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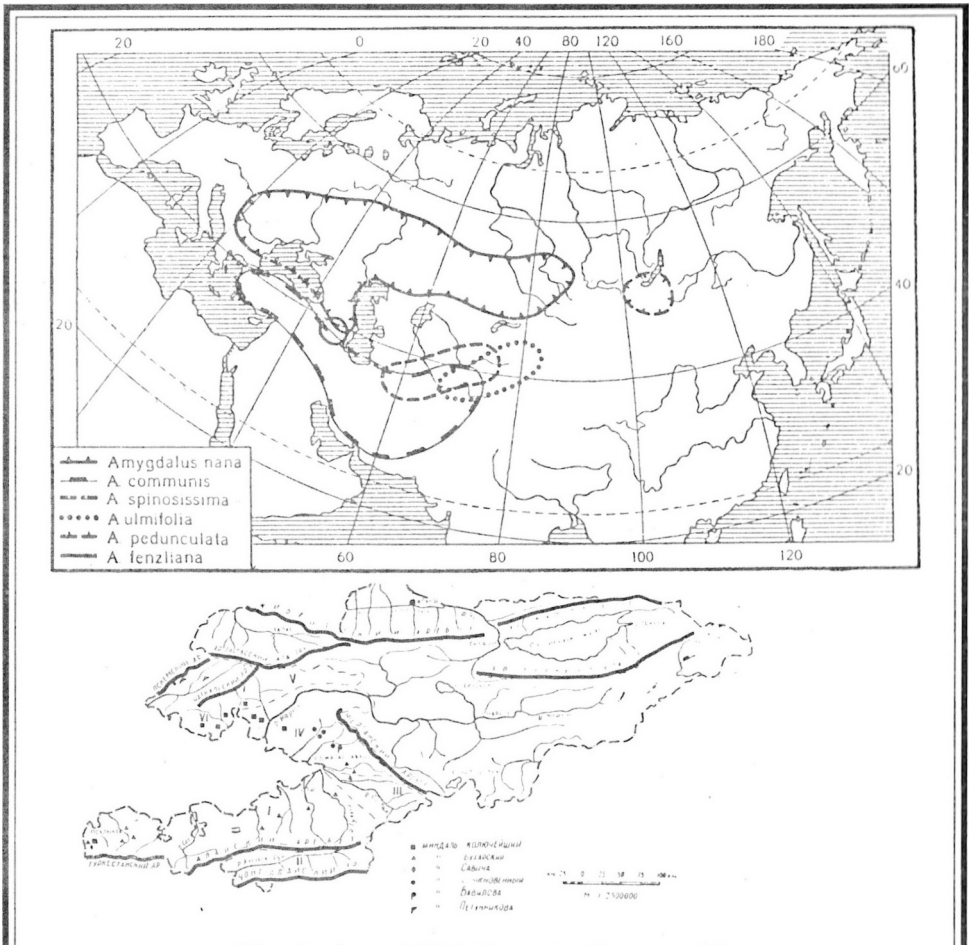

Distributions of Wild Almonds *(ISee page 10)*

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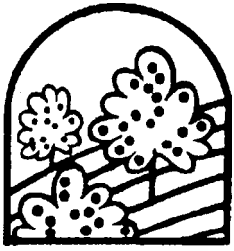

ACOTANC-95
Australasian Conference On Tree And Nut Crops
Lismore, New South Wales, Australia
September 11-15, 1995
PO Box 7091, Lismore Heights, NSW 2480, Australia
Phone: (066)-24 3211 • Fax: (066)-24 1007
Conference Secretary: Merv Richens

ACOTANC-98
Australasian Conference On Tree And Nut Crops
Hawke Bay, New Zealand
1998
c/o New Zealand Tree Crops Association Inc
PO Box 14053, Hamilton, New Zealand
Conference Secretary:

ACOTANC-2001
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Acotanc-95 steaming ahead

Things are really beginning to move in the arrangements for ACOTANC-95, the sixth Conference of the Australasian Council on Tree and Nut Crops. The most important industry-wide conference of its type in the Australasian region, it will take place in Lismore, northern New South Wales, on September 11-15, 1995.

The vital post of Conference Secretary has been awarded to Merv Richens, who is also Secretary of the ACOTANC organization itself.

Merv Richens

Merv brings a wealth of experience and talent to the post — he was very active in the highly successful ACOTANC-88 Conference, also held in Lismore. Although his family has horticultural interests, Merv is not a professional horticulturist, instead he is a businessman, and is known as a Supreme Organizer!

The present Conference will be the first time an ACOTANC has been held twice in the same location, and the first time to be hosted by ACOTANC itself — previous (and future) events will be hosted by Participant Groups.

Already, as a result of the previous issue of *Acotanc Bulletin* and other contacts, more than 30 potential speakers and over 50 papers are under consideration (see panel below).

But these are only the start — we want to have more offers, and we want as many people as possible to attend — please contact ACOTANC-95 now, and alert others yourself, or give us their contact details!

Some potential speakers: *Issa Shehaglio, Tanzania; Prof. Art Schroeder, UCLA; Jean de Muller, USA; Eve Elliot, Florida; Roger Meyer, California; Dr Esteban Herrera, New Mexico; Gale McGranahan, UC Davis; Dr Bobby Tee, Brunei; Prof. M Guangjing, China; Prof. Yosef Mizrahi, Israel; Mariana Fichet-Purnell, South Africa; Stephen Halloy, New Zealand; (Australia)— Dr Vinod Kulkani, Dr E Charko, B & T Pavy, David Simpson, Dr V Vithanage, Dr C A McConochie, Dr Colin Turnbull, Jeff Michael, Dr Graeme Richards, David Brine, Jude Fanton, Bronwyn Anderson, John Slack, Brett Robinson, Elliot Tuckwell, Patti Stacey, John Chamberlain, David Noel.*

Some potential topics: *Wildfruits, Tanzania; Cherimoya; Natal plum; Jujube; Hardy & coloured kiwifruit; Pecan; Potential new tropical nuts; Desert fruits; Cactus fruits; Gevuina nuts; Mango; Tree crop nutrition; Cashew; Lychee; Macadamia; Walnut breeding; Capulin cherry; Organic certification; Avocado; Value-adding for export; S E Asian markets; Genetic diversity; Low-chill stonefruit; Australian native fruits, nuts; Custard apple; Coffee; Farm design.*

APPLES AND PECANS — Thinking about dwarfing rootstocks

Dwarfing rootstocks are a key part of production strategies for many developed horticultural crops. This is because their use can lead to earlier initial fruiting of trees which are smaller and easier to manage.

