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CALENDAR OF FORTHCOMING EVENTS

Deadline for next issue: 1 May 2007

2007

- Feb 27 Tue * WANATCA General Meeting (David Brown - To Russia with Affectionate Apprehension)
- Apr 10 Tue WANATCA Executive Committee Meeting
- May 22 Tue * WANATCA General Meeting
- Aug 28 Tue * WANATCA General Meeting
- Nov 20 Tue * WANATCA General Meeting

*General Meetings are held starting at 7:30 pm. Venue: As Noted in each case.
These meetings usually include a display of current world tree-crop magazines offered free.
• Event with WANATCA participation; § Refer to news item in this issue of Quandong.
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Ginkgo (*Ginkgo biloba*)

See: About the Cover, p. 2



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AT THE NEXT WANATCA GENERAL MEETING:

7:30 pm, Tuesday, 27 February 2007

David Brown will present experiences and impressions on ecological horticulture in the Caucasus Mountains Region in Russia, and elsewhere. He will also cover aspects relating to kitchen gardens and dachas and touch on some implications of the Russian Paradox!

To Russia With Affectionate Apprehension

This meeting is at Kings Park Headquarters as usual. It's an opportunity to find out more about modern China, and how Australians can interact with its people.

Late enquiries to 9250 1888 please.

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About the Cover

The Ginkgo (*Ginkgo biloba*), sometimes known as the Maidenhair Tree, is a unique tree with no close living relatives. It is classified in its own division, the Ginkgophyta, comprising the single class Ginkgoopsida, order Ginkgoales, family Ginkgoaceae, genus *Ginkgo* and just the one species. It is one of the best known examples of a living fossil.

Ginkgo is a gymnosperm (as opposed to an angiosperm), meaning "naked seed"; its seeds are not protected by an ovary wall and hence, the berry-like structures produced by female ginkgo trees are technically not fruit. (Wikipedia) Photo: Bob Cook

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Notes from the last meeting...

China 2006 - Australia's future

Several years ago, Bob Cook retired from his civil service job. He had enough physical work to do to keep him fit, but he wanted a challenge to keep his mind active. He looked at the educational offerings of TAFE and chose to study the Chinese language. He has now made two visits to China, in Feb/March and in Aug/Sept of 2006.

China is immense. From the eastern-most province, Taiwan, to Tajikistan in the west, it spans 5 time zones. However, all China operates as one time zone. The Chinese think it is strange that Australia has so many time zones, and they wonder how we go about doing business in an efficient manner.

China is divided into 23 provinces, 5 autonomous regions (Tibet, Xinjiang, Guangxi, Ningxia and Inner Mongolia), and 4 municipalities under the direct jurisdiction of the Central Government (Beijing, Shanghai, Tianjin and Chongqing). There are 2 special administrative regions (Macau and Hong Kong). Mainland China still regards Taiwan as a province.

The first half of the 20th century saw many warlords ruling in China and a protracted civil war, interrupted by the invasion of the Japanese. In 1949, the Communists, led by Mao Zedong, were victorious and eventually unified the country with a strong Central Government. A strong Central Government would seem to be necessary because of the vast numbers of people of differing opinions.

Under Mao and his successors poverty has been greatly reduced and the economy has soared. Private wealth is very noticeable on the streets of the big cities, especially in Shanghai and Beijing, but not limited to these. There are many fashionable city malls.

Even in the countryside, the people are much better off than under the old system of a century ago. Bob has stayed at the small village of Luo Cun and although compared to

our standards they are very poor, they say that things continue to get better with the passing of time. Rural incomes are about \$600 per year. Children are educated, or at least the boys are. Boys can go to university, but not the girls. In the country, the one child policy is not enforced. For the most part, rural girls can only look forward to marriage. Physical deformity, whether by birth, accident or disease, makes a girl unmarriageable.

Mao is still revered in China. His mausoleum is visited by an average of 50,000 people per day. On one day in August, there were 200,000 visitors. Bob made 2 attempts to visit. The first time, he went 2 hours early, but the queue was 3 km long, and he gave up. The second time he went 4 hours early, arriving at 5 am. However, after he had been there for 2 hours, the soldiers made him leave because he had a camera and a plastic bag - both forbidden. The portrait of Mao still hangs at the entrance to the Imperial Palace in Beijing.

Under the current regime there have been some massive and disastrous errors with terrible consequences.

1958 - "Great Leap Forward"

1966 - 1976 Cultural revolution.

1989 - Tiananmen Square massacre. This is never discussed. People will not talk about it except to say that the whole mess was cleaned up in one day and the damage to the square was fixed in only 2 or 3 days.

Religion

Most of the younger generation are non-

believers, or so they said. Bob noticed at temples and shrines that all age groups of the Chinese were very respectful and most offered prayers.

Contrary to what The West Australian recently reported, police and soldiers do not guard church services. Christian services are very popular with a small amount of the population. There are mosques, Confucian, Taoist and Buddhist temples as well as Protestant and Catholic churches. Religion is not encouraged, but it is not forbidden. Bob saw no soldiers at religious sites.

The people

There are 57 ethnic groups in China which make up the population of 1,345,000,000. 93% of these are of Han descent who speak Mandarin in one form or another. There are quite a few dialects, including the Cantonese, but they all use the same written language.

Since the 1950's Mandarin has been compulsory in schools and it is the official language of China. It was at this time that the government simplified the Chinese characters to their current appearance. The only areas that still use the more complex older characters are in Taiwan province and in Hong Kong. About 10 years ago, the Chinese Government made English compulsory in schools, recognizing it as the business language of the world. The



Typical fruit stall - Photo by Bob Cook

Chinese people are very friendly. Many, of all ages, will ask westerners for conversation so that they can practice their English. They are also most generous, especially when it comes to food. Chinese people LOVE their food and eat well and regularly. They feed their guests to bursting point with all types of delicacies.

Agriculture

Most of China, like Australia, is inhospitable to agriculture. They make the most of the areas that are arable and these range from near tropical to near arctic. This gives rise to a great variety of fruits and vegetables as do we here.

China is nearly self-sufficient in its food production and as we know, they export a great deal as well. China's annual consumption is 455 million tonnes of grain, of which they grow 450 million tonnes. Much of the 5 million tonne shortfall is supplied in the form of wheat from Australia and Canada.

Chinese agriculture is carried out in forms ranging from pots on windowsills to large-scale agriculture. Predominantly though, it is done by millions of very small farmers with farms as small as one acre. In the cities, food is being grown privately, from vegetables to fruit trees (very few flowers are grown, unless they are edible). In both Beijing and Xi-An



Seed pod of Magnolia grandiflora



Examples of urban agriculture - Photos by Bob Cook

Bob saw pumpkins being grown so that the fruit was on the roofs of the houses and the vine afforded some protection from the sun. Broad-scale farming is mainly done by the government or businesses.

A visit to a 1-acre farm revealed very dense, intensive planting. All fruits were covered with paper or plastic bags while on the trees, to protect from chemicals, humidity, insects and birds. Jujubes grow everywhere, many different varieties. Corn is a staple everywhere. Bob was impressed by peaches that were firm and crunchy, yet very sweet and delicious.



This was the barest spot Bob saw on a visit to a one-acre farm.

Trees of interest

At many temples, palaces and parks there are many very old trees, such as ginkgo and camellia, that have been carefully taken care

of over the centuries. It seems that trees have a special place in the hearts of the Chinese and the many parks in the big cities reflect this.



The camellia tree is 600 years old.



In the foreground is an efficient - and attractive - kerb-side drainage system, instead of a simple gutter. Photo: Bob Cook

Industry

China is in a process of rapid industrialization. Unfortunately they have not learnt from the West that it is disastrous to do this without checks and balances. Air pollution is horrific both in the cities and in the countryside. The water is polluted, too. Tap water, from rivers, cannot be drunk.

Each month about 250,000 new cars hit the road in China and the big boys from the west are all there with VW, GM, Ford, Hyundai as well as Chinese branded cars. All of these add to the industrial pollution.

In Beijing, to help ease pollution and to add to the visual effect of the city for the Olympics, all taxis must be less than 2 years old by 2008. In the main they have gone to the Hyundai Elantra.

Shanghai is in a continual state of building and it is said that 17% of the world's cranes are in operation in Shanghai.

Electricity is in high demand and the power stations are very polluting coal-fired ones. This audience will probably disagree but the only solution to this problem for China is to go nuclear. Iron works, ship building and the manufacture of appliances everywhere adds to the pollution.

In March this year at the 5-year-plan conference, the government did state that the reduction towards elimination of pollution was in the top 3 priorities and would be top



A delicious crisp, crunchy peach that Bob opened by twisting in his hands. Note the red colouring.

priority in the next 5-year-plan.

