

NEWSLETTER

Quandong

WEST AUSTRALIAN NUT AND TREE CROP ASSOCIATION

ISSN 0312-8989 Vol. 8 No. 1 February 1982

FIRST MEETING FOR 1982 - WEDNESDAY FEB 17

7.30

THE NEW VENUE FOR MEETINGS IN 1982
WILL BE THE NATURALIST'S HALL 63 MERIWA ST.

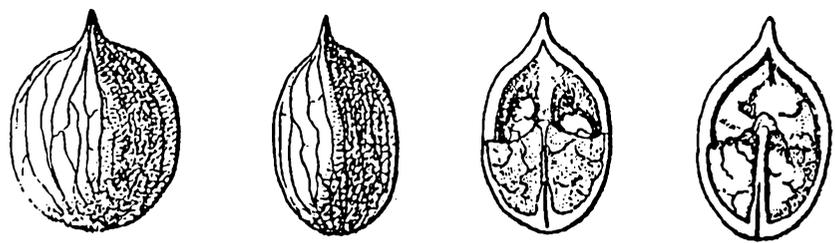
NEDLANDS

The guest speaker will be Mr Alex Hart who will present a talk on 'Trees for forage, honey, cork and other purposes'

During the meeting there will be a repeat of the extremely successful auction held at the last meeting. Check the results on the next page and see if you can afford not to be there!

****Anyone with anything to sell please bring it along****

Also a quick reminder to members that subscriptions for 1982 are now due and prompt payment would be appreciated so please send them in as soon as you can.



Carya cordiformis

'THE GREAT TREE AUCTION'

The auction of trees and nuts held at the end of the last WANATCA meeting was a tremendous (tree-mendous?) success.

Very ably conducted by Wayne Geddes, the auction gave members present an opportunity to acquire unusual or rare plants, often at real bargain prices!

It turned out to be a real fun occasion and will become a permanent feature at our meetings. Those members who brought trees mostly went home beaming, having spent their proceeds on items brought in by others!

Similar auctions in Queensland have sometimes brought very high bids, as much as \$250 for a single plant!

Items sold at our auction included:

Chile hazel (<i>Corylus avellana</i>)	- \$7.00
Shagbark Hickory (<i>Carya Laciniosa</i>)	- \$5.50
Cashew nut	- \$3.00
Cinnamon	- \$4.00
Five corner fruit (<i>Averrhoa carambola</i>)	- \$3.00
Elephant apple (<i>Feronia limonia</i>)	- \$4.00
Banana passionfruit (<i>Passiflora mollissima</i>)	- \$4.00
Kei apple (<i>Dovyalis caffra</i>)	- \$5.00
Grafted chestnut 'Nova'	- \$6.50
Macademia	- \$4.00
Ginkgo	- \$4.50
Grafted avocado 'Rincon'	- \$8.00
'Fuerte'	- \$9.50
'Zutano'	- \$6.00
Grafted pistachio '15-11'	- \$9.00
'15-19'	- \$11.50
Black walnut (6' high)	- \$7.50
Mixed lot of three bags of nuts	- \$4.50

As 80% of the proceeds go to the suppliers, 20% to WANATCA the Association benefited by some \$21.

David Noel

Home-drying of tree fruits

by Doug Kneen, district horticultural officer, Swan Hill, and Albert Heslop, senior viticultural industry officer, Mildura

The advent of the "natural" philosophy in relation to the food we eat has led to great changes in eating habits for many people. One notable result is the increase in the number of people who preserve their own food for later enjoyment. Freezing, bottling and drying of produce have become popular activities that bring the satisfactions of a country life style to many people.

Drying of fruit may seem to be a complicated business, but for housewives, home gardeners and hobbyists there are three straightforward methods. They all require simple equipment and techniques.

Dried sulphured halves

This is the method most commonly used by commercial fruitgrowers when handling apricots, nectarines, peaches and pears. The fruit must be at full eating ripeness to give top quality dried fruit.

Cut each piece in half along the "seam" or suture. Remove the seeds and place each half, cut side upwards, on a wooden tray. Prepare a number of trays in this way and then stack them in a sulphuring chamber with a gap of about 20 mm between trays. A chamber made from a tea chest is illustrated on page 379.

Place powdered sulphur in a suitable container under the front edge of the sulphur chamber. Then light the sulphur. The aim is to keep the sulphur burning as slowly as possible, for 6-8 hours. The sulphur chamber is made airtight, apart from a gap above the sulphur tin, and a very small vent hole on the top of the sulphur chamber at the back. These two

gaps can be varied to control the burning rate of the sulphur.

Once the fruit has been sulphured the trays of halves are spread in the sun until the fruit is dry. In good weather this may take from three to seven days. Fruit is dry when it can be rolled, twisted and squeezed with pressure without any moisture being exuded.

Sulphuring is important for several reasons. Some fruits dry more quickly, retain their light color, have better texture and have more resistance to insect and fungal attack after sulphuring.

When sulphuring, 0.5 kg (1 lb) of burning sulphur will be needed for every three cubic metres (100 cubic feet).

For the tea chest equipment shown, 42 g (1½ oz) will be sufficient sulphur and 8 hours a reasonable burning time.

As it is corrosive, sulphur should be burned in an iron vessel. It is hard to light so a good wick or live coal will help in this respect. The addition of 1-2% sodium nitrate to the sulphur will assist burning.

Naturals

Many people prefer to dry their fruit without the aid of chemicals. This can be done successfully but the fruit color will be darker and the flavor slightly different. Naturals take longer to dry.

After drying, the fruit will continue to darken rapidly unless stored under refrigeration.

Kamaradin

This is an Arabic name for apricot pulp dried in the form of thin sheets. Marked and over-ripe fruit can be used.

The production of kamaradin is basically simple. Collect and wash

the fruit, remove stones and add a few grams of potassium metabisulphite powder. The amount to add is 7 grams per 5 kilograms of fresh fruit (½ oz per 12 lb). A household plastic bucket will just hold about 5 kg of fruit before pulping. Mix to a pulp and spread it on trays for drying. Adding potassium metabisulphite powder is equivalent to "sulphuring" and will keep the light color of the fruit even in the dried product.