A typical example is the case of apples. A series of apple rootstocks were developed in Britain at the East Malling and Merton Research Stations, and these or their derivatives are now used worldwide in the apple industry.

When budded, these rootstocks give a fruiting tree of the desired variety which is reckoned to be only a percentage of the size of a typical seedling apple. For example, the new WA-bred variety 'Pink Lady' budded onto MM-111 rootstock typically gives a tree 90% of seedling size.

On MM-104, the size is down to 80-90%, on MM106 it is 60-75%. With M-7, dwarfing achieved is 55-65%, while with Malling-26, a tree only 40-50% the size of a typical seedling is obtained.

Why are dwarfing rootstocks desirable?

Rootstocks are used in growing tree crops for many reasons associated with achieving desired growth characteristics. Given rootstocks may allow a fruiting variety to be grown on soil types, drainage conditions, or temperature, salinity or rainfall regimes which are quite different to those with which the variety would thrive on its own roots. Rootstocks may have resistance to soil-borne diseases or pests.

Generally speaking, rootstocks have little effect on the appearance and characteristics of the fruiting variety budded or grafted on them, so that a 'Pink Lady' apple budded on any apple rootstock will always produce apples which are very obviously 'Pink Lady' fruit. There may be some physiological rootstock influence, for example the skins of citrus fruits may be thicker on some rootstocks, but this influence is not enough to make the resulting fruit obviously different. What rootstocks will do is strongly affect the growth habits and hence yields of the topworked varieties.

Dwarfing rootstocks have the ability to produce a smaller tree, which is not only more manageable (for example, fruit may be picked from the ground instead of a ladder), but is normally much more precocious, so that fruit may appear in the first or second year instead of the fourth or later year of growth. In addition, smaller plants can be packed more per hectare, which can give higher yields per hectare in a new planting.

Dwarfing rootstocks for pecans and newer fruits or nuts

Apples have been cultivated for many hundreds, even thousands of years — the ancient Romans were known to have grafted fruit trees. However, fruits or nuts which are relatively new to commerce, for example the pecan, do not generally have dwarfing rootstocks available. While dwarfing rootstocks have valuable properties, they must first be located, and then vegetatively reproduced for later grafting.

Vegetative reproduction of rootstocks may be quite expensive — difficult techniques such as layering or root cuttings may be needed, if cuttings do not root readily,

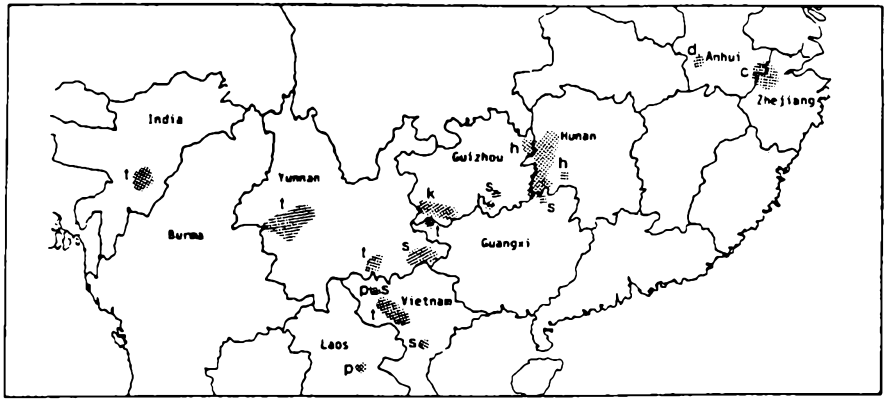

Figure 1. Distribution of *Carya* in Asia. c = *C. cathayensis*, d = *C. dabishanensis*, h = *C. hunanensis*, k = *C. kweichowensis*, p = *C. poilanei*, s = *C. sinensis*, t = *C. tonkinensis*.

as with the pecan. For this reason, most grafted pecan trees sold today have the selected nut variety grafted on seedling rootstock. Often nuts of a particular variety, such as 'Riverside', may be used for rootstock, and the seedlings are then somewhat more uniform than ones grown from any random lot of nuts.

Nevertheless, available of a good dwarfing rootstock for pecans could transform the world pecan industry. Pecans become embarrassingly large in an orchard situation, requiring special spray equipment to reach tree tops, and needing either drastic pruning or extensive tree removal as they mature. Moreover, a good dwarfing rootstock might give earlier fruiting, with a tree coming into production at year 2 or 3, instead of 5 or 6. And there would be similar advantages for most of the other newer fruits and nuts which are still grown as seedlings or on seedling rootstock.

Efforts have been made to find or produce dwarfing rootstocks for nut trees, for example by irradiating nuts to produce mutations and screening the resultant seedlings. Because of the long development time and expense involved, there have been few notable successes.

How do dwarfing rootstocks work?

It may be that better success in locating these rootstocks would be found if we had a clearer idea of how they work, and hence, what characteristics they might need.

Some general principles are more or less accepted. One of these is that plants in which the sap flow to the roots is restricted in some way are likely to fruit earlier. Hence the use of cincturing in grapes and some fruits, or fruit induction by bark cutting or damaging, or bending branches downwards.

The act of budding or grafting does itself produce an imperfect join which has restriction properties. This can be shown by grafting part of a seedling on itself — the grafted branch produced will often fruit before the rest of the plant.

The usual view is that the fruiting wood grafted on is more 'mature' physiologically, and hence better able to produce fruiting buds. It does seem reasonable that the

restriction caused by grafting is able to force the plant more towards fruiting effort rather than growth.

A more important factor is probably the genetic difference between the rootstock and the fruit variety. Every genetic individual produces chemical products and behavioural triggers which are somewhat different from its relatives — that is why different varieties of apple taste differently, taste is a very powerful genetic discriminator. So is smell, which is why a bloodhound can follow the trail of a single individual which crosses the path of thousands of other individuals.

It seems possible, then, that there is a 'software' restriction at the junction of a rootstock and its fruiting top, that is, the interchange of plant substances between the top and bottom which are subtly different in their effects in the two parts. This contrasts with the 'hardware' restriction, that of a physical nature, produced by the grafting process.

