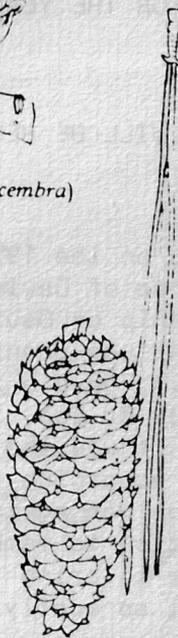


76. Swiss stone pinenut (*Pinus cembra*)77. Coulter pinenut (*Pinus coulteri*)78. Sugar pinenut
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(*Pinus lambertiana*)80. Limber pinenut (*Pinus flexilis*)

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NEXT MEETING

THE NEXT MEETING WILL BE HELD ON WED. AUGUST 18
AT THE NATURALIST'S HALL 63 MERIWA ST. NEDLANDS

THE GUEST SPEAKER WILL BE MR FRANK BATINI, A MICRO-BIOLOGIST WITH THE FORESTRY DEPT. TALKING AND SHOWING SLIDES ON AGRO FORESTRY.

THE FINAL GENERAL MEETING FOR THE YEAR WILL BE HELD ON WED. NOVEMBER 17.

THE NEXT EXECUTIVE MEETING WILL BE HELD TUES. 5 Oct.

At the last general meeting on the 19 may Mr Alex Sas took the chair in the absence of David Noel. He proposed that we confer life membership on David for his role in the conference and agreement was unanimous.

Mr Paul Thompson from U.S.A. gave a talk on Jojoba. The auction was conducted By Mr Sas, in the absence of Wayne Geddes. Mr Sas claims it was the most frightening experience of his life but according to all reports this did not show and the auction was again a great success . Mr Sas has made the suggestion to members that in future auctions it would be better to bring trees that are not dormant as these don't sell as easily.

WHOLESALE PRICES EFFECTIVE FROM
21st JULY 1982

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Prices Subject to Variation

	<u>Outer</u>	<u>C/S Lots</u>	<u>5kg Lots</u>
Almonds Blanched	12.5	5.00	5.50
Almond Kernels	50	4.20	4.40
Almonds Kernels Roasted	15	4.60	4.80
Almond Kernels Roasted & Salted	15kg	4.80	5.00
Almond Kernels Smoke House	11.34	5.60	5.80
Almond Shell	31	2.40	2.50
Almond Slices	11.34	5.00	5.50
Apricots Moist	12.5	6.00	6.50
Black Eyed Beans	25	1.45	1.55
Black peper Asta Quty Whole	25	3.00	3.50
Borlotti Beans	50	1.56	1.70
Brazil Nuts	12.5	2.00	2.20
Brazil Kernels	16	4.60	4.80
Brown Beans	25	1.70	1.85
Caraway Seed Whole	25	3.00	3.30
Cashews Raw	11.34	7.30	7.50
Cashews Roasted	12.5	8.20	8.50
Cashews Roasted & Salted	12.5	8.50	8.80
Celery Seed Whole	25	4.00	4.40
Chick Peas Roasted	25	1.50	1.65
Chick Peas	25	1.65	1.80
Cinnamon	25	2.80	3.00
Coriander Seed	25	1.95	2.40
Cummin Seed Whole	25	3.50	3.80
Dates Chinese Red	12.5	2.00	2.20
Penugreek Whole	25	1.65	1.75
Figs Turkish Dried	14	2.35	2.50
Great Northern Beans	25	1.90	2.10
Hazel Nuts	22.7	2.60	2.70
Hazel Nut Kernels	11.34	5.00	5.50
Hazel Nut Kernels Roast	12.5	5.50	5.80
Kidney Bean Dark Red	25	1.95	2.10
Kidney Bean Light Red	25	1.90	2.00
Lentils Brown	25	1.50	1.60
Lentils Red	25	1.65	1.80
Lima Beans Large	25	2.25	2.40
Macedamian Nuts	50	2.60	2.80
Mexican Pepitatas Raw	25	6.35	6.85
Mung Beans	50	1.40	1.50
Paprika Spanish	25	2.90	3.20
Peanut Kernels Raw Blanched	50	2.40	2.65
Peanut Kernels Raw	50	2.35	2.60
Peanut Kernels Roasted	50	2.60	2.80
Peanut Kernels Roasted & Salted	50	2.80	3.00
Peanut Shell Raw	25	2.00	2.40
Peanut Shell Roasted	25	2.25	2.40
Pearl Barley Whole	25	.85	.95
Pecan Nut Kernels	11.34	7.50	8.00
Pecan Nut Shell	25	2.65	2.80
Pimento Whole	50	3.60	3.85
Pine Kernels	13	8.00	8.20
Pistacchio Nuts	12.5	9.50	9.70
Popping Corn	50	.95	1.05
Poppy Seed	25	1.50	1.80
Prunes Extra Large Seedless	14.5	2.40	2.70
Pumpkin Seed	25	3.00	3.30
Pumpkin Seed Salted	9	4.00	4.30
Sesame Seed	25	2.40	2.60
Split Peas Green	50	1.05	1.15
Split Peas Yellow	50	1.02	1.10
Soya Bean Flower	25	1.00	1.10
Soya Beans	50	1.17	1.30
Sunflower Seed Kernels	15	2.60	2.80
Sunflower Seed Kernels Roasted & S	10	3.60	3.90
Walnut Kernels	11.34	5.80	6.00
Walnut Shell	25	2.35	2.50