Coal-fired hot water factories are another source of pollution. These are used to heat the housing in the cities; hot water is pumped through pipes set in the floors to keep all rooms at 18 - 20°C even in bitterly cold areas. In the countryside ancient and traditional methods are often used - mud brick bed platforms with built-in ovens underneath.

The Chinese willingly undertake colossal infrastructure projects, such as the 4,700 km train track from Beijing to Lhasa. To address drought problems, they are developing a massive canal project through the middle of China.

Trains in China are good quality, clean, efficient and smooth, and tickets are exceedingly inexpensive. There are no restrictions on travel in China. Bob recommends that booking for travel and accommodation be done by Internet - it is much cheaper.

Bob pointed out that there were notably two fruits that were in very short supply: wine grapes and lemons. Australian wines are quite expensive in China. E.g. Jacob Creek Chardonnay sells for \$7.87 (47 yuan) in Australia and in Beijing and Xi-An it was 120 yuan (\$20). Sellers said they would like more. They also buy wine from Chile.

Lemons are virtually non-existent in China. When they were available they were very expensive, up to 6 yuan each (\$1). Perhaps our citrus industry should do some investigating in relation to the export of Australian lemons to China.

Bob suggests that Australia is not taking advantage of the opposite hemisphere effect to supply fresh fruit to China. Opportunities here for fruit growers! Even if producers targeted only millionaires, there are 40 million of them in China. Business people are very willing to speak to Australians about trade. --8

[The Orchardist, April 2006]

Red-fleshed apple a silver bullet?

New Zealand pipfruit growers could have a red-fleshed apple to help them in their battles in pipfruit markets in 8-10 years time. If the spectacular colour is matched with impressive eating characteristics and the trees are relatively easy to manage, this apple could be the boost to local growers that ZESPRI Gold has been to kiwifruit growers. It's hoped trees will be available to local growers in five or six years.

On 20 March, HortResearch unveiled a new apple, which had been worked on since 1998. This apple carries rosy flesh we associate with most apple varieties right through to the core. It also promises the health benefit of a high concentration of anthocyanin - an antioxidant known to offer human health benefits. This high concentration of anthocyanin also triggers the red flesh.

Red-fleshed apple varieties came into the HortResearch gene pool from the remarkable wild apple forests of Kazakhstan and Krygyzstan, where seed was collected by Dr Dominique Noiton in the 1990s.

Some apple cultivars originating from Kazakhstan were red-fleshed, but they were often bitter tasting or left a furry feeling on the tongue. This apple has been developed using "smart breeding" techniques dependent on a detailed knowledge of genetic expression in apples generally, but with no use of genetic engineering.

HortResearch's chief scientist Dr Ian Ferguson commented: "The genes are not modified by us in any way. We simply use our understanding of the genes to identify which of the natural crosses stand the most chance of successfully producing red-fleshed fruit with the right balance of flavour and appearance. We call it Precision Breeding or Smart Breeding.

"We identify 'marker genes' that reveal desirable characteristics in fruit - in this case red-flesh - and can then develop tests that

enable us to efficiently select elite seedlings from breeding populations that frequently number in the tens of thousands."

Dr Ferguson explained that HortResearch began work in 1998, using apples that have naturally red flesh, but do not possess the external appearance, eating qualities or storage capability required to meet commercial standards.

Breeders crossed these apples with high quality white-fleshed apples, creating breeding lines with fruit that range from white/pink to full purple.

The red-fleshed breeding line has been chosen for immediate fast-track development mainly because the colour is so appealing and HortResearch reports excellent progress.

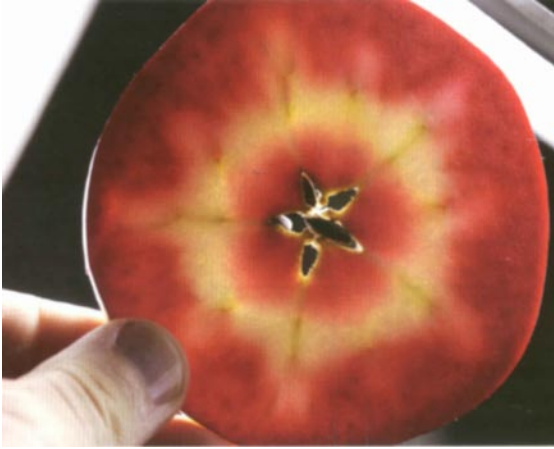
In the past, taking a new fruit trait from this early stage to full commercialisation has often taken decades of breeding effort, but scientists at the company's Auckland research centre in Mt Albert are now endeavouring to speed up the breeding effort by unlocking the apple's genetic code. Researchers there have already identified over 150,000 apple ESTs - Expressed Sequence Tags - portions of an entire gene that can be used to help locate and identify unknown genes.

Using this database, they're well on the way to identifying the genes responsible for turning the apple red - information which will accelerate the efforts of the breeding team. Getting that balance right can generate huge commercial revenues.

Other researchers are working on red-fleshed apples. HortResearch was protecting some of the science involved in the red-fleshed apple project in terms of 'transcription factors' governing how the red flesh is 'turned on'.

Asked what other flesh colours would be feasible in apples, Dr Ferguson said green, yellow and purple would be. A true blue colour was very difficult to achieve in fruit.

Stability of colour in the cultivar was important and this was driven not simply by its inherent character-



[<http://www.ars.usda.gov/is/AR/archive/jan06/apples0106.htm>]

Remarkable Kazak Apples

Central Asia—Kazakhstan and Kyrgyzstan in particular—is likely the ancestral home of familiar domestic apples (*Malus x domestica*) such as Red Delicious, Golden Delicious, and McIntosh. Apple researchers from around the world have been collecting genetic material for breeding programs, in particular for disease resistance.

The U.S. Dept. of Agriculture has thousands of apple trees grown from germplasm collected in central Asia, in Geneva, N. Y.

The Kazak trees showed significant resistance to apple scab—the most important fungal disease of apples—as well as to fire blight. They were highly resistant against *Phytophthora cactorum*, which causes collar rot, and *Rhizoctonia solani*, an agent of apple replant disease. As well, researchers found genes in the Kazak apples that allow them to adapt to mountainous, near-desert, and cold and dry regions.

Many of the Kazak apples lack the size and flavour needed for commercial success.

istics but by environmental conditions in the orchard such as temperature, light and ultra violet concentrations.

Chairman of Pipfruit New Zealand Ian Palmer said the prospect of the new apple would give hope to an industry struggling after two tough seasons. "Growers may not see it for another 10 years, but for those dedicated to the industry it will be worthwhile hanging on for."

This apple was so special that it could be what the industry needs to build a future on.

But it's the trees' ability to resist diseases that sets them apart. Breeders will be able to cross them with palatable varieties.

Young seedlings and hybrids are subjected to 'the Gauntlet' in the greenhouse - exposure to common pathogens. Survivors and their offspring are part of continuing studies to identify the genes that convey resistance.

The goal now is to release germplasm lines from the collected materials within 5 years. "These collections are now being offered to breeders to develop diverse and useful hybrids for fruit, ornamental, and rootstock value."

---Luis Pons

[<http://www.abc.net.au/landline/content/2006/s1801968.htm>]

[<http://www.galeru.com.au/>]

Martha's bush food a winner

Thirteen years ago she didn't know a wattle from a banksia. Now Martha Shepherd's bushfoods products have earned her the RIRDC 2006 Rural Woman of the Year Award.

American-born Martha Shepherd moved to Australia in 1993 with 20 years of experience in the food industry but no knowledge whatsoever of Australia's native bushfoods.

She signed up for a TAFE course to learn about native trees, never expecting that she would find out about a lot of edible fruits. Two species of lilly pilly, *Syzygium fibrosum* and *S. leuhmannii*, caught her attention.

Martha said, "I'd take them home and play around with them and come up with recipes; all these new flavours I'd never heard of. Neither of these are particularly wonderful as a fresh fruit. They need to be processed into something. Because my background was in the specialty bakery industry, I immediately started thinking about ways to put them into bakery products.

"A lot of really sour things have incredible flavour components. So some of it is just in making it sweeter, but a lot of it has to do with how it's handled and processed."

Four years later, she and partner David Haviland bought 4.5 ha at Cooroy, inland from Noosa. In 1997 they started planting lilly pillies, much to the amusement of locals. Three years ago, Martha established Galeru, a small business transforming fruits

of the rainforest into delectable delights.

She trademarked new names for the fruit: *S. fibrosum* became 'Raincherry™' and *S. leuhmannii*, 'Rainberry™'. The couple chose farmers' markets to promote their cakes, sauces and yogurts. Galeru grew the fruits but outsourced processing to local firms.