Where to look for dwarfing rootstocks

If this reasoning has validity, it does lead to a suggestion of where to look for rootstocks which will have a dwarfing effect. What is required is a certain degree of incompatibility — not enough to make the graft fail, but enough to provide a sufficient restriction, hardware or software, to cause the plant to put more of its resources into fruiting rather than growth.

The place to look for the desired degree of incompatibility is in relatives which are fairly close, but not too close. As an example, the pecan is one of about 25 species of the genus *Carya*, most of which are native to North America. The map shows the positions of natural occurrence of seven relatives of the pecan in south and east Asia. One or more of these species, or some individuals within these species, may bring about the desired degree of incompatibility to achieve dwarfing of pecan when used as a rootstock.

There are existing examples of this effect. For example, when the pear, a *Pyrus* species, is grafted onto quince (*Cydonia*), a strong dwarfing effect is produced. The pear and the quince are far enough apart to be classed in different genera, but close enough so that grafts can be successful.

Now that reasonably accessible facilities are available for DNA analysis of plants, it would be interesting to compare the genetic material in the different dwarfing varieties of apple rootstock, and see whether there is any correlation with the dwarfing ability. Unfortunately, the whole compatibility/ incompatibility balance may be not just a matter of degree of overall genetic difference, but more of differences in specific genes having a major part in plant functioning processes.

Even with the familiar apple, possibilities for future rootstocks are by no means fully investigated. For example, in the last century, in Burma, apples were routinely grafted onto local rootstocks in the genus *Docynia*. Who can guess what interesting effects might be achieved from exploiting this little-known family further, perhaps in warmer-country orchards?

— David Noël

Reference

Graucke, L.J. et al (1991): *Genetic resources of Carya in Vietnam and China.* Northern Nut Growers Assn: Annl Rept/ 82: 80-87.

Australian native fruits, nuts, on trial

ACOTANC Inc is not just concerned with conferences — in the last issue of Acotanc Bulletin an article described the history behind the **Big Scrub Botanic Garden** near Lismore. This garden, located at Summerland House With No Steps (a member of the Wheel Chair Association) is an ACOTANC initiative intended to serve as a Gene Bank for native and exotic species with tree crop potential. Some of the native species already planted are listed here.

Some Australian native fruits and nuts at the Big Scrub Botanic Gardens

No. Plants	Botanical Name	Common Name
3	*Acmena smithii*	Lilly pilly
10	*Amorphospermum whitei*	Rusty plum
19	*Antidesma bunius*	Herbert River cherry
6	*Araucaria bidwillii*	Bunya pine
39	*Athertonia diversifolia*	Atherton Oak
6	*Buchanania arborescens*	Satinwood
34	*Davidsonia pruriens* var. *jerseyana*	Davidsons plum Northern NSW
30	*Davidsonia pruriens* var. *pruriens*	Davidsons plum Northern Qld
2	*Diploglottis berrieana*	Berrie tamarind
1	*Diploglottis bracteata*	Boonjee tamarind
6	*Diploglottis campbellii*	Small leaf tamarind
2	*Diploglottis diphyllostegia*	Northern tamarind
1	*Diploglottis smithii*	Smith tamarind
35	*Eugenia reinwardiana*	Beach cherry
2	*Ficus sp.*	Sandpaper fig (Qld)
3	*Flacourtia sp.*	Cape plum
3	*Garcinia warrenii*	Sour plum
6	*Hicksbeachia pinnatifolia*	Red bopple nut
6	*Planchonella australis*	Black apple
28	*Pleiogynium timorense*	Burdekin plum
10	*Podocarpus dispera*	Plum pine (Qld)
10	*Podocarpus elatus*	Plum pine (NSW)
9	*Rhodomyrtus psidioides*	Native guava
2	*Rubus fraxinifolius*	Native raspberry
20	*Sterculia quadrifida*	Peanut tree
25	*Syzygium australe*	Creek lilly pilly
2	*Syzygium banksii*	Beach cherry
4	*Syzygium fibrosum*	Bamaga satinash
2	*Syzygium johnsonii*	Johnson satinash
28	*Syzygium leuhmanii*	Riberry
10	*Syzygium oleosum*	Blue lilly pilly
10	*Syzygium paniculatum*	Magenta lilly pilly
2	*Syzygium pseudofastisatum*	Claudie satinash
6	*Syzygium suborbiculare*	Lady apple
2	*Syzygium tierneyanum*	River cherry

World nut statistics newly published

The latest issue (April 1994) of *The Cracker*, the international nut trade magazine, contains a valuable 16-page Global Statistical Review.

The review gives world crop production figures for the eight nuts most important in world trade — almonds, hazelnuts, walnuts, pistachios, pecans, cashews, brazils, and macadamias. Within each nut, figures are given for each of the main producing countries, and for the last 5 or 6 production years, from 1988 on.

The number of countries for which detailed figures are given varies according to the nut. Eight are given for almond, 7 for macadamia, walnut, and pistachio, 5 for cashew, 4 for hazel, 3 for brazil and pecan.

The USA is the leading producer for almond, walnut, macadamia, and pecan. Turkey leads for hazel, Iran for pistachio, India for cashew, and Brazil for brazil nut.

Total world production of the eight nuts for the 1993-94 season amounts to about 1,939,000 tonnes, of which some 10,930 t (about half of one percent) were produced in Australia. In order of tonnage produced, Australia's most important nuts were almonds (4700 t), macadamia (3500), pecan (2670), and pistachio (60).

Further tables give almond imports for over 40 countries for 6 years (Australia imported US $7.2 million worth of almonds in 1992), detailed breakdowns of nut imports for the three biggest importers (Germany, Japan, Netherlands), and more detailed figures by country and year for six nuts on hectares bearing, yields/ha, domestic production etc.

Special tables include walnut production in China by province, world coconut production (194,000 t in 1992), US imports of brazil nut, and pistachio consumption in eight countries. No figures are given for peanuts, only for tree nuts.

The Cracker is produced by the International Nut Council (c/ Boule 4, E-43201, Reus, Spain), and the three issues per year cost US $60. This is a useful magazine, although it is concerned principally with trade rather than production methods.

