



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Growing lemons in Australia- a production manual - Readers' Note

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<http://www.dpi.nsw.gov.au/agriculture/horticulture/citrus/lemon-manual>

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Eureka is Australia’s main lemon variety

INTRODUCTION

Around the world lemons are largely grown in the semi-arid and arid subtropical regions with mild winter temperatures. The two most important acid lemon varieties are Eureka and Lisbon.

In Australia the main lemon varieties grown commercially are Eureka, Lisbon and Meyer. There are also small plantings of other varieties including Fino, Verna, Villafranca and Yen Ben. Several new varieties and clones of lemon have also recently or will soon become available including Allen Eureka, Eureka Seedless (Eureka SL from South Africa), Genoa and Limoniera 8A.

Variety selection should be based on the product specifications of the market to be supplied and the climatic conditions of the growing site.

Information on the performance (yield and quality) of Eureka, Fino and Verna on a range of rootstocks is available from the Final Technical report on the lemon variety/rootstock trials undertaken at three sites from 1997-2003. This report (CT97002) is available from Horticulture Australia and is also on the Australian Citrus Growers website www.austcitrus.org.au

Included in this chapter are copies of the Lemon Variety Fact Sheets available at the Australian Citrus Growers website www.austcitrus.org.au These fact sheets are updated periodically.

LEMON VARIETIES

Eureka (48% of Australian lemon plantings) - there are a number of selections of Eureka, which are fairly similar. The two most commonly used clones in Australia are Taylor and Lambert. Management practices have a greater effect on fruit quality and yields than choice of clone. Eureka is incompatible with *P. trifoliata* and all citrange rootstocks except Benton citrange. In some regions Eureka tends to produce flowers at several times of the year. Sometimes cultural practices can be manipulated to produce larger summer crops which generally attract very high returns. Eureka is moderately vigorous, virtually thornless, sparsely foliated with the main crop produced in winter and smaller crops in spring and summer. Fruit is normally produced in terminal clusters at the ends of branches.

Eureka SL from South Africa was obtained by gamma irradiating Frost nucellar Eureka lemon. It is totally seedless even under strong pollination pressure. Pollen fertility (6%) is much lower than Eureka (50%). The other fruit characteristics are normal for Eureka. Eureka SL has a higher rind oil content, a lower fruit set with more fruit abscission. It is a more rounded fruit than the seedy Eureka and less acceptable to the Japanese.

Allen Eureka - More buds of Allen Eureka are distributed in California, by the California Clonal Protection Program (CCPP) than of any other clone of Eureka lemon. In Arizona, it is claimed that the foliage of Allen Eureka is virtually thornless, and harvesting is easier. Allen Eureka has been imported by Auscitrus and is undergoing multiplication. Budwood will be available to nurserymen in 2004.

Like other Eureka lemon clones, Allen Eureka is incompatible with *Poncirus trifoliata*, citrange and citrumelo rootstocks. It will be assessed on Cox and Fraser hybrid rootstocks and Benton citrange to see if it is compatible.

[Extracted from Auscitrus Fact Sheet 27 (02/02) Newly Available Lemon Varieties.]

Fino and Verna - are varieties recently imported from Spain. They were evaluated at three Australian sites, the results of which are available in Project Report CT97002 available from Horticulture Australia.

At all sites Fino matured at a time similar to Eureka and produced nice shaped fruit. Fino is planted extensively in the Murcia area of Spain and is noted for its smooth rind texture and consistent heavy crops. Fino is vigorous, somewhat thorny with a tree habit similar to Eureka. The main crop is produced in winter and it tends to out yield Eureka. At Gosford it produces several smaller crops between spring and autumn.

While Verna matured later and could be held on the tree for very late harvest, as late as mid November at Renmark, it produced mainly elongated and rough textured fruit (probably a consequence of the juvenile vigour of young trees). Verna trees were planted at Renmark in late 1994 and in 2003 fruit are now more attractive than from younger trees, but still a little too rough textured for export markets. This will probably make Verna less suitable for commercial production. Verna is virtually thornless, is prone to alternate bearing and produces its main crop in late winter-spring.