Drying will take about a week if the weather is fine. One day in the sun is enough to fix the color; then further drying can be done in sun or shade.

Drying trays can be of wood, sheet-metal or enamelled metal. They are covered with sheets of plastic, onto which the pulped fruit is poured. The strips of pulp can be 15-18 mm (½-¾ inch) thick and 180 mm (6 inches) wide for convenient handling.

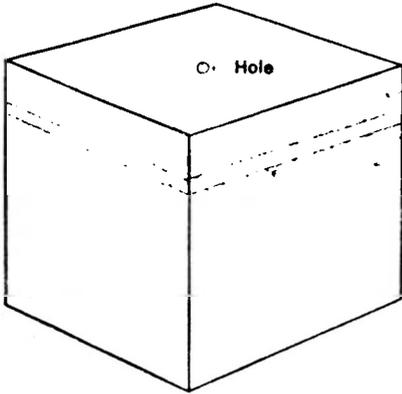
It helps to turn the strips over after about three days to hasten drying. Storage of the material is simple. Roll it up, cut it into short lengths or small pieces and place them in an airtight jar or tin. To store it for a short time a moth-proof bag will do.

If dried fruit moths attack the material when stored, a few drops of ethyl formate (sold as "Erinol") will kill the insects.

A pleasant confectionery can be made from kamaradin by adding ½ kg (1 lb) of white sugar for each 5 kg (12 lb) of pulp, when adding the sodium metabisulphite. The texture will be further improved if the sugar is added and the fruit brought to the boil before adding the metabisulphite, then pulping and drying.

Kamaradin can be made from apricots, plums, pears, peaches and nectarines.

Tea chest sulphuring cabinet



Polythene

Tap edges of polythene wrapping

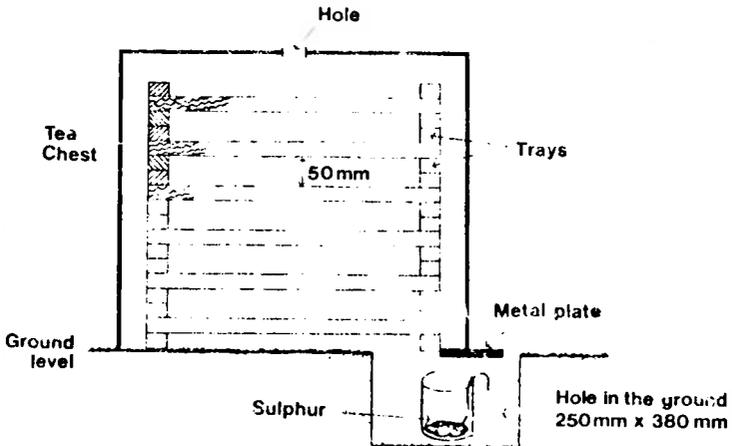
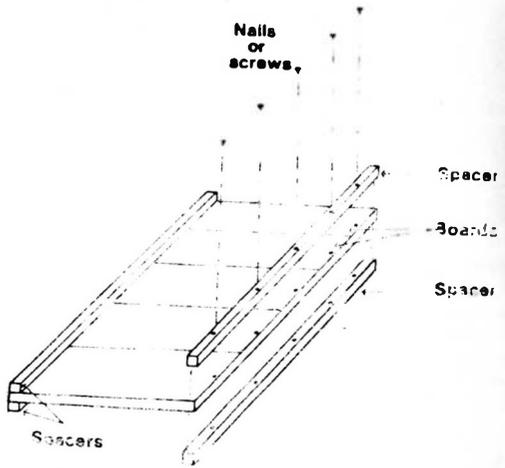
Put chest upside down with open top placed on ground. The polythene cover makes the chest air tight.

Polythene requirement:

500 mm x 920 mm to go over the top
 2040 mm x 540 mm to wrap around the sides and overlap the ends of the polythene that went over the top.
 Seal with a hot iron.
 Make a hole of the diameter in the middle of the chest in the middle.

The trays (6) are:

3 lengths 360 mm x 76 mm x 25 mm for the floor for each tray.
 4 lengths 380 mm x 25 mm x 25 mm for spacers for each tray.
 Lay the 76 mm boards flat together and nail 25 mm x 25 mm spacers over the ends.
 Make six trays.



An aid to getting the sulphur burning

tin

Hessian



Light the hessian wick

Sulphur inside tin

DRYING OF FRUIT

Suitable varieties for drying:	Picking	Sulphuring and dipping	Drying
Apricot Trevatt, Moorpark, Bulla, Tilton, Royal Storey's early, Morocco, Hunter	To be picked at "eating ripeness" stage. Discard over-ripe fruit. For even drying fruit should be size graded before drying	In high temp. and low humidity, sulphur for 4 or 5 hours If cool, cloudy, humid, sulphur for 7-8 hours. If whole apricots are being dried, sulphur for 12-18 hours.	To reduce the occurrence of "white centre" fill the hollow halves with water after sulphuring Drying time is 2½-4 days if sunny. Important to place fruit in boxes for even moisture content after drying.
Peaches Elberta, Blackburn, J.M. Hale, Halehaven varieties Nectarine Goldmine	Harvest when well coloured then keep for 1-2 days to fully ripen.	High temp. low humidity sulphur peaches for 15hrs nectarines for 3hrs. Cool, cloudy, humid conditions sulphur peaches 20hrs, nectarines 12hrs If drying in shade sulphur for 20hrs.	Best results by 2-3 days sun drying then stack trays to allow drying in shade.
Pears Williams' Bon Chretien	Pick when green in colour but mature. Store until ripe (when stalk is easily pulled from flesh)	Sulphur for 24-36hrs until pear halves cannot be lifted from the tray without disintegrating.	For best results sun dry for 1-3 days 'til outside edges darken then stack in shade.