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ACOTANC-1

With the tremendous success of ACOTANC 1 this must be the most satisfying year for the society and particularly David Noel, our president and founding member.

It required a great effort and forethought to organize the conference and make it as successful and stimulating as it was. I am sure David has the respect and appreciation of all of us for the part he played. As a small token of our appreciation life membership to the society was bestowed upon David at the last general meeting of the society.

The idea that tree cropping is potentially an extremely viable and ecologically beneficial form of agriculture seems at last to be established in the community. This was shown to a degree by the extensive media interest and some of the public response to this. It is very satisfying to be a part of this society and to see the part it has played in establishing and promoting these ideas.

The conference was very well attended by almost three hundred people from every state in Australia with Queensland and Victoria contributing many delegates, and people attending from both islands of New Zealand

Media coverage was extensive including television, radio and several newspapers. An A.B.C. rural officer covered the conference and regular reports were carried on the A.B.C.'s country hour.

All in all I don't think we could have hoped for or imagined a better result or more encouragement for the future.

Editor.

★ ★ ★

CLIPPING from an English magazine sent in by an anonymous reader tells of a social worker who had been visiting an old gentleman. To show his gratitude, he gave the social worker some lovely white nuts. On a later visit she mentioned how much her family had enjoyed them. He said there were many more in the cupboard, and told her to help herself. She declined his offer, saying that they were too expensive for him to keep giving away. "Oh no," he said, "a friend buys them for me, but without teeth I can only manage to suck the chocolate off."

★ ★ ★

CHEERRIES

Cherries have not been widely grown in Western Australia in the past. Although the catalogues and literature list numerous varieties which are perfectly suitable for domestic use, it is advisable to restrict the selection for commercial plantings to the dark coloured, early to mid season varieties.

When grown with adequate care and attention, cherries will produce satisfactory crops but careful management and planning is essential if the entire crop is to be harvested and marketed.

Climate.

Cherries are traditionally associated with areas of fairly high latitude such as Japan, Southern England and Tasmania. All these regions have colder winters and milder summer conditions than Perth. The hills districts and the southern apple growing areas of the State could be considered potential cherry growing areas. However, soil type, irrigation potential, degree of protection from hot summer winds and local climatic variations would influence the final selection.

In general, mid-season varieties should not be planted beyond the Donnybrook area as increasing competition from imported cherries depresses the market return. A unique situation could exist in the Albany area, where the population density should enable successful disposal of mid and late season cherry crops.

Soil.

Before irrigation was adopted, soil type was extremely important in the successful cultivation of cherries. Deep, well-drained, fertile profiles were recommended, with the provision that moisture retention be adequate to ensure fruit sizing and regular cropping from season to season. The cherry is one of the most sensitive trees to poor drainage. Inadequate drainage results in reduced vigour, which is extremely noticeable as cherry trees tend to be difficult to manage in their early years because of their great vigour.