It was then she realised the need for a model that would help small farms in the area become more economically and environmentally sustainable.

The value chain concept goes like this: a group of growers pools its fruit and retains ownership of it at each successive value-adding point. The Value Chain Management Model is a business model in which producers and growers work with suppliers and processors to increase the value of the crop: a synergy is created because everybody has interests in the crop, everyone is working together to build the value of it,

The judges were impressed not only with the products, but with Martha Shepherd's plan to develop a value chain with other growers. She says it is a model for value-adding that small producers of any crop can follow.

--- Pip Courtney



The beetle was found pollinating the Rainberries™

[<http://www.hawaiiifruit.net/bags.htm>]

[http://www.hawaiiifruit.net/bag_report.htm]

Protective fruit wrapping

Ken Love has studied horticulture for more than 25 years and has made many trips to Japan. His job for the University of Hawaii is to help farmers make more money, and this includes improving the quality of fruit produced.

For hundreds of years throughout most of Asia, farmers have been covering fruit with paper either to protect their appearance or to increase the time the fruit would be on the tree, thus making it sweeter.

Currently there are over 3000 types of bags manufactured in Japan alone. In addition to differences in size, the bags vary in the amount of light being transmitted to the fruit, colour of paper, wax coatings and chemicals impregnated in the paper. (.05% diazinon is the most common). The bags all have a small wire embedded at the top in order to facilitate the wrapping process. There are slits in the bottom so that any rain water can drain out. Some bags have or can be made with an open bottom.

The bags we used for this test were made in Niigata Japan. The company started manufacturing wax coated papers for umbrellas over 300 years ago. The bags are sold throughout Japan, China, Taiwan, Malaysia, Korea, and Chile. They are used primarily on apples, asian pears, loquat, peaches, grapes and mango. Bags are used to control ripening time, for desired coloration and for pest control. The company works directly with growers as well as wholesalers to find the best bag for a particular crop. The types of bags tested were recommended by the company after input from Hawaiian growers.

Some of the types of bags tested:

White with light wax coating and 50% light transmission.

Red with light wax coating and 38% light transmission.

Light brown with wax coating and 61% light transmission.

Recycled phone book paper with 33% light transmission.

Inner coated recycled phone book paper with 4% light transmission.

White with light wax coating and 73% light transmission.

Hawaii Tropical Fruit Growers, West Hawaii chapter members participated in a number of bagging tests to determine the time to bag various fruit. The average was 7 minutes per 25 bags. There were some variables depending on the type of fruit and position of fruit to branch. In tests with 100 bags, bagging times ranged from 16 minutes to 30 minutes. There are bagging contests in Japan as part of some festivals where the average time per 100 bags is 8 minutes.

This report will touch on a number of fruit being tested with the bags. The economics of using the bags, some of the horticultural practices involved in bagging, problems encountered and the results.

Loquat

In Asia most varieties are orange when fully ripe and very sweet. Using the bags prevents the fruit fly and birds from getting to the orange ripe fruit. We practice the Japanese type of production where flowers and young fruit are cut back so that there are only 3 or 4 fruit per cluster. In half the cases these clusters were bagged together. The rest of the fruit were bagged individually. Some fruit clusters were left unbagged on each tree at various heights. In no cases was unbagged

bags with less light transmission was desirable for better colouring and no damage. Larger bags (205mm x 300mm) were used to bag 3 or more fruit in a cluster and bags (102mm x 131mm) were used for individual fruit.

Less labour time to use one bag on three or more fruit rather than individual bags was somewhat offset by the differences in prices of the bags. Larger bags are priced at an average of 2.89 yen per bag in Japan, and smaller ones at 1.09 yen per bag.

The use of bags on loquat is common in Japan, China, Spain, Israel, Algeria and other producing countries.

Figs

In previous years, in order to protect fruit from birds and fruit flies, we strung a number of CDROMs from branches, hung aluminium foil and Christmas tinsel as well as left a half dozen fruit fly traps around the tree.

In 2001 we used 200 bags, 180 of which produced saleable fruit. Damage to the other 20 figs was caused by insects on over ripe fruit which we did not harvest in time. Perhaps because of the additional heat inside the bag, the fruit tends to ripen much faster. In some cases with bags with less light transmission, brown turkey figs will stay green but ripen and become soft and sweet to the taste. Kadota figs also ripened faster inside the bags and have a light green colour when ripe. Tests this year are inconclusive as we are in mid season. From the first 100 bagged figs: undamaged fruit 94; damaged 6

The damaged fruit was caused by rats eating through the paper. This occurred on both uncoated and wax coated bags. Birds damaged 86 of the unbagged figs.

We used 3 types of bags, all of which had a V cut in the top centre of the bag to facilitate bagging the fruit close to the branch. In some cases we would remove leaves close to the



Bagged loquats, University of Hawaii experiment

fruit able to ripen fully. Birds or stings damaged all fruit that had ripened to orange. The bagged fruit had only one instance of damage from roaches.

Counted totals:

	7800 bagged fruit	
Insect	damage:	3
	2100 unbagged fruit	
Bird	damage:	747
Fruit fly	stings :	984
Useable:		301
Other:		68

Fruit was bagged after it had been thinned and developed to about 20 mm in length. In some cases top leaves were stripped back to facilitate the bagging.

We found few differences in bags during the previous years testing other than fruit exposed to direct morning sunlight would be susceptible to sunburn during the green to yellow stage of fruit development. When the fruit receives more sunlight, we found that using

fruit. Bagging takes place when the fruit is developed to about 30 mm in length.

Abiu

The growing popularity of this fruit in local and mainland markets warrants growers giving it much more space in their fields. Previous testing taught us that bags with a V cut in the centre top and an extended wire, cut bagging time considerably. When we bagged fruit in previous years, we found some green fruit with apparent fruit fly stings and some with a sunburn. This year we bagged younger fruit, about 6 cm in length. In some cases, perhaps because of our dryer area, rough handling during the bagging caused the fruit to fall from the branch. Greater care and more time had to be taken with individual fruit. In other cases, fruiting and flowering occurred at the same time and flowers close to the fruit were removed during the bagging.

Current tests are still underway. So far we have bagged 500 fruit and harvested 78. There has been no visible damage. In previous years, we have been able to get few fruit to market that had not been bagged. Our conclusion is that bagging abiu is the only way to make it marketable in West Hawaii.

Mango

Closed bottom bags are used in Japan where mangos are grown in greenhouses. All the fruit is grown in bags and is harvested when it drops into the bag. At night, someone sits in the greenhouse listening for the mangos to drop, then packs them.

We tested both closed and open bottom bags in a variety of colours and light transmission capabilities. Although colouring is affected slightly, we could find no significant difference in bags with 33% to 73% light transmission. More research is indicated in order to determine the best coloration for individual varieties.

We found that with open bottom bags some

mangos were free of infestation. With all closed bottom bags there was some infestation from either roaches or borers. In some cases cane spiders or geckos made a home inside the bags. For some reason this only happened on mango.

There were no stings on the bagged fruit whereas all the unbagged fruit had some sting damage. Different varieties had slightly different reactions when bagged.

More research is needed to determine the types of bags to use for different mango varieties and the best time to bag them.

White Sapote

The skin is sensitive, and the tree also has a reputation for aborting small fruit and dropping others in strong winds. We looked at bagging the fruit as a way to keep the fruit attached to the tree with the help of the wire in the bag. Pest control and even coloration were helped by bagging. The white sapote seems to suffer from a number of viruses as well as insect damage and we found the bags seemed to promote consistency in ripe fruit.

Although there were some differences in fruit colour with the various bags, we could discern no other differences with the limited testing. There was no insect damage in any of the bagged fruit.

White sapote will ripen after harvest and the use of the bags along with taste tests at the KPFC test market showed that there is a potential for this fruit in today's marketplace.

Lychee

Perhaps the most extensive testing we performed this year was on lychee. Preliminary previous years testing dictated that we use open bottom bags in order to prevent some mealy bug or roach infestation. The white bags available were 254 mm x 340 mm. Based on this years test we would recommend a length of 450 mm and a wire that extended an ad-

ditional 30 mm from the top of the bag. In years with a heavy fruit set, the width could be extended to 300 mm. The additional length would help protect against the fruit fly stings that occurred on the bottom fruit in bagged clusters. The extra wire would facilitate the bagging process in tightly grouped clusters and while bagging from a ladder.



Bagging lychee at the University of Hawaii Kaimaliu Experimental Station

The translucent white bags with 50% light transmission helped to promote more even ripening on the lychee. There were few cases of the side facing the sun being red and the back side still green. With the bags, we could keep the fruit on the tree up to 3 weeks longer allowing it to ripen to its fullest and enabled us to have fruit to sell after the season was over for other growers. The coloration on Kaimana was perfect and we could command a higher price for the perfect fruit.