'MEMBERS' CORNER'

Here are the latest nut prices from Wayne Geddes at the Perth Markets:

Pecans	- \$3.30
Walnuts (American polished)	- \$2.50
Walnuts (Indian)	- \$2.00
Almonds	- \$2.60
Pistachio	- \$7.00
Hazel nuts	- \$3.00
Chestnuts	- \$7.00
Macadamia	- \$3.30
Brazil nuts	- \$2.40
Chinese pine kernels	- \$8.50
Peanuts	- \$-

Wayne says these have a sweeter flavour and are better value at this stage.

Unavailable at present.

This is an interesting addition from China Wayne says is selling very well. Perhaps worth considering for local production.

Not available at this stage.
The next consignment of peanuts will be coming from China also. Wake up Joh!
What ever happened to peanut production from KURUMURRA?

Do put away those calculators and water those trees!.

Mrs R. Lofthouse from Dongara writes:

Dear Sir,

Some time ago we contacted your company with intention of joining in the cultivation of nuts in our district. Now we suddenly find ourselves forced by ill health to sell our small farm and retire from the land. We therefore want to thank you for the helpful literature you sent to us at that time, and say, may your Nut Growing Society go on to greater successes. Again, thankyou.

Editor's note:

As the new editor of QUANDONG I would like to thank on behalf of the committee Mrs Bathie Bryant for the effort she put in as the previous editor. She and her husband are now working full time on their property in the South West.

I would really appreciate any feedback from members, particularly any new ideas or suggestions which will benefit readers. If members are interested we will provide a page for advertising in the next issue. So send your advertisements (buying and selling) to P.O. BOX 169 ARMADALE.

Please remember I would like any articles or information of interest to be sent to me at the same address.

If any member wishes to speak to me they can ring me at the A.B.C. Perth on 3260312 where I work as a music programmer in the Sound Library.

Since joining the Association some five years ago my main interests have been the establishment of pecan trees at my property in Armadale and a trial plot of $1\frac{1}{2}$ acres of pistachios at York. I have also been trying to establish chestnuts at Armadale but so far have been beaten by termites.

There have been many setbacks at Armadale, including people placing their stock on the property and water supply problems. Last year however I had my first token crop of pecans, almost enough for a pecan pie!

Bill Napier.

Exotic Fruit Explosion in Northern N.S.W.

Northern N.S.W. is about to become a major fruit and nut producing area. Macadamias, Kiwifruit, Cherimoya, Avocado are just some of the crops involved.

Barry Kafer

Recently completed statistics have confirmed a belief that the Northern NSW coastal strip is set to become a major fruit and nut producing area. Most activity has occurred in the Richmond, Brunswick and Tweed valleys, with a pocket around Coffs Harbour.

Bananas have of course, been grown in substantial quantities for many years, but the significant expansion has been in other exotics to the point of being an explosion of plantings.

Former dairy and beef properties have been subdivided, and developed with potentially highly productive plantations.

Although a few of the long term farmers have recognised the area's potential for fruit and nut production, the majority of the fruitgrowers now are newcomers, and, in many cases, without a previous background in horticulture.

Macadamias and avocados were the early pacesetters and have now been joined by chinese goosberries (Kiwifruit), Lychee, Cherimoya (custard apple), guavas, stone fruit, limes, pecans and to a lesser extent mangos and persimmons. As planting material becomes available, plantings of Longans, carambolas, white sapote, blueberries, feijoas, etc. will increase. Some of the fruits are virtually unknown on the Australian market, except to ethnic groups.

Some of the 1981 planting figures, compared to 1979, indicate a supply surge in 1983/85 and beyond and the market may not be prepared for it,

unless consumer promotion campaigns get under way fairly soon.

Some grower groups have recognised the downstream situation and have begun promotional activity. Much, much more needs to be done.

Macadamias

Syndicated investment activity has been attracted to these new plantings, principally macadamias. Sixty-four new growers entered the industry in 1980/81, and the area now planted is 1,992 ha or 362,920 trees. Quite a few of the earliest plantings have commenced production, and yet more areas are being prepared. As this product commands a good export potential, there is no apparent concern being expressed about over-production. An extensive mix of varieties has been planted and it is probable that some of these will be found to be less than suitable on a number of counts.

A few years ago interest increased in processing guavas with the availability of improved varieties. It looked like being a useful diversification for growers of other fruits. They looked at plantings of one to two hectares. Then syndicated investment moved in and potential small growers were squeezed out with fairly clear indications that the syndicates would control processing. Some market forecasts suggested that an area of 70 ha would suffice to supply a reasonable share of

the Australian juice market. The 1981 planting figure is now 206 ha (146,405 trees). With first production per tree at eighteen months around 54 kg increasing to 90 kg the following season, the industry could be in trouble. Note also that plantings have been made in Queensland and we may be looking at production running up to four times the forecast requirement.

Cherimoya (custard apple) plantings are up 525% on 1979. Plantings in the past twelve months were up 231% on 1980. Seventy-three new growers came in, and we now have 15,812 trees in the ground. The domestic market is really untested as far as this fruit is concerned, and an export market does exist. On maturity, present plantings could produce around eight million fruit. It should be noted that recent Queensland plantings are of the same order as this region.

Kiwifruit

Kiwifruit planting is up 550% on 1979 and now totals 66 ha. Total Australia-wide plantings are 170 ha. Potential production from this area would be three times total imports from New Zealand in 1979/80. Plantings in that country are proceeding apace and although Australia represents a minor part of New Zealand's target market, we do face a supply surge. New Zealand forecasts that they will export (world wide) 15 million trays. In 1981 the figure was expected to be 6 million. In 1976 the figure was 1.4 million. 1990 forecast is 35 million! Two counter factors affecting Australian production are environment and varieties. Some plantings in this country have been in the wrong places. We have also to sort out our variety problems.

Avocado plantings are up 144% in

the last twelve months and now total 124,378 trees. With medication now available for phytophthora cinnamona, production potential has been increased.

Litchi (Lychee) plantings are up from 53 ha in 1979 to 73 in 1981. Current plantings indicate a further substantial increase by 1982. The domestic market for fresh lychee is untried and an export market exists in the northern hemisphere off season. Tall management problems relating to flowering and fruit set are yet to be really overcome, and so it is difficult to foresee an oversupply problem, yet. Real consumer acceptance will come with promotion and proper use of post harvest treatment methods.