Genoa (Genova) Lemon - This variety is of Italian origin, like Villafranca. The tree has fewer and smaller thorns on fruiting branches and is of smaller habit than Eureka, but is more cold tolerant and has denser foliage.

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It is the leading lemon variety in Chile and accounts for 83% of the planted area. Genoa produces fruit almost all year round in Chile, with an intermediate proportion of fruit during the summer and autumn months (30%). The fruit has very good appearance, is ellipsoid in shape with a small pointed neck and nipple and is of medium size. It has a smooth thin rind, high juice content and a relatively low number of seeds (3-8). It bears fruit on the outside of the canopy making it prone to wind damage. For maturity dates and fruit quality assessments in Central California see the website www.ccpp.ucr/variety/503.html. In Argentina, Genoa lemon trees grown on Troyer citrange rootstock are the most productive combination.

Genoa lemon was privately imported from the budwood scheme in Concordia, Argentina. The private importer is currently assessing the horticultural performance of Genoa lemon in Queensland.

[Extracted from Auscitrus Fact Sheet 27 (02/02) Newly Available Lemon Varieties.]

Lisbon (29% of lemon plantings). - is very similar to Eureka, although it is generally considered that Lisbon is thornier and produces its main crop in winter. It tends to be more cold tolerant and produces more fruit on the inside, wind-protected parts of the canopy. This may result in better quality skins (less wind rub) even if boundary windbreaks have been established. Lisbon is vigorous, thorny, densely foliated with a more upright growth habit. Fruit tend to be produced on the inside of trees and the main crop is produced in winter. Lisbon is the most resistant variety to adverse climatic conditions (heat and cold).

Limoniera 8A - Currently the preferred selection in California, Arizona and Argentina. It has similar vigour to Eureka and blossoms more, leading to a much longer harvesting period: for example, in Arizona it is picked twice monthly, from April to October and once monthly from November to March. Fruit size and seediness is similar to Eureka and it has a high rind oil yield.

[Extracted from Citrus Varieties of the World by James Saunt (2000)]

Meyer (9% of lemon plantings) - has a much lower acid content, a more orange rind colour, fruit is less elongated and more bulky than other lemon varieties. It tends to have a smooth thin rind which is more sensitive to damage. Meyer is nearly thornless with the main crop produced in winter but it tends to crop continuously throughout the year.

Villafranca (2% of lemon plantings) - is rarely grown. Villafranca (Villa Franca) belongs to the Eureka group and the fruit is generally similar in appearance. The tree is closer in appearance to Lisbon, though less upright and less thorny. It is mainly a winter cropper, but in Queensland, where this variety is more commonly grown, it produces a significant proportion of its crop in summer if managed correctly, ie early harvesting, irrigation and nitrogen nutrition. The crop, however, is susceptible to rind breakdown during prolonged wet weather in autumn.

In a lemon variety and rootstock trial begun in 1971 at Gosford, Villafranca over 12 years had similar cumulative yields to Eureka and Lisbon and slightly greater summer crops, but trees are generally larger, more thorny, with a lower cropping efficiency. Its juice and citric acid levels are also lower than those of Eureka and Lisbon. There are no rootstock compatibility problems (except with

Varieties

smooth Seville) so this variety can also be planted on *P. trifoliata*, Troyer or Carrizo citranges (Freeman *et al.* 1986).

The Villafranca nucellar clone (Acc 3658) was originally selected in 1959 at Narara from seedlings sourced from an 18-year-old tree at Narara and can be supplied as selected status budwood.

[Extracted from NSW Agriculture Agnote DPI/137 Lemon Varieties, J. B. Forsyth and R. Sarooshi, 1996.]