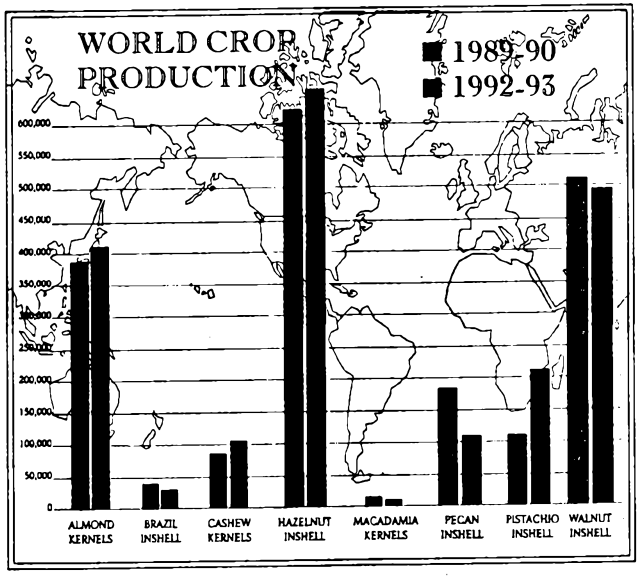

Figure: Total world nut production for 8 leading types (in metric tonnes)

A note on the Statistical Review says that after December 1994, it will not be included in all issues of *The Cracker*, only in those mailed to INC members. This may well be a policy error, as in so many efforts to restrict information — certainly it will make subscriptions to the magazine much less attractive. It also seems a bit underhanded, as most of the statistical information is drawn from public sources anyway.

— David Noël

Out-Zone Report:

The Macadamia in Costa Rica

The following is some information presented at the first Costa Rica National Macadamia Seminar. The statistics presented are for 1992. [AB Ed: some figures in the original are converted from imperial to metric].

There are over 730 farms with an estimated total of 8350 hectares of macadamia nuts in production. Most of the acreage (62%) is located on the Atlantic Coast, with 32% in the northern region and 6% in the south. Farms tend to be larger in the Atlantic region (about 25 ha/farm), than the north (10 ha/farm) and south (2 ha/farm). In comparison, the Hawaii Agricultural Statistical Service, HASS, reported 690 farms in Hawaii with 9000 ha in the 1991-92 crop year.

Costa Rica's macadamia acreage was about 4000 ha in 1986, so over half of the acreage is new planting. However, most of the new acreage is reported to be in marginal areas. According to a survey, 60% of the current acreage is 1 to 6 years old, 20% is 6 to 10 years old, and 11% is over 10 years old. (In Hawaii according to 1988 figures from HASS, 20% were under 5 years old and 31% were 5 to 12 years old. The U.S. International Trade Commission reported 36% being 7 years and younger in 1991.) Thirty percent of the acreage is planted at a density of 165 trees/ha, 60% at 200 trees/ha, and 10% at over 200 trees/ha. The older plantings tend to be lower densities. The high densities of newer plantings is an attempt to boost yield per hectare.

Wet in shell production for 1992 was about 1800 tonnes. About 240 t worth $2.1 million were exported, of which over 200 t of raw and roasted kernels worth $1.6 million came to the US. Production has increased from about 1600 t in 1991, and less than 500 t in 1984. By comparison, gross production for Hawaii was 24,000 t in the 1991-92 crop year.

Recovery rates for Costa Rica are difficult to interpret because of non-standardized moisture contents. However, figures presented showed a decreasing recovery rate over time, with an overall average of 17% several years ago to around 14% today (Hawaii averages about 22% to 25%). Recovery rates vary widely by district, from a low of 10.2% up to nearly 19%. Newer production areas seem to have more problems with recovery rates. (Note: The Costa Ricans and the Hawaiians are measuring from unculled, wet-in-shell to dry kernel.)

The Costa Ricans realize they have problems with recovery rates, and recognize an urgent need to improve quality. Immature kernels, low oil content, stinkbug damage, and rot were identified as major problems leading to low recovery rates. Overall it seems that Hawaiian cultivars do not do especially well in Costa Rica, or at least perform differently than in Hawaii. The U.H. 660 va'riety seems to do best, with the 508 having lots of rot and stinkbug problems. Poor performance was attributed to too much rain (different climatic conditions), but planting in marginal areas also seems to be a con'tributing factor. A data bank has been established in Costa Rica, and research is being conducted to identify/develop varieties for different areas.

Government representatives suggest a program with the theme of improving production to be competitive. Actions include research, technology transfer, replanting of low density areas, using agro-ecological conditions to guide the development of new areas, restructuring the credit system, development of marketing activities, and organizing producers.

My observation is that Costa Rica has not tapped into its tourist market. The high quality product is exported abroad, so the macadamia nuts available domestically are of questionable quality at best. The processed samples I saw, but did not get to taste, seemed to be of excellent quality. They had been density-separated by water, mechanically sized and hand sorted.

— ***Stuart Nakamoto***, University of Hawaii at Manoa

[from Hawaii Grown Tree Crops Journal / Fall 1993, and Calmac News]

Industry Focus:

Almonds in Australasia

The almond-growing industry in Australasia is quite old and well-established. It is also quite small on world standards. However, it appears to have the capability of massive expansion, even to the stage of becoming the leading world producer.

World production and trade in almonds is dominated by the USA and Spain (see figure 1). In 1992-3 the USA produced about 250,000 tonnes of almond kernels, while Spain grew about 72,000 tonnes. All other almond-producing countries came in under 20,000 tonnes — Australia's figure was 4,300 t [Global, 1994].

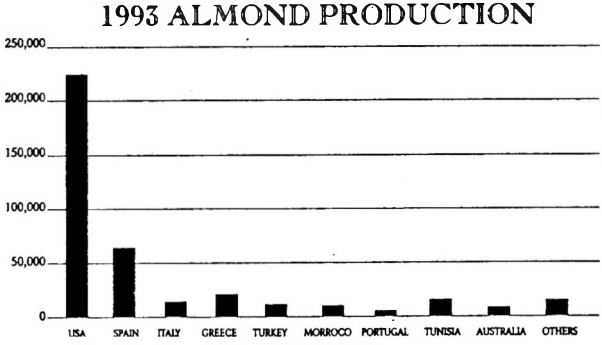

Figure 1. World almond production, 1993 [Global, 1994]

The interesting thing is the production per hectare obtained in these two countries. In the USA, their production was from about 160,000 ha, equal to 1.56 t/ha; for Spain the figures were 600,000 ha and 0.12 t/ha.

What was the reason for this vast difference? All the US production was from California, while most of Spain's production was from its Mediterranean-coast area (Fig. 2). The climates of these areas are not too different, so it was not that. The main difference appears to be in the production approaches used.