Mango plantings have shown a much slower growth, due, in some measure to lack of suitable varieties. More are becoming available and this combined with better anthracnose control is likely to cause an increase in the area planted.

Availability of low-chill peaches and nectarines has created an upsurge in interest, and we now have 22 ha (10,696 trees) planted. This area is likely to double in 1982. The fruit will be on the market early and is not likely to affect the situation of traditional stone fruit areas!

The region now has over 10,000 hectares planted to fruit and nut crops, whilst it is interesting to note that banana plantings increased by less than 1% in the past twelve months. 🌳

Barry Kafer is the President of the Exotic Fruit Growers Association based in northern New South Wales. He can be contacted c/o Rosebank Rd., Rosebank, N.S.W. 2480.

Australian Horticulture, October, 1981

The Unique Response of the Pistachio Tree to Inadequate Winter Chilling¹

Julian C. Crane and Fumiomi Takeda

Department of Pomology, University of California, Davis, CA 95616

Additional index words. *Pistacia vera*, rest period, heterophylly

Abstract. 'Kerman' pistachio trees produced incompletely developed leaflets and leaves with a reduced number of leaflets following the mildest winter in 48 years in California. Nuts were produced both laterally and terminally on current season's shoots in addition to their normal production laterally on 1-year-old wood.

The usual symptoms of insufficient winter chilling to completely break the rest period of deciduous fruit and nut trees are delayed and irregular blooming and foliation (9). Deterioration of flower buds may also occur, and in trees of some species considerable numbers of their buds may abscise during late winter or early spring (2). The mild winter of 1977-78 in California set a 48-year record. There were only 670 hours of temperatures below 7°C (45°F) at Davis, for example, in comparison to the 48-year average of 1,445 hours. There have been only 2 other winter periods during which the total number of hours below 7°C was less than 1,000, 1940-41 with 824 and 1950-51 with 966 hours. New growth of the pistachio (*Pistacia vera* L.) had incompletely developed leaflets, leaves with a reduced number of leaflets, and occasionally a modified fruiting habit in the spring of 1978. Details of these unique phenomena, particularly as occurred in a deciduous tree are reported here. Detailed observations were made on trees growing at the Wolfskill Experimental Orchards, Winters, CA, 14 miles west of Davis. Similar observations were also made in various pistachio orchards throughout the Sacramento and San Joaquin Valleys.

Pistachio is characterized by imparipinnate leaves that, according to Zohary (12), have 1 to 2, sometimes 3, pairs of leaflets. He pointed out, in discussing the genus *Pistacia* in general, that simple

leaves occur very rarely, particularly in *P. vera*. Bailey (1), in contrast, made no mention of simple leaves but indicated that the leaves generally have 1 to 5 pairs of leaflets. Leaves of pistachio cultivars currently being grown in California normally have 5 to 7 leaflets, 1 terminal, and commonly 2, or occasionally 3, lateral pairs (Fig. 1). Documentation of this fact was made in a study in 1970 to determine if 'Kerman' leaflets occupying various positions in the leaf were as satisfactory for mineral analyses as entire leaves (10). Additionally, the 5 leaflets in leaves of 'Bronte' were used to determine the effect of different leaf areas on inflorescence bud drop in 1972 (5). Previous documentation of leaflet number had been made, thus attention was drawn to the abnormalities mentioned above.

The discussion presented here, unless otherwise specified, refers to 'Kerman', which comprises practically all of the commercial pistachio acreage in California. 'Peters' is the principal cultivar used as a pollinizer for 'Kerman'; but occasionally trees of 02-16 and 02-18 are used to supplement 'Peters', particularly for the latter part of the pollination period. The numbered selections are unnamed seedlings grown and selected by USDA personnel from seeds of Russian origin.

Blooming and foliation in the spring of 1978 were delayed about 1 week when compared to the average date, but the delay may have been due to

prevailing ambient temperatures. Both vegetative and flower bud openings were irregular, and the periods over which they occurred were prolonged several days. There was considerable variation in this respect among different portions of individual trees, as well as from one tree to another. The staminate selection 02-16 bloomed so late as to be of doubtful value as a pollinizer for even the last of the 'Kerman' flowers (Fig. 2). Pollen production by many of its inflorescences was extremely poor. Neither floral nor vegetative buds of the pollinizer 02-18 had begun to expand when 'Kerman' was in full bloom about the middle of April (Fig. 2). In fact, some floral and vegetative buds of this selection expanded as late as the first of July. The majority of its inflorescences failed to produce pollen and many buds abscised.

There was a pronounced apical dominance effect on time of floral bud opening and development of the individual inflorescences. The distal most buds were the first to open, their inflorescences were the most vigorous, and they contained the most flowers. Pollen production by the basal inflorescences of 'Peters' was scant, and flowers of basal inflorescences of 'Kerman' were apparently so weak, or so poorly developed as to preclude their setting even if the flowers were pollinated with viable pollen. Consequently, fruit set was poor and a light crop was produced although 1978 was the "on" year of the alternate bearing cycle. These observations corroborate those of Weinberger (11), who noted poor pollen production and germination, and flowers with atrophied styles and stigmas that prevented fruit set in several peach cultivars following a winter of insufficient chilling to break the rest period of their buds.

The most conspicuous and prevalent abnormality resulting from the mild winter was a change in leaf form. Leaves predominantly had 3 leaflets rather than the normal 5 (Fig. 1), and simple leaves were not uncommon (Fig. 4). An occasional leaf had 4 completely developed leaflets (Fig. 3), whereas some had 4 to

5 leaflets, 2 of which were incompletely developed (Fig. 3). The ontogeny of the pistachio leaf has not been studied, but in a typical leaf having 5 leaflets it would appear that development occurs from a primordium which gives rise to 1 terminal and 2 pairs of lateral leaflet primordia. The terminal leaflet and the subterminal pair appear to arise from a common point on the rachis in normal leaves (Fig. 1). The subterminal and basal pairs of leaflets, however, are separated by the rachis that is 3- to 4-cm in length. The predominant leaf form in 1978, as stated previously, was the 3-leaflet type, with a 3- to 4-cm rachis separating the terminal and subterminal leaflets (Fig. 1, center). Leaves with the terminal and subterminal leaflets arising at the same point on the rachis (Fig. 1, right) were uncommon. It appears that it was primarily the subterminal pair of leaflets that failed to develop in most leaves. The interpretation is substantiated by the leaf shown in Fig. 3, left, a typical example of many that were observed. In this case, the lateral leaflet primordia gave rise to 2 basal leaflets, but only 1 subterminal leaflet. A similar situation, but with leaflet development incomplete, is illustrated in Fig. 3, right.