Under irrigation, the basic soil requirements are related to drainage and depth of exploitable soil. Shallow soils and deep sands are equally unsatisfactory.

CERRIES

The small size of the fruit gives the cherry a large surface area in relation to its volume. This, combined with its thin, delicate skin, results in high water losses through cuticular transpiration. It is therefore particularly important to avoid moisture stress. Most people are familiar with the effects of high temperatures and prolonged exposure to winds in desiccating plums and grapes. Cherries are even more sensitive to this type of injury than either of the above crops.

Irrigation.

Trickle irrigation is ideally suited to cherries as they are exceedingly prone to fungal and bacterial disorders of the trunk, limbs, fruit and foliage. The only drawback with a trickle system is that it cannot be used in minimising frost damage, which may be troublesome in some areas during the crucial bud burst and blossoming periods.

All young trees respond best to individual basin watering which in turn affords a more efficient use of water. As a trickle system virtually duplicates this effect, care must be taken that the quantity and frequency of application do not result in over watering.

Rootstocks.

No nurseries in W.A. propagate cherry trees at present, and trees sold locally come from South Australia, Victoria and New South Wales.

In the nursery, Mahaleb is comparatively disease resistant while Mazzard is considered very susceptible to leaf spot and mildew problems. Field performance suggests that Mazzard is more resistant to the bacterial disorders than Mahaleb and consequently the F 12/1 Mazzard selection is the best choice at present.

Planting distances.

Sweet cherries on the currently available stocks should not be planted closer than 8 metres by 8 metres (25 ft x 25 ft). Closer planting in hedgerows could induce earlier cropping with possible height and disease control problems on the existing vigorous stocks. Interested growers may care to investigate this system on a limited scale.

CHERRIES

Cross Pollination.

Sweet cherries are beset with self incompatibility and cross incompatibility problems that require careful selection and distribution of pollinating varieties to achieve satisfactory cropping.

Fertilisers.

Fertiliser recommendations must take into account differing soil types and allow for past fertiliser practices. Department of Agriculture Bulletin No. 3660, 'Fertiliser Recommendations for Apple Trees', is a useful guide, coupled with the local experience of your district adviser.

High rates of nitrogenous fertilisers applied to the time of fruit ripening will inhibit and delay fruit maturation and reduce the amount of red pigmentation.

This is a heavily edited reprint of an article by S.J.R Newton Horticultural Adviser, supplied by the Dept of Agric. Any one intersted in growing cherries would be advised to obtain a copy of the full article as it contains some finer detail.

CONSERVATION FARMING SOCIETY

- a non-profit organization
for the co-operative buying
and management of large blocks
of farm and bush land.

PUBLIC MEETING

- with talks and displays on
existing projects - afternoon
tea - conversation
(Annual General Meeting of Society)

SUNDAY AFTERNOON

AUGUST 22, 1982, 2pm

at the

W.A. NATURALISTS' CLUB HALL

63 MERIWA STREET

NEDLANDS

ALL WELCOME

For further information ring 386 7105

MEMBERS' CORNER

Membership Drive.

At the last meeting of the Executive Council it was decided to have a Membership Drive. In this issue we have included a membership form which we hope members will use to capture new members. So it's open season on member-recruiting.

Note. Could members please remember to write on the form the current subscription fee of \$15.00. This is important as there has been some confusion in the past with New Members.

Competition.

It was also decided to run a competition for a slogan to be used as advertising on bumper stickers. Please send your witticisms to Lorna Budd, P.O. Box 27, Subiaco. W.A. The prize is a year's free subscription to the Society or two selected nut trees.

Research.

The Society has entered into the field of research. Enlisting the expertise of Chris Newell, a programme aimed at propagating pistachio nut trees through tissue culture has begun.

Plant Diseases Survey.

The CSIRO has contacted the society asking for submissions which they are conducting. If you would like to make any submissions to this please contact Nola Washer on 407 5888, who will be representing the society.

Tropical Black Walnut.

The Society has located a source of tropical black walnut seed in South America.