We bagged the lychee after the main fruit set. In some cases, with smaller clusters of fruit that were next to each other, we stripped some of the leaves and bagged 2 of the clusters together. With a longer bag, this leaf stripping might not be necessary. We found some differences in insect attack between the varieties bagged.

With labour, we found it easier to find part time help at the time of bagging for \$10 to \$12 per hour than during harvest time at \$12 to \$15 per hour.

One of the biggest differences we found was

in the time to cull harvested fruit. The average time to harvest and prepare an order was less than half with the bagged fruit. We believe that the increase in labour cost and the cost of the bag is more than offset by the greater number of fruit that is marketable and by the time saved during the culling process.

Overall labour time was less with the bags because of the dramatic decrease in time to cull harvested fruit. Per 1000 lychee we could achieve an additional profit of \$75.00.

Other tests

All of our results clearly show the need for more testing as well as the advantage of using bags for fruit quality as well as quantity. How the bags made for climates in Asia and Chile affect the crops in Hawaii is unknown.

How the colours and materials (wax coatings etc.) of the bags affect the flavour of the fruit can only be guessed at without further testing.

Preliminary tests on tomato, white pineapple, cucumber and guava are encouraging.

Q&A

Why use some types of bags over other types?

In Asia bags are used as much for coloration and to control ripening times as for pest control. Some farmers in Japan will choose bags for peaches based on the colour they want. Wax coating helps during the rainy season and may help prevent some types of pests from attacking the fruit.

At what stage should the fruit be bagged?

Usually after fruit set although this is not as crucial on open bottom bags. With loquat, bagging needs to take place while in the early green stage in order to prevent sunburn. This may be true with some abiu as well.

Should we strip leaves close to the fruit?

Although a common practice in some parts of Asia, leaf stripping or counting the number of leaves per fruit is not practised in Japan. I've found that in some cases such as with loquat, this helps to improve fruit size and facilitate the bagging procedure. With lychee, stripping some of the leaves also helps the bagging procedure and makes harvesting easier and faster.

How can you tell when fruit is ready to pick?

The bags tend to promote a more even ripening time. Random checks will tell if it's time to harvest. With some fruit a gentle squeeze will let you know it's time. In other cases you can tell from the colour through the bag. It depends on the colour of the bag and fruit type. In very few cases was it necessary to open the bag to determine harvest time.

Doesn't it cost too much to bag the fruit?

No, the cost of the bags and time to bag fruit is more than offset by the time saved in culling bad fruit, the increased numbers of marketable fruit and the higher price fruit can be marketed for because of the better colour.

How much do the bags cost?

From 3 cents to 10 cents are average prices. It depends on the quantity ordered as well as bag type.

---Ken Love

University of Hawaii, 12 Trees Project



There are a number of discussion groups on the internet where many people have written about their experiences with bagging fruit. They have tried just about every kind of covering that can be put over a fruit: tulle, cling wrap, cloth bags, paper and plastic bags of all sorts. Some are successful and some are not. Humidity causes many failures due to mould and fungus. In some places, pest animals learn to remove or destroy the bags. Ordinary paper bags can come apart if water dissolves the glue. Ziploc bags have a certain following. The 'zip' is pressed closed around the stem, but may need a staple to secure it, and the lower corner of the bag should be snipped off to drain moisture (fruits and leaves in the bag transpire).

[<http://www.naturedirect2u.com/Essential%20oils/bergamot.htm>]

[http://www.en.wikipedia.org/wiki/Bergamot_orange]

Off-beat citrus: Bergamot

Most of us have smelled it or tasted it, but we may not have realised it was a special citrus.

The bergamot orange (*Citrus aurantium* subsp. *bergamia*) is a citrus fruit, small and roughly pear shaped. The fruit, produced in Italy, is a cross between the pear lemon and the Seville orange or grapefruit. Bergamot oranges grow on small trees known as bergamots. It is named after the Italian city of Bergamo where it was first grown.

Production mostly is limited to the Ionian coastal region of the province of Reggio Calabria to such extent becoming a symbol of the entire region and the city. In no other part of the world does it fructify with the same yield and quality of essence; it is cultivated in Ivory Coast, Argentina and Brazil but the quality of the obtained essence is not comparable with the essence produced from the bergamots of Reggio Calabria due to the argillaceous, limestone and alluvial deposits there.

The fruit is sour, and its aromatic peel is used to produce an essential oil that is used in Earl Grey tea, in perfumery, in candy-making, and in aromatherapy to treat depression. It is also used as a digestive aid. It is a component of the original Eau de Cologne developed in Germany in the 17th century.

At least one Italian food manufacturer produces a commercial marmalade using this fruit as its principal ingredient. It is also popular in Greece as a preserve, made with bergamot peel boiled in sugar syrup.

The Bergamot orange is unrelated to the herb (*Monarda didyma*) of the same name.

The oil has been linked to several negative side-effects such as photosensitivity and the prevention of intestinal absorption of potassium.

Bergamot oil has been used to stimulate hairgrowth. Bergamot oil is also used to assist mental performance and was once used by professional Starcraft players in Korea.



From: Köhler's Medizinal-Pflanzen

As an instrument of planetary home repair, it is hard to imagine anything as safe as a tree.

--- Jonathan Weiner

[<http://www.kentucky.com/mld/heraldleader/living/home/15870606.htm>]

This forbidding fruit doesn't tempt

Ginkgo trees are large, beautiful, long-lived trees. Important foods and medicines are made from their fruits and leaves. However, this silver lining has a large black cloud...

What is that smell? Did someone step on a doggy land mine on their way inside? Did one of the kids get sick in the corner and not tell anyone? Did someone ... oh, wait, is it late October already?

Well then, that smell would be from the tree that looms over my back yard.

We have a ginkgo tree, a beautiful, gigantic ginkgo tree, complete with a swing hanging from one of her sturdy branches and shade garden underneath. And she is woman -- smell her roar.

You see, the female ginkgoes are the ones that drop mounds of fruit this time of year. The fruit is small -- a little smaller than a golf ball -- and looks like a miniature apricot. Inside is a white nut that the squirrels go ga-ga for. Sound charming?

It probably would be, if it weren't for that smell. But we'll get back to that.

This tree, which dominates almost our entire yard, was a major selling point when we bought our house near downtown. It's the kind of tree you wouldn't find in one of those



Ginkgo fruit and leaves.

little lots in the 'burbs. Of course, we bought the house in August. Little did we know what was waiting for us in November.

In the last eight years, I've developed a sort of love-hate thing with this gorgeous tree. Eleven months out of the year, I lounge in her copious shade, marveling at her strength and massiveness. Come springtime, I watch in wonder as she turns radiant with glowing green leaves that are shaped like delicate fans.

Even now, in late October, I know that any day she'll put on another glorious show. One night, she'll decide that winter is officially coming, and, almost magically, all of her leaves will turn gold. They'll hold the color for a few marvelous days, and then -- almost all at once -- fall to the ground.

The big stink with the gink

But after the ginkgo leaves fall, the fruit starts plopping down in bushels, and the Baniak house operates on a different set of rules. If the kids want to play outside, the back yard is off limits. The dogs get more walks around the neighborhood -- anything to keep them out of the yard. (One of our dogs likes to eat ginkgo fruit. And if you think they smell bad lying on the ground, you should smell them after they've been fully processed by a dog. And I won't even go into the issue of ginkgo-laced dog breath).

I've read articles that describe the smell of ginkgo fruit (which we simply refer to as "stinky fruit" for the sake of clarity) as something like rancid butter. I haven't spent much time around rancid butter, but I'm not quite sure that fully captures the awfulness of the scent. I've always thought of it more

in the range of fermented vomit. (That makes sense because the fruit actually includes an acid that is also present in vomit -- or so I read on the Internet.) To make matters worse, the slimy fruit sticks to anything with the tenacity of wood glue, and the smell is generally impervious to soap and water.

Getting rid of them

Think you have it bad, with your yard full of oaks or maples, or whatever? Stop by my house in a couple of weeks. I'll be the guy out back, wearing a pair of old boots, an old hat and alternating between a rake and a snow shovel.

Yes, a snow shovel. Through eight years of experimentation, I've found a snow shovel to be the most efficient way to scoop and dispose of the piles and piles of ginkgo fruit.

And we're not talking a little bit of fruit. Last year, I filled my Lenny a dozen times over, plus nearly four dozen of those big brown paper bags -- just with fruit. I can fill the bags only about a third full of fruit before they rupture, a fact I discovered while carrying a full bag to the curb a few years ago, only to have it explode in a shower of slime that covered me from neck to toe.