The temperature-induced heterophyly reported here for pistachio appears to be paralleled by several herbaceous species, both terrestrial and aquatic. Leaves of a species of New Zealand buttercup, *Ranunculus hirtus* DC, produced at 10°C, were compound and had 3 separate leaflets; those produced at 20°C were simple and shallowly lobed (6). Virus-infected horseradish, *Armoracia rusticana* P. Gaertn., B. Mey. & Scherb., produced broadly laminate leaves at 28°C, but extremely divided leaves at 16°C (8). A striking example of heterophyly is the marked difference in leaf form between aerial and submerged leaves of the aquatic plant *Ranunculus flabellaris* Raf. Submerged plants of this species produced dissected leaves with numerous narrow lobes, whereas plants grown terrestrially produced expanded leaves with

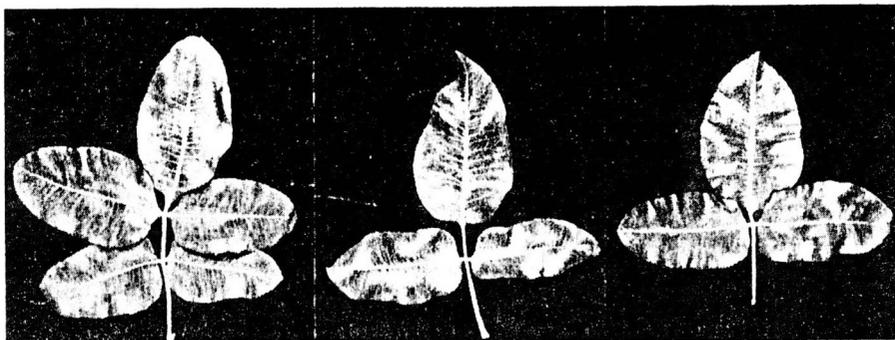


Fig. 1. Left, predominant type of 'Kerman' pistachio leaf produced following adequate winter chilling. Center and right, leaf types produced following the mild winter of 1977-78. Center, leaf in which the subterminal pair of leaflets did not develop; right, leaf in which the basal pair of leaflets did not develop.



Fig. 2. Branches of (left to right) 02-18 (staminate), 02-16 (staminate), 'Peters' (staminate), and 'Kerman' (pistillate) pistachio, April 18, 1978. Note the progressive decrease in size and development of the individual inflorescences from tip to base of the branch.

fewer lobes. Plants grown terrestrially at 16°C, however, produced finely dissected leaves, approaching in form those of submerged plants. At 28°C, the leaves had the characteristic expanded form (3). In further experiments with submerged plants at 28°C, partially expanded leaves were produced that approached the characteristic terrestrial form. Thus, temperature has been shown to have marked effects on leaf form in various herbaceous perennial plants. To our knowledge, the changes in leaf form observed in pistachio following the mild winter of 1977-78, are the first to be described for a deciduous tree. It is recognized that minor differences in leaf form occur naturally in most plant populations and some may be brought about by variation in environmental conditions. Major differences in leaf form sometimes occur in woody perennials as a function of age (juvenile *vs.* adult); but all pistachio trees involved in the observations reported had been vegetatively propagated from buds taken from adult wood and all had been bearing fruits for several years. It is pertinent to point out, however, that the solitary leaves produced on adult shoots following the mild 1977-78 winter were similar to those observed previously on 1-year-old pistachio seedlings (juvenile). A review of the literature dealing with the physiology of leaf growth in general, and the influence of environmental and other factors on leaf form in particular, has not been forthcoming since that of Humphries and Wheeler (7) in 1963.

Another notable response of the pistachio to insufficient chilling was a drastic modification of its bearing habit. Shoot extension begins from terminal buds the latter part of March, and ends the last of April to the middle of May. A leaf at each node subtends 1 axillary bud, most of which differentiate into inflorescence buds (staminate or pistillate, depending upon the sex of the tree) during April, and grow to their ultimate size for the season by the end of June. The inflorescence buds expand the last of the following March and the

panicles of flowers are wind-pollinated during the first 2 weeks of April. Thus, the pistachio bears its fruits laterally on wood produced the previous season.

The occurrence of the type of abnormal fruiting behavior shown in Fig. 4



Fig. 4. Branch of 'Kerman' pistachio with panicles of young nuts borne laterally on 1-year-old wood (normal) and terminally on current wood (abnormal). Note the simple leaves subtending solitary nuts (abnormal).

was spectacular and it indicates the significant role temperature must play in floral bud initiation and differentiation in pistachio. This phenomenon occurred most frequently on shoots on the south sides of the trees. Not only did the current growth terminate in an inflorescence, but occasionally single flowers were produced in the leaf axils where inflorescence buds normally develop. Lateral inflorescence buds were observed to have completed development and set nuts parthenocarpically during the same summer the buds were formed when shoot tips were broken off in a previous study (4). However, neither single flowers in the leaf axils nor terminal inflorescences on current or

1-year-old wood have been observed previously. Both lateral solitary flowers as well as those in the terminal inflorescences set and developed into mature nuts that were normal in all respects (Fig. 4). Thus, with this modification in fruiting habit, crops that normally would require 2 years to be produced were telescoped into 1 year. This, of course, is undesirable, particularly in view of the fact that there were no vegetative buds on the shoots to produce new shoot growth the following year. Consequently, dieback occurred to the nearest dormant vegetative bud or lateral branch.