The two known varieties are: Ju glans Honorei & Neo-Tropicale
We will be importing a quantity of seed and hope to set up trials with the Forestry Department or CSIRO to determine its potential as a nut and timber crop in Australia. It is hoped that some seed will be available for sale to members.

Annual Conference.

Following the success of ACOTANC it is proposed to hold an annual conference beginning in April or May 1983. If you have any suggestions or requests for the agenda please forward them to the secretary Lorna Budd.

Seminar.

A seminar on Tropical Nuts and Fruits in W.A. will be held on Sat. 20 Nov. at the University of W.A., Nedlands.

STOP PRESS

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\$4 TO \$40, DEPENDING. LEAVE YOUR
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BOOK REVIEW

1. AN INTRODUCTION TO PISTACHIO GROWING IN AUSTRALIA. D.H. Maggs (CSIRO, 1982). 36p. Pbk. \$3.50
2. SOME TREE FRUITS FOR TROPICAL AUSTRALIA. D.M. Alexander et al (CSIRO, 1982). 56p. Pbk. \$5.00

Two first-class new booklets have just been issued by the Commonwealth Scientific & Industrial Research Organization. Beautifully produced, with many good colour illustrations, they contain concise summaries of relevant information.

Don Maggs' booklet summarizes the results of his 15 years' work in the introduction of pistachio to Australia. He has been the pioneer in this area. Sections cover pistachio botany, ecology (site preparation), horticulture (propagation), orchard management, harvesting, processing, and utilization. There is also an appendix on chip budding (preferred method for pistachios), and a very useful Further Reading list (including Don's own article in our 1975 WANS Yearbook).

This book is a must for anyone interested in pistachios.

Don Alexander, Don Maggs' colleague at CSIRO Horticultural Research in Merbein Northern Victoria, is the principal author of 'Some Tree Fruits for Tropical Australia'. The booklet starts off with a good introduction featuring five maps showing rainfall and temperature conditions in the northern half of Australia, plus a very useful chart of the maturity times of the 20 or so species considered.

These species include avocado, cashew, carambola, chinese jujube, date palm, durian, guava, jaboticaba, jackfruit, langsat/duku, litchi, longan, mango, mangosteen, pummelo, rambutan, sapodilla, soursop, sweetsop, and west indian lime.

For each species excellent colour photographs of fruits and trees are given, and the accompanying text summarizes botany and origin, growth and fruiting habits, propagation, and uses. Altogether, an excellent introduction to the subject.

Although written specifically for tropical areas of Australia, several of the species described can be grown successfully in warm-temperate climates such as that in Perth. These species include avocado, jujube (quite a hardy species), date palm, guava, litchi, mango, and pummelo. All these are known to have fruited locally. Some of the rest may be successfully introduced as more cold-hardy selections are found.

Both the above are currently available from Granny Smith's Bookshop, PO Box 27, Subiaco WA 6008.

Cornucopia Press

Publishers in Useful Horticulture

PO Box 27, Subiaco, WA 6008, Australia

Phone: (09)-381.7341



----- T R E E C R O P S : THE THIRD COMPONENT -----

The Proceedings of ACOTANC-1, the First Australasian Conference on Tree and Nut Crops, will be published later in 1982 by Cornucopia Press for the West Australian Nut & Tree Crop Association.

The contents will be as follows:

SECTION 1. TREE CROP INDUSTRIES, THEIR PRESENT AND FUTURE

- a) OPENING ADDRESS : Development of Tree Crop Industries - A renewable resource (Sir Charles COURT, KCMG, OBE)
- b) ROLE OF TREE CROPS IN SOME NATIONAL ECONOMIES (John Hyde, MHR)
- c) THE CALIFORNIA EXPERIENCE - Development of tree crops in Southwest U.S.A. (Paul THOMSON)
- d) THE NEW ZEALAND EXPERIENCE : how Government fostered new export and local tree crops (Doug DAVIES)
- e) THE VICTORIAN EXPERIENCE - Development of nut and non-traditional fruit crops (Tony ALLEN)