How bad does the fruit smell? Well, two years ago, the city sanitation employee who picks up my yard waste left me a little note, gently asking that I not ever put the fruit in my Lenny again. He said it didn't qualify as yard waste. I called the city to plead my case. If this isn't yard waste, I explained, I don't know what is.

I genuinely feel sorry for the guy -- he probably opened the lid to my Lenny and thought I'd stuffed a dead tree sloth in there. But what other option do I have? The nice woman at the city took pity on me and suggested I use the bursting brown paper bags instead.

Over the years, my wife, Susan, and I

have considered all manner of whacked-out scenarios for ridding ourselves of ginkgo fruit. One year, she suggested draping tarps over our entire back yard. As the fruit fell, it would hit the tarps and be funneled into a complex series of barrels and buckets for easy disposal. I think a system of pulleys and levers was also involved somehow. Alas, the best solution remains a rake, a snow shovel and an old pair of boots.

A business idea?

But I do have a new scheme this year: I've read that ginkgo nuts are considered a delicacy, especially in Asian cultures, and the trees have been cultivated for thousands of years for that purpose. I might be missing out on a great business opportunity. Perhaps this autumn I should steal a page from the business manual of Double Stink Hog Farm, the kid-friendly U-pick pumpkin patch in Scott County. Hmmmm, let's see ...

Starting in about two weeks, come visit Quadruple Stink Ginkgo Farm, right smack in the middle of downtown Lexington. Enjoy the easy drive, the, um, stirring smells of nature; and fill your wheelbarrow full of this prized ancient fruit.

--Peter Baniak



Ginkgo leaves

[http://hcs.osu.edu/pocketgardener/source/description/gi_iloba.html]

[<http://www.aafp.org/afp/20030901/923.html>]

[<http://www.siu.edu/~ebl/leaflets/ginkgo2.htm>]

[<http://www.xs4all.nl/~kwanten/usage.htm>]

More about ginkgo

There are some very good, thorough websites devoted to all aspects of ginkgos. The medicinal uses of ginkgo are so important that plantations are being developed around the world, including in WA.

'Ginkgo' is derived from the Japanese word 'ginkyo', meaning 'silver apricot', referring to the fruit, which is eaten in Japan. 'biloba' translates as 'two-lobed', referring to the shape of its leaf blades.

Ginkgo, a native of China, prefers moist, deep, sandy soils in full sun, but is very adaptable to stressful situations, including poor soils, compacted soils, various soil pHs, heat, drought, cold, salt spray, and air pollution (and is therefore very urban tolerant).

Ornamental trees are propagated primarily by cuttings from male cultivars grafted onto seedling rootstock, and are being used as street trees around the world. Seedlings will be of either gender, which will be unknown for at least 20 years.

They can grow to be much larger than 25 m and can live to be 1000 years old. The wood is light-coloured, light, fine grained, smooth, flexible and has a silky shine. Its decay isn't very fast. It has long been used for structures, sculptures, tea shelves and utensils for the Japanese tea ceremony, for Buddhist family altars, chess boards, chess men, tubs for brewing sake, choppingboards, and go-boards (go-ban). It is also used to make insect-proof cabinets and for lacquerware materials such as trays, bowls and containers for tea powder. The female tree is used to make (sheet) paper.

The seeds are still given (shell dyed red) and roasted and eaten at weddings and other feasts as a delicacy (however, they should only be eaten in moderation). The seeds are

usually steamed until the hard shell cracks open, then the kernel can be removed (or can be cracked open) and eaten like pistachio nuts, or used in pilaf, porridges, soups, vegetable dishes or mixed with rice, tofu, mushrooms and stir-fried vegetables.

The taste is sweet like a large pine nut, a cross between potatoes and sweet chestnuts when baked. In Japan the nuts are eaten in an egg-custard dish called chawanmushi. Fresh ginkgo nuts (also canned with fleshy outer coats removed) are available in Japan and China and sold in markets (it seems they don't mind the smell) as Pa-Kewo, Pakgor or ginnan ("silver almonds" or "white nuts"), being edible when baked, cooked or roasted. They contain only 3% fat, are rich in niacin and a good source of starch and protein.

Oil from the seed is used as a lighting-fuel and a soap substitute is produced by mixing the pulp of the seeds with oil or wine.

The seedcoat contains an allergen that may cause a mild form of dermatitis in sensitive people, so wear latex gloves when handling the fruits.

Ginkgo biloba leaf extract is the most widely sold phyto-medicine in Europe, where it is used to treat the symptoms of early-stage Alzheimer's disease, vascular dementia, peripheral claudication, and tinnitus of vascular origin. It also is one of the 10 best-selling herbal medications in the United States.

Pat ⌘

[<http://www.abc.net.au/rural/news/content/2006/s1829229.htm>]

Caffeine-free non-decaf coffee may soon be on the menu

Coffee drinkers may be soon able to drink a cup that does not have caffeine and yet is not decaf.

One of Australia's pioneer coffee growers is looking to import a plant that naturally grows without caffeine.

Linda Jaques from far north Queensland says the coffee should be healthier and taste the same.

But the plant's success depends on the

Brazilian researchers who uncovered it.

"Some Brazilian scientists were researching in Ethiopia and they found 6,000 coffee plants in an area; they discovered there were four of those that were naturally caffeine free," she said.

"They have now taken these back to Brazil and they are researching and trying to propagate them."

[<http://www.scidev.net/News/index.cfm?fuseaction=readNews&itemid=3067&language=1>]

Strategic tree planting could save water in dry areas

Researchers say that planting trees in dry regions of the world could make better use of scarce water resources increasingly threatened by climate change. They warn, however, that although planting the right species in the right areas could improve water efficiency, other species could make the problem much worse.

The World Agroforestry Centre (ICRAF) findings, based on 20 years of research in Kenya, were announced at the World Water Week meeting in Stockholm on 22 August.

Many African countries have large plantations of pines or eucalyptus. But ICRAF scientists advise against planting these fast-growing evergreen trees because they need a lot of water.

Instead, they recommend planting deciduous trees in integrated 'tree-crop' systems, in which agriculture and forestry are practised on a single piece of land.

Such trees shed their leaves for up to six months of the year, nearly halving the amount of water they need. This enables them to cope with long dry spells and also means they won't compete with crops for water.

ICRAF recommends tree species for specific regions.

A relative of mahogany called *Melia volkensii*, which produces high-value timber, would benefit semi-arid areas such as those in East Africa, for example.

Water-catchment areas in Central and West Africa, meanwhile, would suit *Cordia africana*. Small-scale honey producers value the tree because its flowers are highly attractive to honey bees.

He said that without action, 70 per cent of rivers would dry up. "Trees are not able to adapt quickly over such a short period. We must select trees that are more efficient in their use of water and that can cope with the changing rainfall."

ICRAF is trying to encourage policymakers and communities who continue to plant evergreen trees — as sources of pine resin or pulp for paper production, for example — to change their practices.

[The Sunday Times, 24 Dec 2006]

Peaches cream the fruit market

A small WA horticultural company has broken into the European market with a special gourmet fruit. Leading British supermarkets will sell the quaintly shaped, aptly named doughnut peach produced by Canning Vale-based business Mercer Mooney.

The company has been developing the flat peach for 10 years. It has been supplying “high end” WA stores, eastern states’ markets and Woolworths’ stores across the country with small quantities for the past few years.

But this year, it expects to triple the amount of fruit sent east to about 30 tonnes.

The firm will also send one or two tonnes to Singapore and Malaysia, which have been markets for four or five years.

More importantly, it has had requests to export its peach to major British supermarket chains Marks and Spencer, ASDA and Waitrose.

Mercer Mooney’s managing director, Michael Sertorio, said the firm had been asked to send a small amount of the doughnut peach

to Marks and Spencer last year.

“We will be sending a modest quantity again, but, hopefully, it will grow,” Mr Sertorio said. “The product is grown in other parts of the world, but we lead Australia in its development. We are the biggest producer in Australia.”

Picking has just begun at the company’s orchard at Capel and other growers in Gingin, Donnybrook, the South-West and the Hills.

The peach was first grown in China 1000 years ago. It came to Australia about two centuries ago when Chinese migrant workers in the gold industry brought with them trees that produced fruit commonly called china flats.

---Nick Taylor



[NWFP-Digest-L No. 8/06]

Forest scent slows global warming

Swedish scientists have discovered that particles in the air over boreal forests help cool the earth by reflecting the sun’s rays back into space. The microscopic aerosol particles called monoterpenes, which also produce the aroma of the coniferous forest, were studied in three locations, two of them above the Arctic Circle. Scientists from the Air Pollution Laboratory in Stockholm found spruce and pine forests produce sun “dimming” particles in late spring and early fall. The discovery will help make more accurate predictions about climate change.