6. Fisher, F. J. F. 1960. A discussion of leaf morphogenesis in *Ranunculus hirtus*. *N.Z.J. Sci.* 3:685-693.
7. Humphries, E. C. and A. W. Wheeler. 1963. The physiology of leaf growth. *Annu. Rev. Plant Physiol.* 14:385-410.
8. Pound, G. S. 1949. Effect of air temperature on virus concentration and leaf morphology of mosaic-infested horse radish. *J. Agr. Res.* 78:161-170.
9. Samish, R. M. 1954. Dormancy in woody plants. *Annu. Rev. Plant Physiol.* 5:183-204.
10. Uriu, K. and J. C. Crane. 1977. Mineral element changes in pistachio leaves. *J. Amer. Soc. Hort. Sci.* 102:155-158.
11. Weinberger, J. H. 1950. Chilling requirements of peach varieties. *Proc. Amer. Soc. Hort. Sci.* 56:122-128.
12. Zohary, M. 1952. A morphological study of the genus *Pistacia*. *Palestine J. Bot., Jerusalem Series*, 5:187-228.

Literature Cited

1. Bailey, L. H. 1937. *Pistacia*. p. 2648-2650. In *The standard cyclopedia of horticulture*. Vol. III. MacMillan, N.Y.
2. Brown, D. S. 1952. Climate in relation to deciduous fruit production in California. IV. Effect of the mild winter of 1950-51 on deciduous fruits in northern California. *Proc. Amer. Soc. Hort. Sci.* 59:111-118.
3. Bostrack, J. M. and W. F. Millington. 1962. On the determination of leaf form in an aquatic heterophyllous species of *Ranunculus*. *Bul. Torrey Bot. Club* 89: 1-20.
4. Crane, J. C. 1973. Parthenocarpy - A factor contributing to the production of blank pistachios. *HortScience* 8:388-390.
5. ———, J. Al-Shalan and R. M. Carlson. 1973. Abscission of pistachio inflorescence buds as affected by leaf area and number of nuts. *J. Amer. Soc. Hort. Sci.* 98:591-592.

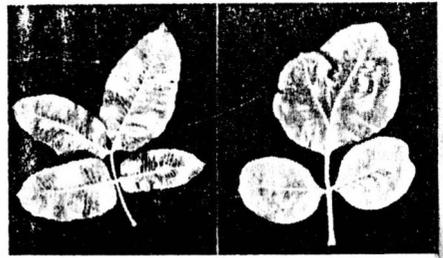


Fig. 3. Atypical 'Kerman' pistachio leaves produced following the mild winter of 1977-78. Left, leaf in which the right subterminal leaflet failed to develop. Right, leaf in which the right subterminal leaflet failed to develop and the terminal and left subterminal leaflets developed incompletely.

"SNIPPETS"

NEW ZEALAND BILATERAL AID PROGRAMME:
TONGA

Banana Extension Specialist/Production Manager

The Tongan Government, with assistance from New Zealand's Bilateral Aid Programme, is implementing in January 1982 a Banana Revitalisation Scheme.

STRETCHING THINGS A BIT FAR

David Noel comments that he has heard of banana-banders, but never banana-stretchers, especially between New Zealand and Tonga! Good to know that the poor bananas may be revitalised afterwards, though.

A local community based employment group has been awarded the Prince of Wales Trophy for its contribution to motivating people to work within its area.

Squirrel Nutkin — a nut shop located in Hay Street Subiaco is also home for the Job Squad.

People interested in working sell packets of nuts door to door.

It is up to the individual how and when he wants to work.

The Job Squad has various unemployed people prepared to do odd jobs, for others with tools shared by the workers.

The trophy, which was awarded to the group recently at

Government House was part of the Queen Elizabeth Silver Jubilee Trust organisation.

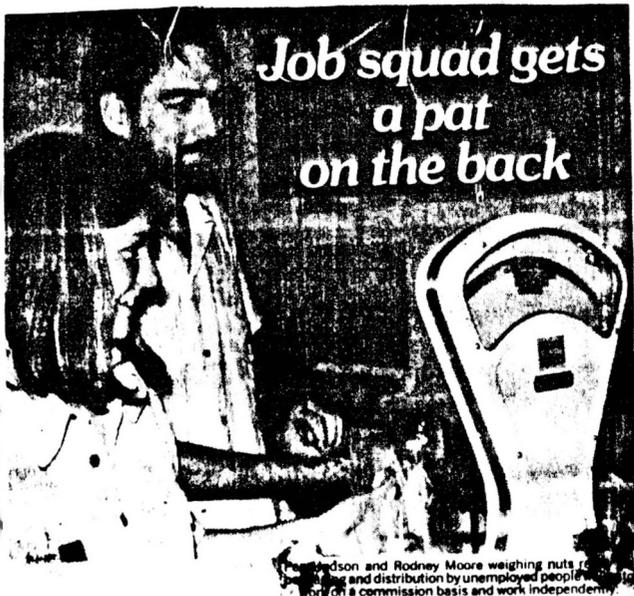
Spokeswoman for the group, Peg Hudson said it was not just the employment factor which should be considered.

She said the people working with Squirrel Nutkin can become an integrated part of the community.

"Being with other people is also important," she said.

"Some people need a groove to fit into..."

Job squad gets a pat on the back



Rodney Moore and Rodney Moore weighing nuts for sale and distribution by unemployed people working on a commission basis and work independently.

The potential for avocados in Western Australia



Commercial production of avocados in Western Australia will depend on creating the right micro-climate and controlling *Phytophthora* root rot.

By M. G. Hawson, Division of Horticulture

"The flesh of the ripe fruit is ivory yellow, framed in a surround of exquisite green. It is soft and buttery with a flavour which is rich, deliciously nutty and delightfully savoury. Sprinkled with salt and pepper is it a delicious sandwich spread. A trace of onion or garlic and a few drops of lemon juice or vinegar bring out the fruit's flavour. The fruit may be spread on biscuits, potato crisps and on fingers of hot buttered toast. It can be served in salads and with hard boiled eggs, cheese, prawns, crabs, lobster, crayfish and cold meats. It combines equally well with hot meals and, diced in soup, it is delicious."