SECTION 2. THE DEVELOPMENT OF SPECIFIC CROPS

- a) PAWPAWS - Development of seedless and other pawpaws into commercial crops (Dick ENDT)
- b) BLUEBERRIES, GUAVAS, CHINESE GOOSEBERRIES - burgeoning Australian crops for local and export markets (Ridley BELL)
- c) CASHEWS - Australia's potential for a major tropical tree crop (Dr John MILLINGTON)
- d) MANGOES - A commercial variety for Mediterranean climates (Paul THOMSON)
- e) MACADAMIAS - Their possible cultural range (Ted DAVENPORT)
- f) PISTACHIOS AND PECANS - Prospects for commercialization in Western Australia (Neville SHORTER)
- g) WALNUTS - Introduction of new high-yielding varieties from overseas (Tony ALLEN)
- h) HAZELNUTS - Prospects for an Australian industry (Jim COX)
- i) PEIJOAS - Factors in successful commercialization in California (Paul THOMSON)
- j) CHERIMOYAS - Factors in successful cropping in California (Wade CORNELL)
- k) AVOCADOES IN CALIFORNIA - suggestions for West Australian growers (Paul THOMSON)

SECTION 3. TOWARDS MORE RATIONAL LAND USE

- a) MAKING FARM TREES PAY - useful products from environmental tree plantings (Alec HART)
- b) WINDBREAKS - Importance in tree crop production (Hamish DEANS; Doug DAVIES; Dick ENDT; Nola WASHER)
- c) FORAGE TREES - Tree lucerne and other multipurpose leguminous forage trees (Doug DAVIES)
- d) ONE-HIT TREE CROP ESTABLISHMENT - planting jojoba and other tree crops under dry conditions (Milan MIRKOVIC)
- e) THE HONEY LOCUST (Jason ALEXANDRA)
- f) MILLIONS OF TREES FOR FOOD AND ENVIRONMENT CONTROL (Charles PEATY)

SECTION 4. ANCILLARY FACTORS IN TREE CROP PRODUCTION

- a) INTRODUCING NEW TREE CROPS - Impact of quarantine policy and controls (Dr R. IKIN)
- b) ON-LINE COMPUTER INFORMATION on Tree Crops (Julie Maxam)
- c) TISSUE-CULTURE PROPAGATION of nut and tree crops (Dr Jennie McCOMB)
- d) FERTILIZER TRIALS ON NUT TREES in Victoria (Paul BAXTER)
- e) PHYTOPHTHORA - Effect of dieback/rootrot on various crop trees (Dr K. SIVA)

SECTION 5. LOCAL EXPERIENCE

- a) THE TOP END - fruits and nuts in a wet/dry season situation (Bruce TOOHILL)
- b) SOUTH AMERICA - Source of promising new introductions of fruits and nuts (Dick ENDT)
- c) PAPUA NEW GUINEA - Wild and cultivated fruits and nuts (Jon DODD & Dr Andree MILLAR)
- d) NATIVE NUT TREES OF AFGHANISTAN (Mir Frahmand)
- e) NATIVE FRUITS AND NUTS OF THE BRAZILIAN CERRADO - a dry outback area (Russ YODER)

The published price of the Proceedings will be \$A 22.00. Orders will be accepted prior to August 31, 1982, at a special pre-publication price of \$A 15.00. Payment must accompany such orders. The slip below may be used.

To: CORNUCOPIA PRESS, PO Box 27, Subiaco, W.A. 6008, Australia.

Please reserve for me copies of "TREE CROPS - THE THIRD COMPONENT" (Proceedings of the First Australasian Conference on Tree & Nut Crops, Perth, 1982) at the special pre-publication price of \$A 15.00. I understand that this price applies only to paid orders received before August 31, 1982. Payment is enclosed of the sum of \$A.....

When the publications are available, please notify:

NAME:

TELEPHONE NUMBER:

ADDRESS:

(Delivery etc. will be charged for at cost)

THEY'RE JUST NUTTY ABOUT GARDENING

GERALDTON, To-day: Local students are growing peanuts as an experiment.

Horticulture students at the John Willcock High School soon will plant 1000 peanut plants on 0.2 hectares of land adjacent to the school.