The Californian growers have a much higher investment per hectare of orchard. This is in irrigation equipment, mechanization, orchard management and fertilization, pollination (bees), and, last but by no means least, research.

Let us look at each of these, remembering that land in California is much more expensive than that in Spain, and so must be worked much more intensively to earn its keep — this is the bottom line with almond yields per hectare. Then we can look at how these factors might transfer to Australia.

Irrigation. Virtually the whole of Californian production is irrigated, while most of the Spanish production not only relies on natural rainfall, but is also sited in naturally 'dry' country, regarded as unsuited to more productive crops. Almonds are a crop which are probably better suited to irrigation rather than equivalent rainfall, as flowering and leaf growth are disadvantaged by the humid conditions occurring with rain.

Mechanization. Californian orchards are highly mechanized, while Spanish almond trees are often just one feature in a mixed family smallholding without much equipment at all.

Orchard Management. In California the almond orchards are intensively managed, with great attention paid to insect control, pruning, and fertilizer and trace element requirements. In Spain the trees tend to fend for themselves and produce what they can.

Pollination. According to Traynor [1993], almonds require a set of 30-60% of all blossoms for a bumper crop, while a 5-10% set is all that is needed for most orchard crops. For this reason, no commercial almond grower in California would consider operating without factoring beehive hire into their budget. From the other side, almond pollination hire is the major income source for Californian beekeepers, and they chase this business. Pollination in Spain is mostly left to nature.

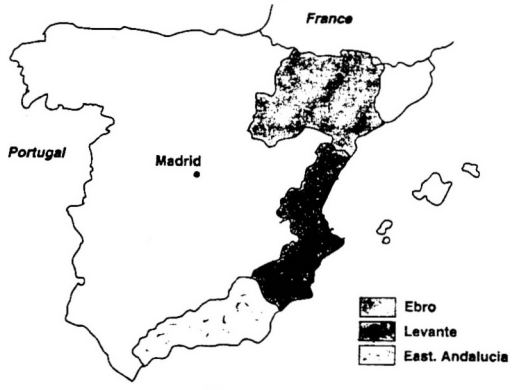

Fig. 2. Major almond growing areas of Spain [Murua, 1993]

Research. Although research on almonds does take place in Spain, far more effort is put in in the USA, not only by government organizations, but also by universities, individual growers, and grower organizations. The Americans operate naturally under a 'research ethic' where every grower tries to work out ways to do things better — and make more money! The investment in this area is diffuse and not easy to quantify, but is undoubtedly huge.

Relative world changes

It seems undeniable that it is this concentration of investment, in both operations and research, which has put the Californians at the top of the almond business. But they have not always been there.

Right up to 25 years ago, in the late 1960s, Italy was the world's major almond producer. In 1960 California had about 45,000 ha under almonds, and in 1969, the largest almond orchard in the world was a 250 ha planting at Fresno, California. By 1990, California had over 172,000 ha in almonds, with more than 30 orchards over 500 ha and one over 4000 ha.

To attain this leading position, the Californians have had to learn not only to grow well, but also to sell well. They now totally dominate world trade — over 80% of almonds sold on world markets are grown in California. In fact Alston [1993] has pointed out that the market responses of the almond trade are such that US growers can make more money from their crop by restricting their exports and selling more at home. While such market manipulation may be perfectly legitimate, he points out that the long-term effect of such actions may be to encourage non-US growers to step up their production.

Back in Australasia

What then are the prospects for building up a massive almond industry in Australia? When the factors operating in the existing large almond-producing countries are considered, they look very favourable.

Figure 3 shows potential almond producing areas for Australia, on the basis of

an industry run on similar lines to California. The map shows two types of area, one in which almonds should grow under natural rainfall, the other where rainfall would have to be supplemented by irrigation.

Obviously these potential areas are huge, covering almost half the continent. Southeast Australia, Tasmania, and New Zealand are not prospective because of spring frost or generally high humidity during the summer. But everywhere else which experiences a fair amount of chilling in winter and to which water is available naturally or through irrigation can be considered.

When compared with existing growing countries, the areas marked do not seem unreasonable. Australia's 1993 production of 4,300 tonnes is much lower than the 17,500 t in Turkey, the 16,000 t in Tunisia, or even the 8,200 t in Morocco, not generally thought of as a nut producer. In Western Australia, a commercial almond orchard exists at Northampton, around 28 degrees latitude, the same as Morocco. In other continents, this latitude corresponds to Ensenada in Baja California, Mexico, or to Kuwait in the Middle East.

Land prices in most of the areas marked are much lower than in Spain, and far, far lower than equivalent land in California. Even so, it would probably be a mistake to repeat the Spanish experience and try to grow almonds under natural rainfall, even where the rainfall makes this possible.

The keys to a successful major almond industry in Australia are probably twofold. The first concerns control of water, the second industry structure.

Water

Australia is rightly thought of as a dry continent—although, it has been pointed out, the water available per head of population is much greater than it is in the USA. Also, the potential for making use of natural rainfall is much greater in an area like the West Australian wheatbelt than it is in California.

In California, with its extensive mountains and limited flatlands, most rain falls in the mountains and must be brought by irrigation canal or pipeline from huge public dams to the dry valley sites. In the low-relief WA wheatbelt lands, rainfall can be carefully harvested on a grower's own property with networks of banks and small dams.

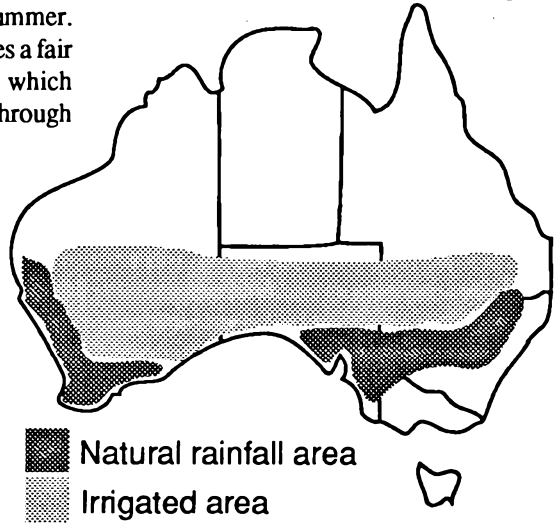

Fig.3. Potential almond production areas of Australia

Effective rainfall can easily be multiplied to any desired degree simply by allocating the use of this stored water. If a 100-hectare property in a 400 mm rainfall zone collects all the rainfall over the whole area and uses it on a 50-hectare almond orchard, that orchard thinks it is getting the 800 mm/year it requires! Although this is an unfamiliar concept for Australian farmers, not one which can be used with conventional field crops, it

has actually been used for centuries in places such as north Africa.