"The fruit has a high caloric, vitamin and mineral content and is claimed to be the most nutritious of all fruits. Because of its high nutritional value and ease of digestion, the fruit is excellent for invalids. It is also highly suitable

for diabetics, who welcome variety in their diets. Indeed, the fruit is so delightful and so easily digested that it can be eaten by everyone at any time and with every meal."

This information has been taken from a fruit wrapper and is followed by the words "Buy it—Try it—and tell your friends".

There is only one fruit to which these comments can apply and that is the avocado.

In Australia, the avocado industry has gradually expanded in northern New South Wales and southern Queensland. While now regarded as a luxury, avocados have met ready demand on major markets indicating that limited expansion of avocado growing in Victoria, South Australia and Western Australia could provide quite profitable returns.

Restraints on a local avocado industry are the expense of establishment, uncertainty of local demand and the risk of the root rot disease, *Phytophthora cinnamomi*.

Phytophthora disease which also causes jarrah dieback, is present throughout the south-west, and particular care should be taken to avoid introducing it when establishing an orchard.

Results with phytophthora control in Queensland and New South Wales are promising, using an "organic" mulch. If this is effective under conditions in W.A., prospects for growing avocados commercially will be greatly enhanced.

Description

The avocado, *Persea americana*, is a member of the laurel family, and a close relative to the common shade tree, camphor laurel. It is native to Mexico, Central America, West Indies and nearby areas, where the fruit was often a major part of the diet of the Indians.

The tree is classified as an evergreen, although some varieties lose their leaves for a short time before flowering.

The canopy of some varieties such as Fuerte, Rincon and Sharwil, is low, dense and spreading. With other varieties the canopy is tall and upright growing to 20 metres high. However, limbs are easily broken by strong winds or heavy crops.

In W.A. trees generally flower in the spring with fruit forming by November. Harvesting spreads from April through to December. However, time of flowering and fruiting depends on where trees are grown and the variety.

Selection of varieties

Varieties with a low spreading habit are recommended as they are easier to harvest and manage and are not so prone to wind damage. An example is Fuerte, which appears to do well locally.

It is advisable to plant varieties from each of two classes. Each class releases and accepts pollen at different times. Details of varieties are available from the Department of Agriculture.

Sources of trees

As the varieties cross-pollinate readily, named varieties should be produced by grafting. Grafted stock is more uniform, so reducing management costs and aiding marketing.

With seedling trees, flowering may be delayed for many years, or when flowering does occur, the flowers may not set fruit.

Local attempts to grow seedlings and then graft trees with recognised varieties have not been particularly successful in producing large numbers of uniform grafted trees.

It is therefore advisable to buy trees from local or Eastern States nurseries which can guarantee freedom from phytophthora. Trees from the Eastern States cost about \$8.00 without freight.

Planting site

A slope facing the north or north-west gives the benefit of any winter sun, and offers some protection from strong winds. While avocado varieties vary in their tolerance to low temperatures and frosts,

young trees are more susceptible than older ones, and a relatively frost-free planting site is recommended.

Soil

The soil preferably should be a fertile sandy-loam high in organic matter, and with a soil reaction slightly acid to alkaline. It should be well drained to about 2 metres, as poor drainage favours root rot diseases. Organic matter and fertility should be built up before trees are planted.

Avocados are very susceptible to salt (both sodium and chloride), and can be damaged by salt drift near the coast. Irrigation water should be of good quality and, preferably less than 400 mg per litre of total soluble salts.

Planting distance

Distance between mature trees may vary from 6 x 7 to 10 x 12 m depending on variety and conditions for growth.

In W.A. due to strong winds and the dry summer, spacing should be reasonably close. Potential growers must decide whether to begin with close spacing and prune as the trees develop or whether to adopt a final spacing accepting lower initial returns and leave the trees more exposed in the early years. Because of the expense of the trees, close spacing increases establishment costs.

Wind breaks

Avocado trees need protection from strong winds as the foliage is soft and the branches brittle. Strong winds reduce pollination, damage flowers, shake fruit from trees and affect market presentation by rubbing.

As most areas of W.A. are affected by strong winds, consideration should be given to planting shelter belts before trees are planted.

Bana grass *Pennisetum purpureum*, which grows 3 to 4 metres high is ideal for protecting young trees. Taller tree shelters may be needed for mature avocados but as some species may harbour the root disease phytophthora, trees selected should be from resistant lines.

Shade

Newly planted trees should be protected from the sun and wind by erecting side and overhead shade during the first nine to 15 months. Steel or wooden posts with shade cloth has been successful but hessian tends to break down in two to four months.

Irrigation

Avocados grow well if the soil is maintained at constant moisture.

Application rates and method of irrigation will depend on the quality and quantity of water, soil type and weather conditions.

On loam soils, trickle irrigation may be used, particularly combined with black plastic mulch.

In the Perth area, provided that soil moisture is kept constant, avocados grow well on deep sandy soils. Small below-canopy sprinklers or microjets are preferred to overhead sprinklers due to dangers of salt accumulation in the foliage leading to leaf burn.

Heavy watering is useful to help overcome the salt problem although it may aggravate root disease problems. In south-west coastal areas, heavy winter rains leach out salts accumulated from summer irrigation.

An accumulation of chloride shows as burning of the tips and edges of older leaves and early leaf drop.

Too much sodium causes burning of leaves between the veins, and dieback of twigs.

Mulches

The disease *Phytophthora cinnamomi* has a devastating effect on avocados but may be suppressed by an organic mulch treatment successfully used in Queensland.

For two years after clearing a rain forest in Queensland and before planting avocados, legume and maize cover crops were grown.

They were disced in, with poultry manure, dolomite (containing lime and magnesium) and superphosphate. The dolomite was applied whenever the acidity of the soil fell to below pH 6.

A similar technique should be used in W.A., using lime instead

of the dolomite, and where necessary adding magnesium sulphate.

When organic matter is difficult to obtain or phytophthora is not a problem, black polythene sheeting may be spread around newly planted avocado plants to help maintain even moisture and control weeds in the developing root zone.

Where the plastic is exposed to the sun, and to reduce heat damage to young developing roots the plastic should be covered with leaves or other vegetation.