[SciDev.Net Weekly Update: 6 - 12 January 2007]

Amazon rainforest relies on African dust

In a study published in Environmental Research Letters, scientists show that dust winds arising from the Bodélé depression — northeast of Lake Chad — are the main mineral source fertilising the Amazon rainforest in Latin America.

A single spot in the Sahara desert is responsible for over half the Amazon basin’s annual supply of minerals, researchers say. Using recent advances in satellite instrumentation, researchers produced the first quantitative estimate of the dust emission: 56 per cent of the Amazon’s total annual mineral supply.

It was known that West African dust winds played an essential role in the Amazon mineral supply. But the rate of emission from the Bodélé depression has not been measured until now.

According to the study, the soil of the Amazon rainforest is shallow, poor in nutrients and almost without soluble minerals. The health and productivity of the Amazon basin depends on nearly 50 million tons of mineral-containing dust transported annually across

[<http://www.azstarnet.com/news/139457.php>]

Ripeness dot

You can forget what your mother taught you about how to buy fruit. A U. of Arizona professor has invented a sticker that tells consumers if a fruit or vegetable is ripe.

A marker on Riley’s RediRipe stickers detects a chemical called ethylene gas, which is released by fruit or vegetables as they ripen. As that happens, the sticker turns from white to blue. The more ethylene gas the fruit produces, the darker the blue, Riley said.

The color shift is not instantaneous once a sticker is attached. It takes about 24 to 48 hours, depending on how fast the fruit is ripening, Riley said.

And there are still bugs to be worked out: The stickers do not change color to reflect an over-ripe or rotten piece of fruit. Also,

the Atlantic ocean from the Sahara.

The Bodélé is known to be the biggest source of dust in the world. This has been attributed to its shape and geography. Wedged in a narrow path between two mountain chains, the depression directs and accelerates surface winds.

Lead researcher Dr Ilan Koren, of the Weizmann Institute in Israel, told SciDev.Net the research posed more questions than it answered. Key questions remain, such as for how long the area has emitted such a huge amount of dust, and how long it will continue. “We are now studying how long the Bodélé — and all Sahara regions — have contributed to the Amazon, and what the forest was like before,” he said.

not all fruit produces enough ethylene to be detected by the the sticker, “There is still a lot of research to do,”

The stickers will be available to growers next year, and should make their way to supermarkets within two to three years, said their inventor, Mark Riley.

Each sticker is expected to cost growers and grocers about a penny (US). For consumers, the possibility of taking the guesswork out of produce purchases is at least worth giving the stickers a try,

---Ken Sweet

[<http://www.hawaiifruit.net/indexjapan.html>]

The Tomiura Biwa Club

Loquats are a rather neglected fruit, and yet they are easy to grow, hardy in difficult conditions, and there are some wonderful large, sweet selections. Here is some self-help action one group took to improve their situation.

The Biwa Club in Tomiura Chiba Japan, a 3-hour drive from Tokyo, is unique in the sense that it focuses primarily on Biwa or loquat. Founded by the Chiba Prefecture Government, Biwa Cooperative, private investors and farmers, the location serves a number of purposes. In this fairly remote location the club is a rest stop for weary travelers heading farther south. While there, they are indoctrinated into the world of Biwa fruit. The facilities boasts a shop which features almost 2000 items manufactured locally with the fruit, as well as a number of other items that are made from Chiba's wide range of agricultural products.

There is something for everyone at the shop: foods, wines, toys, cosmetics and books, all about loquat. There are many logo items featuring cartoon characters based on the Biwa. The restaurant inside the club features many items that contain the fruit. Biwa curry and Biwa ice cream are popular items. There is also a library and reference room for farmers as well as meeting rooms.

During the height of loquat season, the club provides space for farmers to sell direct to the public. The large area around the club

is a parking and staging area for bus tours from Tokyo and elsewhere in Japan. Tours are either pre-arranged or can be decided upon at arrival. The tours are not at the club but at farmer member locations. Depending on the farmer's schedule, they can choose to open their farm for the day or not.

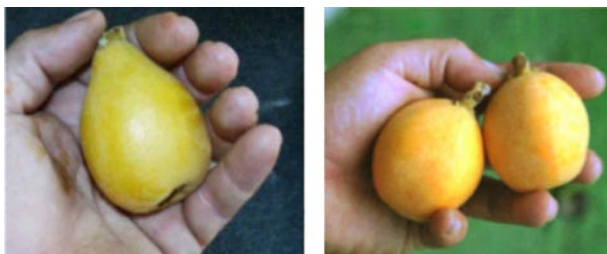
Independent travelers can leave their cars at the club and join bus tours of the farms. The tours start and end at the club, which is packed with people in the peak of the season.

Once at the farms, visitors can join a farm tour and learn about the growing cycle of the Biwa trees, or they can simply enter one area and pick and eat the fresh fruit. There are farm stands, which sell packaged fruit and other items that may or may not differ from what is available at the Biwa Club. Some visitors will tour a number of different farms the same day, although the differences from farm to farm are minimal and may only differ in the cultivar of loquat grown. Some farmers report that since the club started these tours, their income has almost doubled. Previously the fruit was sold solely to the cooperative. The cooperative has embraced the idea as it builds awareness for the fruit and teaches the public (often city dwellers) what the farmers go through. Since the cooperative has a share in the club, as do the farmers, all benefit economically. Visitors buy items at the farm and the club as well as paying for the tours.

---Ken Love

(see also:

<http://www.hawaiifruit.net/>)



New Japanese varieties of loquat, grown in bags.

[E-News - Agriculture & Food Industry News: Issue 29, 23 August 20 06]

Canned avocados could change markets

Canned avocados?!

A new technique has been developed to can avocados, increasing their shelf life and retaining their nutrients. Preserving the fruit without freezing will allow processors to export the nutrient-rich product to foreign markets where demand is on the rise. In France alone per capita consumption went from 400 to 1500 grams in the last year, according to Research and Markets.

The technique, developed by food engineers in Argentina, coats the avocado and treats it with an antioxidant. The process can increase shelf life of pasteurized avocado pulp and dry avocado powder to at least six months.

Freezing, the typical preservation technique, gives avocados a longer shelf life, but has a negative effect on the fruits nutritional value, said engineers Diego Prieto and Martin Cecchini in Science Live magazine. Canning is also disastrous to the product because of

the high oil content and the presence of the polyphenol oxidase enzyme, which is responsible for browning. An organic acid, such as those found in lime and lemon, usually counteracts the browning process. However, using acids in the canning process produced an unpleasant acidic taste.

Successfully canning avocados will change the shape of the lucrative avocado market and could increase demand. Currently, the production of avocado mostly based in Mexico and Southern California, is not meeting the growing demand of consumers in Europe. The EU remains the worlds largest importer of avocado, importing 40 per cent of the supply from non-member states. The Research and Markets group estimates that demand will grow in Europe as avocados become more available and the organic market begins to mature.

[<http://olyecology.livejournal.com/>]

Earth's Tree News

Earth's Tree News is an on-line Journal of news concerning trees, collected from publications around the world. Original URLs are supplied. The Journal can be read on the website, or you can subscribe to receive updates by e-mail, which come out about once a week. Here is a sample, below.

Barren Tibet had thick cypress forests some 4600 years ago.

London, Nov 30 (ANI): Researchers have revealed that the barren landscape of Tibet as is in evidence today, was covered by thick cypress forests some 4600 years ago. According to the research carried out by Georg Miehe of the University of Marburg in Germany, the forest was destroyed by the local inhabitants to make way for barley cultivation and graz-

ing animals.

The researchers after having analysed climate data, pollen records and ancient soil samples from in and around Lhasa, drew the inference that the climate in the region was most suitable for the growth of the forest.

"Plenty of rainfall, little permanent frost or snow and good mean temperatures through the growing season, suited the forest growth", New Scientist quoted Miehe as saying. (ANI)

Longing for a lingon

The lingonberry (*Vaccinium vitis-idaea*), a low-growing evergreen relative of the cranberry, produces small, bright red, tart-tasting fruit.

As a chef back in the 1980s I was yet to discover the wonderful array of salad leaves now so readily available and iceberg lettuce was the order of the day. The only way to get an edge with something different was to grow it yourself; as the specialty growers were few and far between.

Having used Swedish preserved lingonberries, which are a traditional favourite sauce for Swedish meatballs, I was thrilled to see lingonberry (*Vaccinium vitis-idaea*) plants available from Woodbank Nursery in Tasmania, but that has now, sadly, closed.

Native to northern Europe, Asia and America and also known as the alpine or mountain cranberry or cowberry in England and the US, lingonberries are said to be a favourite fruit of polar and brown bears. The plants are frost-resistant but drought-tender, tolerate colder conditions and do quite well in Tasmania.