Industry Structure

To duplicate the Californian industry success, most of the same investment, research, training, pollination, farm equipment, cooperative handling and processing plant factors would apply.

These costs are major, however even here, Australia has some notable advantages, such as lower land costs. Another big plus is the fact that Australia is free of major bee pests, tracheal and varroa mites, which beset all commercial US beekeepers.

These mites can be controlled, but the inspection and treatment needed is expensive and has a major effect on beekeeping economics in California, resulting in higher charges to almond growers.

Incidentally, Canadian bees are still mite-free, and could be brought into California for almond pollination (but not sent back). There is a possible opportunity here for Australian beekeeepers to supply hives or queens to California.

Politically and strategically, perhaps the easiest way to build a major almond industry in Australia might be to encourage Californian growers to take up joint-venture operations here, when they would bring their own expertise and capital with them. This would be a very cheap way for Australia to get the industry structure needed.

Beyond California

Everything so far has been about the almond industry as it grew up and currently exists. There are possibilities beyond this.

As I have pointed out previously [Noël, 1985], the genes which form the basis of commercial almond industries have travelled a long way round the world from their original centre of origin in Central Asia. At each stage of these travels, the genes have been put through a sieve, as it were, to select characteristics such as cold-hardiness, fruitfulness, and good kernel size and flavour.

The result is a gene pool which must be considered effete and limited in its ability to grow under extreme conditions. There are possibilities for going back to the almond's origins to pick up all manner of useful genetically-based characteristics.

On the cover of this issue of *ACOTANC Bulletin* are shown two maps. The top one [from Bakhteev] shows the natural distribution of six species of almonds in Asia. Our familiar almond was bred from *Amygdalus communis*, which the map shows as a southern species, in the same latitudes as modern commercial producers.

The lower map shows the distributions of six almond species, mostly different to those on the upper map, in the mountainous country of Kirgizia, formerly one of the republics of the USSR. From all these species, extending from the frozen tundra of Siberia down to the deserts of the Persian Gulf, genes could be taken to create almonds able to grow under a much wider range of conditions than the almond we know today.

— David Noël

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The New Zealand Scene

The dramatic and far-reaching changes in the infrastructure of New Zealand horticultural industries have continued — some might say they have reached the ultimate.

DSIR, the New Zealand Government's former Department of Scientific and Industrial Research, has disappeared completely. Even NZ Telecom has no refer-on number left for them.

Some of its functions have been taken up by various new Crown Research Institutes set up by the Government, such as the Horticulture & Food Research Institute of New Zealand Ltd. These, however, are very business-oriented, fee-earning companies, mostly concerned with short-term specific investigations. What fundamental research is left appears to be mostly in the funds-starved universities.

The old MAF, the Ministry of Agriculture & Fisheries, continues, and does offer some extension services. But even these are now on a fee-for-service basis.

New Zealand's extensive horticultural industries, while not exactly thriving, do seem to have come through the worst, and have expectations and hopes of improving business. Whether these hopes will be realized without any basic research base remains to be seen.

Ultimately, relief of this situation may come from the other side of the Tasman Sea, from Australia. AIDAB, the Australian International Development Assistance Bureau, have recently published eligibility criteria for firms tendering for AIDAB-supported projects.

In this it is interesting that, for example, a "Team Leader must be an Australian or New Zealand Citizen or permanent resident, and have relevant qualifications recognized in Australia or New Zealand". The description specifically notes that "the inclusion of New Zealand is required to fulfil Australia's obligations under the Government Preference Agreement and the Closer Economic Relations Trade Agreement".

The latter agreement, CER, is slowly improving the effective integration of many aspects of New-Zealand/Australia services and facilities. Interchange of capital and population has few present restrictions, though this was also true under the old British Empire. Perhaps one day, West Australians will be able to source nursery stock from New Zealand without the application of 'international-level' quarantine!

The Western Australian Government does not seem concerned that most horticultural research in Australia takes place in Queensland or New South Wales. Perhaps it does not matter, as long as we all communicate. And perhaps New Zealand can make do with sharing Australia's basic research, with the same proviso.

— David Noël

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[Countryman / March 31, 1994]

$2m program will identify new crops

The University of Queensland Gatton College will lead a $2.25 milllon research program over the next five years to identify new, commercially-viable crops.

The project — funded by the Rural Industries Research and Development Corporation and the Grains Research and Development Corporation — will also involve the CSIRO, Queensland Department of Primary Industries and New South Wales Agriculture Department.

Dr Rob Fletcher, a plant breeder at Gatton's plant production department, said the program would benefit the agricultural and food industries as well as Australian farmers.

He had compiled a list of 4236 potential new crops—including beverages, cereals, drug plants, medicinal and pesticide crops—as the first step in the program.

Dr Fletcher said the research team had come up with an innovative market-driven approach to evaluate and select those crops with the best economic prospects and to help foster their commercial development.

— John Logan

New ATCROS due in November

The new 1994-95 Edition of ATCROS, the Australasian Tree Crops Sourcebook, is due for publication in November 1994. Deadline for inclusion is August 31.

The first edition of ATCROS, published in 1991, was described in the last edition of *Acotanc Bulletin*. The new edition will be an updated and enhanced version of the first.

All the wealth of data it contains is included in series of tables. These include information on all sorts of fruits, nuts, and other tree crops, and branch and membership information for leading Australasian tree crop organizations. There is also a comprehensive Directory of suppliers of plants, information, organizations and services within Australasia, and a selection of relevant contacts outside it.

ATCROS a major ACOTANC benefit

Availability of ATCROS for members of Full Participants in ACOTANC is one of the most valuable benefits.

The new edition of ATCROS will be published at $10.00 per copy, but Full Participants in ACOTANC can place a pre-publication order for copies of ATCROS for each of their members at only **$2.50** per copy.

The ATCROS Directory Tables are the principal reference source for people looking for supplies of trees, plants, publications, consulting services, and educational courses relating to tree crops. Members of ACOTANC Full Participants can claim to have their entries in bold type.