In home gardens, well rotted lawn clippings or other organic mulch may be used to prevent the soil drying out.

Diseases and pests

The organic mulch treatment should be used on established trees and before planting, to suppress phytophthora.

Two other diseases which could affect avocado growing in W.A., are black streak disease which occurs in the west coastal districts in the United States, and sunblotch virus. Efforts are being made to identify and eradicate trees affected by sunblotch.

Avocados in W.A. have been relatively free of pests.

Harvesting

After harvest there is a delay before avocado fruit begins to ripen. This delay period is influenced by the time fruit is left hanging on the tree, variety, and temperature when picked and during ripening. Generally it is five to ten days.

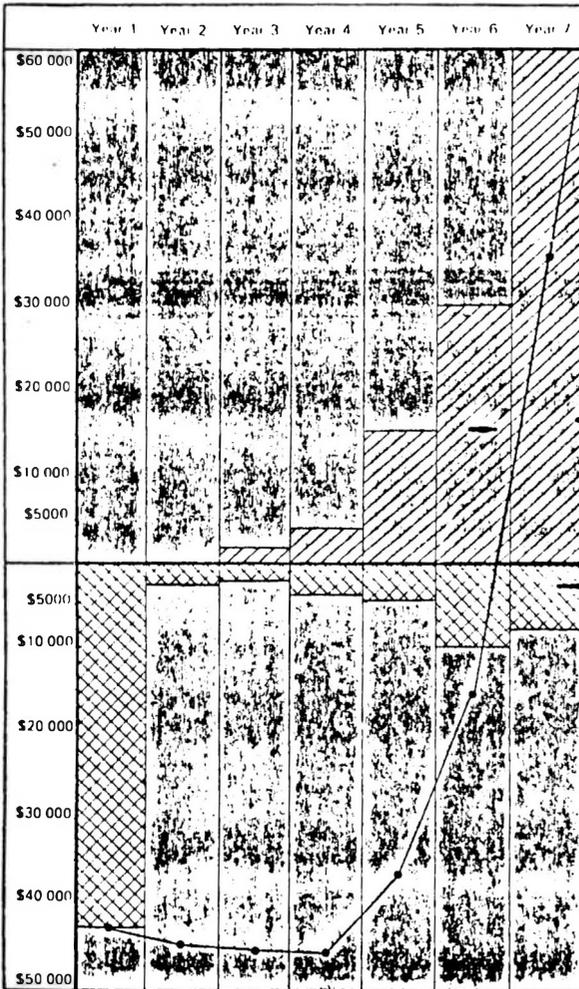
Experience from South Africa indicates that for quality, fruit should be picked in the morning when cool and preferably before temperatures reach 21°C. Care should be taken not to bruise fruit during harvesting and subsequent packing.

Economic potential

The figure indicates the trend of costs and returns likely for a 4 ha avocado orchard of 750 trees on a 10 ha property. Some items such as equipped bores are assumed to have been established already, and used over the full orchard.



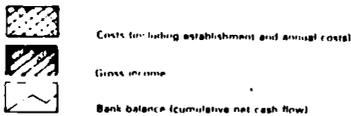
Hessian windbreak around young tree



In full production, individual trees are assumed to yield 10 cartons each (20 fruit per carton), with an overall production of 7 500 cartons a year. Returns are assumed to be \$10 a carton.

Production should continue for 15 to 20 years providing yields are not adversely affected by factors such as root rot, virus or rising salt levels.

The figure thus shows the large expenditure in the first year, and the five to six years before any substantial income from the sale of fruit.



Costs and returns for a 4 ha avocado orchard

RECIPES

PACIFIC COAST TUNA SALAD

(Makes 4 to 6 servings)

$\frac{1}{2}$ cup lime juice
 $\frac{1}{2}$ cup salad or olive oil
1 tsp chopped parsley
1 tsp salt
Dash white pepper
1 medium head lettuce
2 cans (approx 7 oz) solid pack tuna, drained
2 fully ripe avocados, peeled and sliced
2 medium oranges, peeled and sectioned
Chopped filberts

Combine lime juice, oil, parsley, salt and pepper; refrigerate. Line salad bowl with lettuce leaves. Put tuna in centre; arrange avocados and oranges around tuna. Sprinkle with nuts and serve with lime dressing.

From 'A Treasury of Prize Winning Filbert Recipes'

PEANUT BUTTER BISCUITS

4 oz butter
 $\frac{1}{2}$ cup sugar
 $1\frac{1}{2}$ tbsps peanut butter
 $\frac{1}{2}$ cup milk
 $1\frac{1}{2}$ cups S.R. flour
1 tsp vanilla

Cream together butter and sugar until light and fluffy, add peanut butter and vanilla, beat well, stir in milk and sifted flour, mix well. Roll into small balls, place on lightly greased oven trays. Press with fork. Bake in moderate oven 15 minutes.

Makes approx 3 dozen.

From 'The Australian Women's Weekly'.

PO Box 27, Subiaco, WA 6008, Australia

West Australian Nut & Tree Crop Association

Incorporating the West Australian Nutgrowing Society

EXECUTIVE COMMITTEE .

David Noel	President	3817341
Alex Sas	Vice President	3975628
Lorna Budd	Sec/Treasurer	4585918
Wayne Geddes		3213200
Milan Mirkovich		4202026
Nola Washer		4475030
Warren Bouchet		3905311

SOCIETY PUBLICATIONS.

Back numbers of Quandong and the year book are available. The cost of each year book is \$6.00 and the cost of one years set of Quandong is \$2.00.

YEARBOOK EDITOR ~~Mr. David Noel.~~ Lois Evans

QUANDONG EDITOR Mr. Bill Napier. -Ph. 3260312

Notes from the Executive meeting.

Just some points of interest from the last executive meeting.

It was decided to run a free advertising service for members in Quandong. For details see the "Members" page.

Improving the standard and layout of Quandong was discussed and hopefully some of these improvements will be evident in the next issue .

The placing of an article in the West Australian, advertising the society was also discussed . Mr Bouchet will attend to the this .