Key References

Saunt, J. **Citrus Varieties of the World**. 2000.

Citrus Variety Factsheets on the Australian Citrus Growers website
www.austcitrus.com.au

EUREKA

Origin

Eureka lemon originated in 1858 in California from selections made from imported seeds from Sicily. Eureka is the most widely grown lemon variety in Australia, California, South Africa, Israel and Argentina. The most widely grown Eureka selections in Australia are Taylor and Lambert. Taylor is a nucellar selection from the home of C.M. Taylor at Crows Nest in Sydney, NSW in 1955. Lambert is a nucellar selection from H.R. Lambert near Taree, NSW in 1956.

A new clone, Allen Eureka, will be available to the Australian industry in 2004.

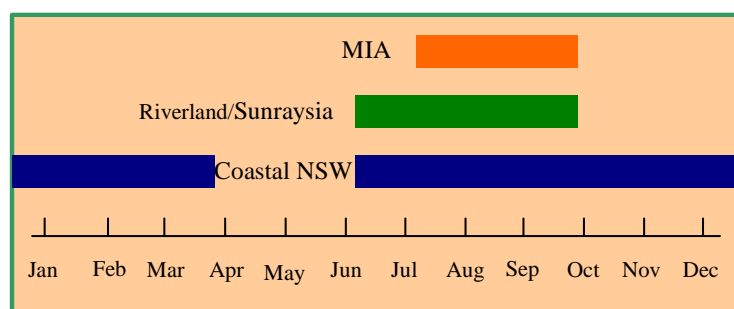
Type

Eureka lemon produces its main crop in winter. However, in coastal growing areas it flowers almost continuously from spring until late autumn producing two to three small crops in spring and summer.

Market

Mainly fresh domestic and some export. Some fruit is used for juice processing. A major export market currently exists in Japan for high quality, chemical free lemons. Premium prices are paid for summer lemons in Australia.

Marketing season (estimated)



Internal quality

Medium to thin skin, flesh colour greenish-yellow, high juice and acid levels. Seedless to five seeds per fruit.

External quality

Fruit from the main winter crop has an average weight of 160-180g. Eureka fruit are usually medium-small but become large and puffy two to three months after maturity. Fruit shape is elliptical to oblong and fruit has a short neck and medium nipple. Eureka lemon has yellow skin at maturity and often has ridges on the fruit surface. Eureka has a tendency to produce fruit in terminal clusters and is prone to wind blemish. In coastal growing areas citrus scab and melanose diseases cause blemish and disfigurement of the fruit rind.



Postharvest performance

Fruit keeps well in cold storage and is well suited to the 'curing' process carried out in California. With proper postharvest handling and fungicide treatment, good quality fruit can be harvested in July/August and cool stored until December/January. Summer lemons attract premium prices on the Australian market.



Eureka lemon fruit grown on Benton citrange rootstock



Eureka

Field performance

Eureka lemon produces trees of medium size and vigour. Trees are precocious, productive and have a spreading habit with sparse foliage. Eureka lemon trees are markedly less cold tolerant than Lisbon lemon and are virtually thornless, making picking easier. Eureka lemon is incompatible with *Poncirus trifoliata*, Troyer and Carrizo citranges and Swingle citrumelo. Trees on these rootstocks produce a characteristic 'yellow ring' at the bud union and usually decline at 6-10 years after planting. Eureka lemon is compatible with Benton citrange, Rough lemon, sweet orange and the recently released trifoliolate hybrids Fraser and Cox.

Results from the scion/rootstock trial at Kulnura on the Central Coast of NSW indicated that the highest crop yields over 5 years were from Taylor Eureka on Nelspruit hybrid 639, Benton citrange and Cox (3798). The most crop efficient combinations were Taylor Eureka on Nelspruit hybrid 639 and Benton citrange.