Lingonberries are a low-growing evergreen with glossy leaves reaching a height of 25 cm with a spread of about one metre. They prefer a well-drained acidic soil of less than 5.5 pH and are suited to partially shaded or



Lingon berries and flowers (inset)

shady areas, though they will succeed in full sun in regions with cooler summers.

The fruit has a sharp acidic taste, is said to have medicinal properties and is used for lowering cholesterol and treating gastric upsets and rheumatism. Lingonberries lend well to being cooked rather than consumed fresh and, along with being used for a range of savoury applications, can also be used for desserts and jams.

In Sweden lingonberries are a natural resource and are harvested from the wild rather than being cultivated. Living in southern Victoria, I placed my plants in various parts of the garden to determine the best spot for them to flourish - some in full sun, others in a more shady position and some under a fern. Those in a pot in full sun were the ones to succeed best.

The plants take about two years to establish before fruiting so it was with much excitement and anticipation that I watched when my lingonberries flowered. Sadly, the fruit did not develop. The following year they once again flowered by failed to fruit, but the next season the pea-sized bright-red berries appeared.

Unfortunately my crop was not substantial enough to allow me to experiment with it in a variety of culinary ways but I was able to savour the tart taste of fresh lingonberries.

Now, the saga continues with the plants producing only flowers in some years and very low volumes of fruit on other occasions. Consequently, I am still left 'longing for a lingon'.

---Gail Thomas

Plum research bears fruit

A super plum that could stave off cancer and heart disease is being developed by Queensland scientists.

The plum is ripening in the Department of Primary Industries and Fisheries research centre at Stanthorpe on the Granite Belt.

It has up to seven times the amount of cancer-fighting antioxidants as other plums and is one of a range of "super" fruits and vegetables.

"It has as many antioxidants as a glass of good red wine but none of the alcohol," horticulture and forestry science general manager John Chapman said. "It has been developed because of the health benefits and that is an area we are pursuing.

The Stanthorpe research centre is one of more than 40 spread across the state working on drought-resistant crops and adapting fruit and vegetables to grow in Queensland.

Produce that is being developed includes a flat nectarine shaped like a flying saucer, tropical sweetcorn and a new fruit, which has been nicknamed "ruby fruit" by researchers.

Senior principal horticulturist Roger Broadley at the Maroochy research centre developed the new ruby fruit, a twist on the custard apple with red flesh. He said it could be worth hundreds of millions to Australian farmers.

"We are nearly there and we anticipate there would be a huge market for this in Asia. If we can control the rights to the genetics we could give Australia the chance to grow a new crop worth between \$100 million and \$200 mil-

lion a year."

Mr Chapman said that new produce like this came along once in a generation. "It's a bit like the kiwi fruit the New Zealanders developed in 1959," he said.

The fruit and other produce are developed over years of cross-breeding and then propagating different strains of plants, isolating the qualities that scientists want.

Methods such as exposing plants to radiation to produce mutants which are then developed over time are also used.

"Only a small amount of radiation is used and that is a well-accepted method which has produced most of the seedless varieties in citrus fruits," Mr Chapman said.

In the past month the Government has announced two new products: a home-grown Australian pineapple that can grow all year, and a pigeon pea hybrid that has the potential to feed millions of people in the Third World.

---Edmund Burke



[http://groups.ucanr.org/mgnapa/Articles/Summer_Pruning.htm]

Summer pruning

Older gardening books will usually only describe pruning as being a winter activity, to be done while the trees are dormant. Newer information highlights summer pruning as being more appropriate in certain situations. This is from the University of California's Napa County Master Gardener site.

Now that peaches are ripe and begging to be picked, do you find yourself gazing up at the top branches of your tree to the fruit that is tantalizingly just out of reach? You can get a ladder or use one of those long-handled fruit pickers, but summer pruning can help you keep your fruit trees from getting so tall that only the birds are enjoying your fruit.

Many summer- and fall-fruiting trees—such as peaches, nectarines, plums, apples and pears—will fare well as shorter trees and can be trained to the shape you wish.

As opposed to dormant pruning, which encourages growth, summer pruning helps you train the tree, reduce the amount of growth and diminish the tree's vigour. In our milder climate, you can prune more often without damaging the tree.

The best time to prune is just after harvest, early enough so that any new growth prompted by the pruning can harden before there is any frost. Young, tender shoots are easily damaged, but shoots that have had time to thicken and toughen can withstand frost more easily.

Summer pruning mainly involves removing those vigorous shoots that you don't need for permanent branches, and heading (shortening) shoots to restrict height. In the home garden, a height of seven to ten feet is manageable for harvesting and future pruning.

If you are planting new fruit trees and want to keep them short, purchase varieties on dwarf or semi-dwarf rootstock. The first year, cut the tree to four or five feet and start the "scaffold" that is the main branching system.

Your dormant pruning in late winter will establish the basic shape of the tree. Then in late spring or early summer of the second year, you can remove unwanted shoots and cut the remainder to the length you desire. You can repeat this process at the end of summer. Because you are clearing out some of the new growth, you will have less dormant pruning to do.

With older trees, you may have to work in steps, reducing the height over a three-year period. You can reduce the branches by one-third the desired amount each year during the dormant season, and then remove or shorten the shoot growth during the summer. Also thin out branches to allow sunlight into the center.

Although planting trees on dwarfing rootstock is the best way to keep trees small, even full-size trees can be reduced for easier care and convenient harvests.

---*Diane Flyr, U. C. Master Gardener*

Many people, other than the authors, contribute to the making of a book, from the first person who had the bright idea of alphabetic writing through the inventor of movable type to the lumberjacks who felled the trees that were pulped for its printing. It is not customary to acknowledge the trees themselves, though their commitment is total.

---*Forsyth and Rada,
Machine Learning*

[*New Scientist*, 5 August 2006]

The fog catcher's forest

When Spanish sailors landed on the Canary Island of El Hierro in the 15th century they were amazed to find an aboriginal population with extensive agriculture, which they had managed to sustain with virtually no rainfall. Legend has it that the Guanche people derived all their water from a single large tree, which stripped moisture out of passing fogs and dripped enough water from its leaves to support a thousand people.

There is no doubt that the only thing stopping the Canary Islands from resembling the Sahara desert, just 70 kilometres to the east, is the moisture-rich fog that drifts in from the Atlantic Ocean. In the time of the Guanche, all seven of the Canary Islands had rich cloud forests that trapped moisture from the fog-laden trade winds and quenched an otherwise dry region. Since then, though, much of the islands' forests have been lost - removed for firewood, construction and to make way for farmland. Most of the islands still have some degree of forest cover, but Lanzarote is all but bare.

Sometime in the last century, the last of the trees on high ground were cut down and the land began to dry out. While some farming survived in the low centre of the island, the lack of water combined with the rise of mass tourism in the 1960s meant that across much of the north of the island agriculture went into decline.

Now David Riebold, a British forestry scientist turned schoolteacher who owns a home on the island, has a plan to reverse the trend. He wants to use artificial fog harvesting to bring back the cloud forest, in what promises to be the largest reforestation project ever attempted using the technology.

The bare hills of northern Lanzarote have been of increasing concern to the island's authorities since it was declared a biosphere reserve by UNESCO in 1993. Despite numerous attempts in the past decade, all efforts at reforestation have so far failed. With limited

water supplies on the island the newly planted trees dried out and died, leaving the hilltops littered with hundreds of dead saplings.

Riebold's house is in the town of Haria from where, for years, he watched the local foresters' failed efforts. Then he read about a successful research project in Chile by a Canadian cloud physicist called Bob Schemenauer, which harvested the fogs that regularly rolled in from the Pacific Ocean and across the rainless Atacama desert. Nets erected on a ridge facing the ocean provided enough water for a small town. Realising that Lanzarote's climate was very similar to Chile's - with plenty of fog but very little rain - Riebold wondered whether fog harvesting could keep the saplings alive.

Beyond reach

Even in the hottest months, clouds form over the mountains of northern Lanzarote. As the trade winds blow over the island the mountains force moisture-rich air to rise and cool and condense water vapour into droplets. The surface of the mountain is too hot for this to happen at ground level, so the fog rarely touches the ground. Instead, it hovers about a metre above the soil. "That's why the saplings died," says Riebold. "They never get tall enough to touch the fog and capture the moisture on their leaves."

On paper, fog harvesting looked like a solution to the island's reforestation problems, but convincing the authorities to give it a try wasn't easy. For more than a decade Riebold tried and failed to convince the local

government and environmental groups to back his idea. With the appointment of the present mayor José Torres Stinga in 1999, his luck changed and the scheme was approved.