Further details and conditions on special ATCROS facilities for ACOTANC Full Participants can be obtained by contacting the Acotanc Permanent Secretariat at the Tree Crops Centre (see page 2).

ENTRIES IN ATCROS ARE FREE.
Make sure you are not left out — contact ATCROS at the Tree Crops Centre before August 31. PO Box 27, WA 6008; Fax 09-385 1612; O/seas +61-9-385 1612

Book Reviews

Listing of Potential New Crops for Australia. ***R.J. Fletcher.*** Published by Gatton College, University of Queensland, 1993. 222 pages, paperback. *$25.00.

This valuable book is the first public product to emerge from a major research project being carried out to identify and exploit 'new' crops for Australia, the vast majority being tree crops or other perennial plants.

Working with a RIRDC grant (from the Federal Government's Rural Industries Research and Development Corporation), Dr Rob Fletcher is working to the following objectives:

• To identify new crops with good prospects for commercial development, by conducting the necessary research and development;

• To investigate their commercial potential, and by taking appropriate action, to foster their commercial development.

Clearly this is a massive undertaking which could encompass the world. Dr Fletcher's first move in tackling it has been to put together a database of all the potential crops which he could assemble from the literature and industry sources. The listing reviewed is the first edition of the printout from this database.

There are two parts. The first is in alphabetical order by botanical name. This has 4591 entries, of which a few percent are synonyms. The total of distinct entries appears to be 4236.

After each species are listed its crop type or types, and its common names. The crop types, of which there are 27, are given abbreviations — *bev* for beverage sources, *gum* for gums, *n* for nuts, *sp* for spices, herbs and condiments, *resin* for resin sources, and so on through to *wind* for windbreak crops.

The second listing is the first one re-sorted by crop type. This does provide a means of looking for new crops according to their intended use. However it only includes species for which the crop type is the first listed, other uses cannot be found.

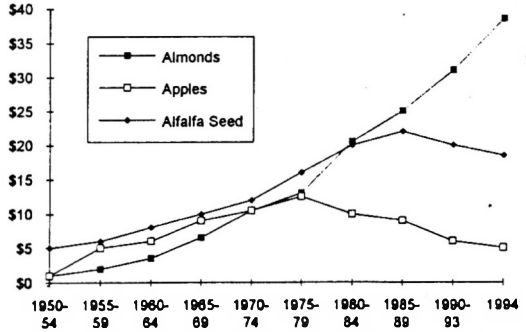
As an example, about 150 species are listed for which their nuts are the principal crop. This is by no means comprehensive — the *botanical names of nuts* table in ATCROS lists over 900, although admittedly this includes synonyms and species where nuts are not the principal product. There is no listing under common names.

This is a very laudable first effort which will have considerable value as a first reference, to look up uses for particular species, or to find which species produce a particular type of crop. The title is actually fairly irrelevant, since the listing includes many crops already grown in Australia, and as Australia has such a wide range of growing conditions, almost any crop could be grown somewhere in the country. Conversely, the list would be useful elsewhere in the world.

We can look forward to future expanded editions — Dr Fletcher's aim is "to seek response from interested parties re the identification of any potential new crop species not yet included". No doubt the database being created will also be used to produce other listings in the future, and for those who can't wait, the database itself is available on IBM format disc as a text file.

Almond Pollination Handbook: for almond growers and for beekeepers. ***Joe Traynor.*** Published by Kovak Books, California, 1993. 86 pages, paperback. *$18.45.

Pollination Fees for Three California Crops, 1950-94



Source: File data, Scientific Ag Co., Bakersfield, CA

This interesting and thought-provoking little book goes far beyond what might be expected from the title. Not that it wanders, but its perceptive analysis of the real factors affecting California almond growers and beekeepers, now and in the past, is sociological as well as agronomic.

Traynor shows that Californian almond growers and beekeepers are locked into a tight symbiosis with effects which reverberate throughout the US West Coast agricultural community. As an example, almond growers are effectively subsidizing both local alfalfa seed producers and Washington apple growers up the coast. In winter the Montana beekeepers, instead of hibernating their bees, now send them to California to work in the sun as part of a circular tour, passing on to Pacific Northwest traditional fruit growers.

This symbiosis is based on a distinctive feature of almond pollination — these trees need a set of 30-60% of blossoms for a bumper crop, while most orchard crops need only 5-10% set.

The overt subject matter of the book is dealt with very competently and in detail. The first section, *For Almond Growers*, covers orchard design for pollination, and includes good tables of pollen compatibility variety groups and bloom dates. Extensive practical information is given on renting bees, on pollination management, and bee removal. Some consideration is given to other factors affecting nut set, self-pollinating almond varieties, other insect pollinators, and importing bees from Canada.

The second section, *For Beekeepers*, comprehensively covers the whole field from the other point of view — even such things as the impact of California state income tax on out-of-state based apiarists.

Finally, Traynor looks at the long-range future of California's almond industry (excellent), and suggests that the Central Valley, where all the almond plantings are located, will see a gradual shift of orchards from the west to the centre, because of water-supply limitations.

This book is well produced and illustrated and is highly recommended.

Strategies for Growth in Australian Horticulture. Horticultural Task Force, Canberra, 1994. 118 pages, paperback. *$8.00§.

Winning the Race: International Competitiveness in Australian Horticulture. Horticultural Policy Council, Canberra, 1994. 48 pages, paperback. *$8.00§

Yet another couple of reports have been issued to help in the transformation of Australia's horticulture towards the efficient, quality-conscious, export-oriented culture which has been displayed on the board as our future objective.

Both of these reports are presentations made to Senator Bob Collins, Australia's Minister for Primary Industries and Energy. The first, 'Strategies', emanates from a specific Horticultural Task Force which was set up under the chairmanship of another federal senator, Nick Sherry, as a follow-on to the Industry Commission report on Horticulture [reviewed in the last issue of *Acotanc Bulletin*]. It includes many recommendations which have been generally well received by the industry, addressing areas left loose by the IC, and contains a lot of practical detail for the industry as a whole. Its job completed, the HTF has been disbanded.

The second report comes from the Horticultural Policy Council, a standing body supported by the Australian Government as a unit within the Primary Industries portfolio. It has been used as the 'textbook' for a country-wide series of International Competitiveness Seminars, also promoted by the federal government. As would be expected, its emphasis is on producing for export.

Both of these reports are useful — but they are producing them faster than I can read them!

*— **David Noël***

* Price from Granny Smith's Bookshop (see ad. page 19). § Handling charge.