The crop should be ready for harvesting in 4½ to five months from planting.

Last year a trial plot of 25 plants survived well and yielded 25 peanuts per plant, indicating that a well-tended crop could prove successful.

Teacher Mr John Hyde said that the experimental plot was given only water. No fertiliser or insecticide was used.

Despite the tough conditions, the plants responded well and suffered little insect attack.

The 45 year Nine and Year-10 students involved in the experiment also have a vegetable garden. They work in pairs during horticulture periods at the school and in their free time during the week and weekends.

The group includes students who have elected to take horticulture, and students termed "at risk" — those with minimal chances of employment.

Mr Hyde hopes that these children will use skills gained in their school garden when they leave school.

Some may join the local tomato-growing industry or go into other areas of horticulture.

He said that the response of the Aboriginal children in his group of enthusiastic young gardeners has been excellent.

The school principal, Mr Alec Scarff, has encouraged the project and allowed school gardener Mr Ken Milovitch to devote some of his time to the project.

Mr Milovitch has had extensive practical horticultural experience.

Mr Hyde said the total cost of the project to date is \$4000, plus countless man-hours from parents, children and staff.

Some funds have come from the Commonwealth Government School-to-Work Transition Fund and from the horticultural branch of the WA Education Department.

The students only pay \$1 each to join the group, which is run as a co-operative. Half of the produce is sold to raise funds, and the rest is given to the students.

Some money has been used to purchase reticulation equipment and the students are now developing skills in this area.

Last year there was a world shortage of peanuts and the price in Australia rose to \$3 a kilo in the shell.

If these conditions continue, the Geraldton growers can be optimistic about their venture into commercial growing.

PINES AS A SOURCE OF EDIBLE NUTS

By Joseph J Havel
Director of research
W.A. Forests Dept.

The interest in trees as a source of food, particularly nuts, is now well established in Western Australia. In addition to the better known nut trees such as walnuts, chestnuts and pecans, pines are also a useful source of small, but very tasty nuts, known as pinons or pignolos.

Pines (genus *Pinus*) are a very large group, containing 90-105 species, depending on whose scheme of classification one accepts. There are still arguments whether some species are only varieties and vice versa. For practical purposes this is of little consequence - what is more relevant is what species or varieties produce edible seeds, and how suitable they are for local conditions.

Basically, the usefulness of pine seeds as a source of food depends on their size, the larger seeds being easier to gather and having large kernels. Taste is also important, in that excessively resinous taste tends to be unpleasant, but in my experience those seeds that are of sufficient size are also pleasantly tasting. The pine seeds range in size from 2 mm in length for the lodgepole pine (*Pinus contorta*) to more than 20mm for the digger pine (*P. sabiniana*) and Torrey pine (*P. torreyana*). Another way of describing the size is in terms of number of seeds per kilogram, the range being from 220,000/kg for lodgepole pine to 1100.kg for Torrey pine.

The difference in the number of seeds one would have to collect and crack is obvious. Less obvious is the proportion of kernel to shell, which also improves with size, as the seeds tend to have a strong, thick coat. Just what the cut-off point is, is hard to say, but any seed less than 15mm long would not be very attractive, and any seed less than 10mm long would not be worth the bother of collecting and cracking it. The species that I propose to discuss are those at the upper end of the range.

As regards suitability for local conditions, two options are open. A field test is obviously the better alternative, particularly if the trial plots cover a wide range of climates and soil conditions. The disadvantage is the length of time needed for this. Fortunately some of the useful species have been fairly adequately tested. Others have been tested inadequately or not at all, and in such a case some indication can be obtained by comparing the local conditions with those under which a particular species grows naturally. This is less reliable than might at first appear, as pines tend to be pioneer species which fill empty spaces and infiltrate disturbed areas, and do not compete well with broad leaf species capable of forming dense stands. For instance, *Pinus radiata* has a very restricted natural range in California, but has proved successful over a very wide range of soils and climates in the southern hemisphere. However where there are no prior trials, an intelligent comparison is better than nothing. In south western Australia, the outstanding environmental characteristics are a strongly seasonal climate with hot, droughty summers and soils of mediocre to poor quality. The latter is significant, as it is unlikely that pines will be planted on best agricultural land except perhaps as windbreaks, but on the other hand fertility is readily improved by application of fertilisers. In any case, pines have a relatively efficient mechanism for picking up scarce nutrients through their association with mycorrhizal fungi, which form absorbent sheaths around their roots. Although it would be possible to compensate for summer drought by irrigation, this is unlikely to be profitable. However, moisture stored in the subsoil can be made to last longer by wider spacing and control of weeds under the pines.