“Proyecto David”, as the locals call it, began last summer. The town authorities erected eight modest fog-collecting devices on three of Lanzarote’s mountains. Each is made up of a metal frame about 1 metre wide containing a plastic mesh, rather like a coarse net curtain. Any moisture that condenses onto the mesh runs down into a gutter and then empties into a plastic bottle. Larger scale set-ups can feed into an irrigation system to supply water to growing plants.

Initial results look promising. A litre a day should be enough to support one seedling, and Riebold has found that on some sites, a square metre of net catches an average of 2 litres of water each day. One site averaged 5 litres a day even at the hottest time of year.

The island council now plans to install eight much larger nets covering 12 square metres each. These will discharge 200 litres of water a day into a pumped drip irrigation network designed to keep the saplings watered. Riebold hopes that this will form the pilot phase of a full-scale reforestation of the mountains of northern Lanzarote. Either the hilltops could be covered with nets to grow new forests all at the same time, or it could be done in stages with a smaller number

of nets being moved around to reforest each area in turn. After perhaps two years of water from the fog collectors, saplings would be tall enough to collect the fog water themselves. Then the nets could be moved to the next site to begin watering another set of saplings.

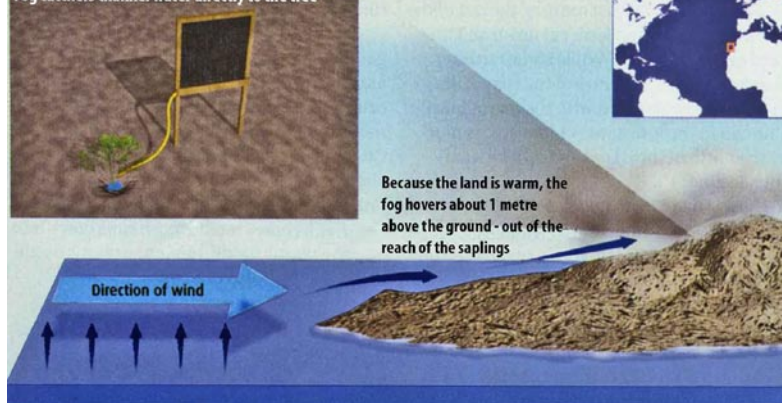
If the initial results scale up, a new cloud forest could restore the island to its former glory. The Lanzarote government has targeted an area of about 20 square kilometres in the north of the island that was originally covered by olive and pistachio forests. Riebold believes that the potential area for reforestation using fog collectors could stretch to 50 square kilometres. The town councillor in charge of the environment hopes the trees will trigger a more widespread greening of northern Lanzarote and have an impact on the whole local ecology. Once the trees are back, the quality of the soil will improve, and a long-lost forest ecosystem will have a chance to return, providing habitat for species long since confined to the other Canary islands.

Previous reforestation attempts used non-native trees but Riebold persuaded the island authorities to confine their efforts to close relatives of the wild olives and pistachios that

GREENING LANZAROTE

Trade winds blow moisture-rich air over the island. As the air rises over the land it cools and the water vapour condenses, forming fog. Fine mesh nets placed on the tops of the mountains can then catch the moisture to water saplings below.

Fog catchers channel water directly to the tree



Greening Lanzarote: graphic by Ronnie Lawrence

would have been in the original cloud forests. The Canarys are a reservoir of unique species and Lanzarote, he says, has more native plants than any of its neighbours. Riebold is known on the island as an expert - his garden in Haria contains more examples of some native species than just about anywhere else on Earth. “My garden is a miniature version of the ecosystem I want to revive,” he says. “I have several fine examples of the local wild olive *Acebuchia lanzarotes*. Only three others are known to remain in the wild.”

Knock-on effects of reviving the forests go beyond restoring the local ecology. Eventually the forests should capture enough moisture to help recharge the local underground aquifers, many of which have remained empty since the forests disappeared. If this happens, wells down in the valleys could also refill, reducing the island’s growing dependence on expensive desalinated seawater.

The technology could allow the revival of an ancient method of tapping underground water. Centuries ago the island’s inhabitants carved tunnels up the mountainside and into underground aquifers. These drained into collecting areas. The islanders call these tunnels ‘galerias’. Once they were the island’s main source of water, but have fallen into disuse. Reinstating the cloud forest could bring them back to life.

Water in Lanzarote has become expensive; desalinated water cannot officially be used to irrigate farmland which makes farming difficult. This, combined with the rise of tourism as a source of revenue, has turned it into a weekend occupation at best.

It remains to be seen if fog harvesting will prompt a large-scale return to farming on the island, but the lessons learned from harvesting fog on the island’s hilltops may be adapted elsewhere: Lanzarote is just a short

hop from West Africa, and the island’s average annual rainfall is less than that of many parts of the Sahara desert. If Lanzarote can catch moisture from the air and convert it to forests and farmland, then perhaps its famine-prone neighbours could do the same.

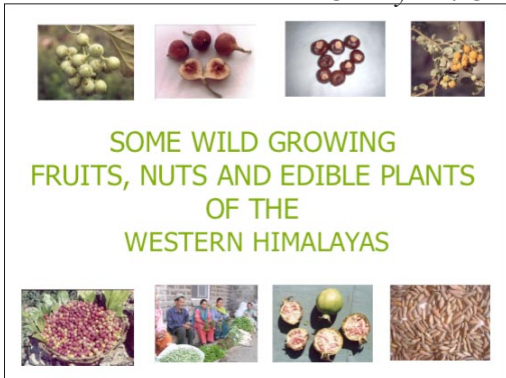
Fog harvesting is the brainchild of Bob Schemenauer, a Canadian cloud physicist, who first used the technology 15 years ago to provide water for a small town called Chungungo on the edge of Chile’s Atacama desert. Chungungo can go years with no rain, but fogs regularly roll in off the ocean. Schemenauer erected large sheets of polypropylene netting on a ridge over the town to catch moisture from the passing fog. The scheme was an immediate success. In the late 1990s the nets were delivering 10,000 litres of water a day to the town. The technology proved too successful for its own good. With a secure water supply, the town revived - the local authority invested in a water pipeline to supply new residents. The nets were no longer needed and were abandoned about five years ago.

Schemenauer now works on similar projects in Yemen, Eritrea, Namibia and Guatemala and has conducted field trials aimed at demonstrating how the technology could help regenerate forests. The most successful was at Mejia in the coastal hills of Peru, just up the coast from Chungungo. Funded by the European Union, it cost just 60 cents per tree and ran successfully for three years. While many of the trees are still standing today, when the project finished and the foreign scientists left, the locals abandoned fog harvesting.

If the Lanzarote reforestation project succeeds it will be the first use of fog-catching for major permanent reforestation and ecological revival, and could inspire similar projects around the world.

---Fred Pearce

A new CD by **Dr. Chiranjit Parmar**



Dr. Parmar is a horticulturist of 41 years experience in research, teaching, consulting and writing columns. He is the author of *WILD FRUITS OF THE SUB - HIMALAYAN REGION* published in 1982. The new CD has information about 30 wild growing fruits, 11 wild growing nuts and 10 wild growing edible plants. There are 152 pictures (88 of fruits, 22 of nuts and 36 of wild edible plants).

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The CD is priced at US\$15, which may be sent by Western Union Money Transfer, or send a personal cheque for US\$20 to the address above, as banks in India charge US\$5 for clearing all foreign cheques.

[<http://www.ars.usda.gov/is/pr/2006/061221.htm>]

New dwarf type may be a giant of grape research

Really big things may come from Pixie, a very small grape recently released by the Agricultural Research Service (ARS).

The seeded black fruit of this grape line is not meant for eating. Instead, the variety's novel traits make it ideal for genetics, genomics, breeding and other research that can lead to new breeding lines or cultivars that grape consumers will love.

Pixie fits well into its classification as a dwarf variety — mature clusters of Pixie typically measure slightly less than four inches long. A Pixie grapevine can be grown in a coffee cup and still produce some grapes.

This characteristic reduces by about 50-fold the amount of space needed for grapevine experimentation, as Pixie vines can be

grown in the greenhouse to maturity without ever needing to be planted in a vineyard.

What really makes the new grape line special is its ability to initiate fruit year round. In fact, it's typical to observe flower buds, blooms, immature fruit, and ripe fruit—all on the same vine.

While this trait would not be useful for the consumer-grape industry—grape producers prefer to pick their crop just once—it does accelerate research, allowing for year-round studies on flowers and berries at all stages of development.

---Luis Pons

On the WANATCA Website

<http://www.wanatca.org.au>

Yearbook 6, 1980, is now on-line. (Yearbook 5 has some technical difficulties, and will appear later.)

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Trees will eat anything!

Photo by Jody Boyman