In the Next Issue:

Focus on

Dates in Australasia

About ACOTANC Inc

(Australasian Council On Tree And Nut Crops)

ACOTANC is a coordination and liaison body, for which involvement is open to any type of organization. Organizations may be incorporated or unincorporated, formal or informal, as for example: grower associations, research stations, university departments or laboratories, commercial firms, and agencies of government.

Operation of ACOTANC will be in the hands of individuals who are nominated by constituent organizations. There are 3 classes of organization involvement.

1) Full Participants.

Full Participants are organizations who support the Council's aims and wish to have rights of voting and participation in the operation of the Council. Each Participant should at least 50% of its individual members within the ACOTANC Zone.

Each Participant will have equal and full rights to Council privileges and services, such as the right to apply for grants and services in the staging of conferences or the pursuit of research, the right to be represented in publications produced for the Council, and the right to nominate representatives to sit on the Council or on its Executive Committees.

Individual members of any Full Participant will have full rights to relevant ACOTANC privileges, such as preferential rates at ACOTANC-supported conferences, preferential discounts on ACOTANC-supported publications, and the right to apply for ACOTANC-supported scholarships and fellowships.

2) Local Affiliates

Local Affiliates are organizations within the ACOTANC Zone who are interested in the Council's aims and wish to be kept informed of its activities and of activities generally in the area of tree and nut crops.

Affiliates will receive a copy of all general newsletters produced by ACOTANC during their period of subscription. Affiliates and individual members of Affiliates may also be offered advantages in such matters as attendance at ACOTANC-supported conferences, but at a lower level than those for Participants and members of Full Participants.

Affiliates will have no obligations toward ACOTANC other than the payment of current subscriptions, but will be encouraged to consider upgrading their ACOTANC status to that of full Participant when appropriate.

3) Out-Zone Associates

Out-Zone Associates are organizations outside the ACOTANC Zone who are interested in the Council's aims and wish to be kept informed of its activities and of activities generally in the area of tree and nut crops.

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ACOTANC Zone Definition

The ACOTANC Zone includes Australia, New Zealand, Papua New Guinea, and all countries with at least 10 percent of their territory on islands of the South Pacific or islands off the south, southeast, or east coasts of mainland Asia.

About Acotanc Bulletin

Acotanc Bulletin is produced for ACOTANC Inc, the Australasian Council on Tree And Nut Crops — an umbrella group whose participants are themselves organizations with interests in productive perennial plant crops.

Acotanc Bulletin is issued twice each year, and carries news of general regional interest, news on forthcoming ACOTANC conferences and events, book reviews, and oversight views on particular tree crop industries and trends. All recipients and readers are asked to respond to the Editor if they would like to receive later issues, and are urged to encourage their own organizations to participate in ACOTANC through a subscription.

Sample issues are available free of charge to any interested organization anywhere in the world, and will be sent to any group the reader recommends which may be interested. Please contact the Acotanc Secretariat at the address on page 2. Suggestions on future content and offers of contributions would be most welcome.

***David Noël*, Editor**

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762A • ALMOND POLLINATION Handbook: for almond growers & beekeepers. Traynor (US, 1993). 86p. Pb. Highly recommended booklet, much info on almonds, beekeeping, beyond title. $18.45

681A • AUSTRALIAN Horticultural STATISTICS Handbook. (Aus, 1993). 36p. Pb. Useful little AHC booklet with production figures & area maps for major fruits, nuts. $2.00§

730B • BRUNEI Darussalam FRUITS in Colour. Serudin (Brun, 1993). 148p. Hb. Lavish large-format all-colour book, exc. photos of ca. 60 fruits, nuts, most unknown outside Brunei. Unique data source. Special import. $89.95

755P • POTENTIAL New Crops for Australia: listing. Fletcher (Aus, 1994). 222p. Very valuable lists, under botanical name & potential uses (fruit, nut, beverage, oil, fibre ...). Highly recommended. $25.00

737S • STRATEGIES for Growth in Australian HORTICULTURE. (Aus, 1994). 118p. Pb. Blueprint of the Horticultural Task Force. Detailed practical social engineering document. $8.00§

322T • TREE CROPS, a PERMANENT AGRICULTURE. J Russell Smith (US,1990). 404p. Pb. Reprint of the classic which established the whole rationale of tree crops as the vital component of land use, permaculture & sustainable agriculture. Essential (and enjoyable) reading., highest possible recommendation. $39.95

764W • WINNING The Race: International Competitiveness in Australian Horticulture. (Aus, 1994). 48p. Pb. Report for the Horticultural Policy Council. $8.00§

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ACOTANC-95

Australasian Conference On Tree And Nut Crops

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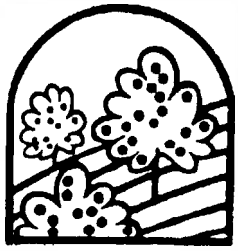

Announcement & Call For Papers

Expressions of interest in attending and/or presenting a paper or poster at the next Australasian Conference On Tree And Nut Crops are sought from all involved in useful perennial crops.

The Conference will embrace a wide range of topics and every sort of climatic and environmental growing conditions. Both established and potential new or unexploited tree crops are covered.

The Conference will be held in Lismore, northern New South Wales, in the heart of Australia's principal subtropical fruit and nut production region.

Some limited assistance in attending may be available for certain contributors.

Please complete the form with this issue of Acotanc Bulletin or contact:

Conference Secretary, ACOTANC-95, PO Box 91, Lismore Heights, NSW 2480, Australia (Phone: (066)-24 3211 • Fax: (066)-24 1007).

Reprinting and re-use of articles from Acotanc Bulletin is encouraged. Acknowledgement of source and authorship would be appreciated.

Submissions of articles, comments, or letters for Acotanc Bulletin are welcome. If text is available on computer disc (Macintosh preferred), this is much appreciated. Contact the Editor at the Tree Crops Centre.

Participation of Your Organization in ACOTANC

If your organization has interest in the use, conservation, and ecology of perennial plant species, for production of fruits, nuts, spices, animal fodder, beverages, pharmaceuticals, industrial and construction materials, and other bioproducts, you will find it to your advantage to subscribe to ACOTANC.

Apply to become a Participant in ACOTANC now.

Details of participation benefits, classes of participation, and the Acotanc Zone are described in this issue of Acotanc Bulletin or will be supplied on request.

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Subscription rates:

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