Using the criteria discussed so far, that is the size of seed and the environmental suitability, it is possible to focus on a few significant groups of pines. There is one group of pines which, although possessing seed of suitable size of known commercial value, can be dismissed because they are unlikely to be suited to local conditions. These pines, which resemble each other, occur in cold climates, either at high altitudes or high latitudes, in N. America, Europe and Asia. They are limber pine (*Pinus flexilis*), Swiss stone pine or Zirbe

(*Pinus cembra*), the Siberian stone pine or kedar (*Pinus sibirica*) and the Korean pine (*Pinus koraiensis*). The only one tested here, *Pinus flexilis*, failed even in the relatively moist, cool locations.

The pine that is probably locally best known and tested is the mediterranean stone pine (*Pinus pinea*). Its natural range is somewhat doubtful, as it has been cultivated so long around the Mediterranean Sea, but it is unquestionably well suited to south western Australia. Many magnificent old specimens with broad umbrella shaped crowns occur throughout the metropolitan area and the southwest. A superior Portuguese strain has been imported by the Forests Department 15 years ago as seed and began bearing at an early age (5-6 years). The cone bearing the seed is round, resembling a squat ball 100-120cm in diameter. The seed scales have blunt ends. The cone contains numerous elongated seeds 12-16mm long, covered by sooty black powder and containing long narrow kernels.

The next best known group of useful pines is a group of related but not particularly similar-looking pines from central and southern California - the digger pine (*Pinus sabiniana*), the Torrey pine (*Pinus torreyana*) and Coulter pine (*Pinus coulteri*). All were once an important source of food of the Californian Indians. They not only come from a comparable climate, but have been extensively tested in the south west by the Forests Department over the past half a century. The older plantings date back to between the two World Wars, and are now mature trees, generally taller and better formed than the descriptions from their home range would indicate. The digger pine at the Manjimup arboretum is over 30m tall and of good form. Coulter pine, whilst less vigorous, has shown good form both at Manjimup and Ludlow. Younger plantings at Collie and Nannup, dating to the early seventies, have also given quite good performance, though of course they cannot match the faster growing radiata pine. There is thus no question that they can handle the wetter parts of the south west, but judging from their natural range, they should be also able to grow at least in the western part of the wheatbelt, especially if not planted at close spacing. Unfortunately, this has as yet not been adequately tested.

Digger pine has an upright habit of growth, but the trunk generally forks into two or more vertical main branches. The foliage is very light, almost feathery. The cone is relatively large, 150-250 mm long. The seed scales end with a stout incurved hook. The seeds are large, elongated, over 20mm long, light brown in colour, with a long, narrow kernel.

Coulter pine is less prone to forking, so that the crown tends to be more symmetrical. The foliage is stiffer and more bunched up. The crown is not particularly dense, but more spreading than in the digger pine. The cones are the heaviest of all pine cones, over 250mm long, with vicious curved ends of the cone scales. They could inflict a nasty head wound on falling. The seed is slightly smaller than that of digger pine.

The Torrey pine has a very restricted natural range, of one island and one coastal locality in Southern California. There is a relatively low, crooked, broad crowned tree less than 15m high. In cultivation under good conditions it does better, exceeding 30m in height, with a spreading crown of medium density. However, it has been also successfully grown in California under desert conditions. The cones are 10-15 cm long, chocolate brown. The seeds are the largest of all species, over 20mm long.

The next major group of pines producing edible seeds, the pinons, consist of about seven species from desert ranges in south western USA and adjacent Mexico. They are related and share common factors such as the capacity to grow on droughty sites, large seeds, short trunks and irregularly shaped crowns. They differ chiefly in the number of needles per bundle. There are species with four (Pinus quadrifolia or Parry pinon), three (Pinus cembroides or Mexican pinon) two (Pinus edulis or nut pine) and one (Pinus monophylla or single leaf pine). Little is known about the remaining three rare Mexican species, *Pinus pinceana*, *P. nelsonii* and *P. culminicola*. Because of their small size and poor form they have been largely neglected by foresters in their introduction programmes. There should be little doubt about their capacity to

grow in the wheatbelt. They have been grown in coastal localities in California, even as bonsais in suburban gardens.

The cones are smaller than those of the preceding group and rounded, generally about 5 cm in diameter. The seeds are shorter than in the preceding group, but broader.

The final group comes from Afghanistan, northern India and Pakistan. It consists of two related species, Pinus gerardiana and P. griffithii. They are mountain species reaching into relatively dry climate, and are widely used as a source of edible nuts. As they have been recently described at A.C.O.T.A.N.C. 1, I shall not discuss them further, particularly as little is known about them locally.

There are some points that should perhaps be made about the growing of pines.

Firstly, because the seed coat is thick, there is a tendency for slow and spread-out germination. This can be speeded up by stratification of the seeds, that is by soaking in water for a few hours and then storing them for several months at just above the freezing point.

Secondly, young pine seedlings are prone to fungal attack near ground level, often described as damping off. It can be prevented by sterilization of the soil, dusting of the seed by fungicides and by using well drained soil, such as loamy sand.

For good survival on transplanting, a well developed system of lateral roots, rather than a single tap root, is needed. This is achieved by periodic root pruning, and by using a nursery with a light textured soil, such as sand or loamy sand. Optimum planting time is in June, after good starting rains.

* A.C.O.T.A.N.C.1 was the first Australasian Conference on Tree and Nut Crops, Held at the W.A University in Perth in May 1982.

Editors note. See article in 1975 yearbook W.A. Nut Growing Society 'The Chilgoza Pine, An Important Nut Pine of The Himalayas. By B.N. Gupta and KK Sharma.

Fourthly as the mycorrhizal association is important for efficient nutrient uptake, the nursery soil should be inoculated by suitable fungi. Mixing in some soil from under an established pine stand is generally sufficient.

As soil moisture is generally limiting during south western summers, it is desirable to keep the pines well spaced, and in the initial establishment stage, free of weeds, especially grasses, either by cultivation or careful weedicide application. Wide spacing of more than 6m apart has further advantages in pines bearing edible seeds. It encourages broadening of the crown rather than height growth, stimulates earlier and heavier flowering and facilitates cross pollination. Pines are wind pollinated, and have separate male and female flowers, the male flowers occurring in the lower part of the crown. Unless there is a strong vertical updraft, pollination occurs by lateral drift of pollen from neighbouring trees, rather than self pollination. For the same reason, planting of several individuals rather than single trees is necessary.

Trees grown for seeds are best left unpruned, at least initially, to ensure adequate production of pollen. However, once pollen is produced higher in the crown, lower branches can be pruned to facilitate collection of seeds under the trees. There are two options for collecting seed. One is to wait until the cones open and the seed is shed. This is only efficient if the ground under the pines is either kept clear or covered by a tarpaulin. It is also possible to collect cones by climbing before they open, and extracting the seeds artificially by drying the cones and tumbling them to dislodge the seeds. It is advisable to give the extracted seed additional drying before storage.

West Australian Nut & Tree Crop Association

Incorporating the West Australian Nutgrowing Society

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SOME NOTES FROM THE LAST EXECUTIVE MEETING

At the last meeting we welcomed the new members to the committee. It was decided to hold a membership drive. After some discussion it was decided to fund an attempt to propagate pistachio nut trees by tissue culture. Chris Newell will be engaged for this. The seminar on Tropical Nuts and Fruit in W.A. was discussed and the date set at 20 Nov 1982 at the University of W.A. It was also proposed that the society should hold film nights and several members of the committee are pursuing this.

If any member would like further details they should contact Nola Budd.

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Lorna, Bill, Lorna!