Eureka on Nelspruit hybrid 639 produced fruit with the highest juice content. Trees on Nelspruit hybrid 639 and Cox were medium with an upright habit and dense foliage. Trees on Benton citrange were variable, from small to medium, with an upright or willowy habit and which were either densely or sparsely foliated.

Pest and disease

In coastal growing areas Eureka lemon is susceptible to lemon scab melanose, black spot, broad mite and bud mites. The incidence of lemon scab and melanose can be reduced with regular removal of dead and diseased wood from trees. Leaf miner is a problem in young trees due to the constant production of new growth.

Extent of plantings

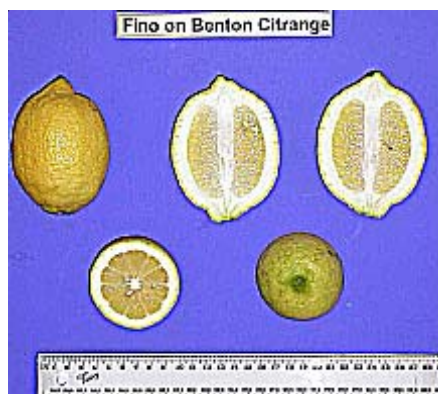
Currently Eureka is the most widely planted type of lemon in Australia. In 1996, there were 1.58 million trees of Eureka lemon (48% of the total lemon plantings in Australia) and the majority of these (61%) were of bearing age.

FINO

The origin of Fino lemon is unknown but it possibly came from an older Spanish variety. Fino lemon is also called Mesero or Primofiori in Spain. The variety currently available is Clone 46, imported into Australia from Spain and released from plant quarantine in 1994.

Type

Fino is a winter producing lemon, with production of one main crop in winter and early spring in southern Australia.

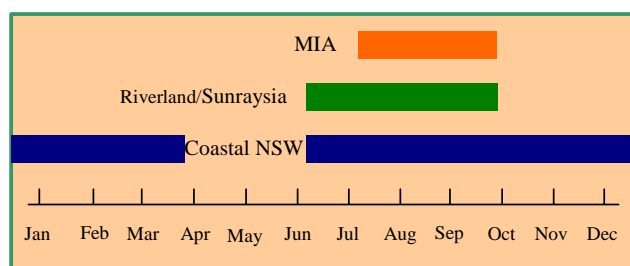


In coastal NSW Fino produces fruit throughout the year, similar to Eureka lemon.

Market

Fresh fruit, domestic and export potential. Fino was imported with the aim of producing high quality fruit suitable for export to Europe between September and mid November when premium prices are obtained.

Marketing season



Internal quality

Fino lemon has a high juice content, low seed number (averages five seeds per fruit) and juice acidity is high. Preliminary assessment of trial fruit at Renmark indicated that fruit grown on Benton citrange, *Poncirus trifoliata* and sour orange rootstocks had the highest juice content while fruit grown on Rough lemon and *C. volkameriana* rootstocks had the lowest juice content.

External quality

Fino lemon produces small-medium size fruit, spherical to oval in shape with a smooth thin rind. The nipple is comparatively small and short. Rind colour is pale yellow to yellow. Preliminary assessment of fruit at Renmark showed that fruit grown on Benton citrange, *Poncirus trifoliata* and sour orange rootstocks had the thinnest skins whilst fruit grown on Rough lemon and *C. volkameriana* rootstocks had the thickest skins. On the Central Coast of NSW Fino lemon produces smaller fruit than Eureka lemon.



Photo by April Winchel
Fino lemons

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Postharvest performance

Early season fruit responds well to ethylene degreening in Spain. In a storage trial on the Central Coast of NSW, fruit were harvested in August 2000 and put into cool storage (10°C and 90% RH) until January 2001, a period of 20 weeks. The results indicated 22% of fruit spoiled largely due to infection by green and blue moulds and total fruit weight loss was 42%. These results indicate that Fino has similar storage performance to Eureka lemon.



Photo by April Winchel
A bin of Fino lemons



Internal fruit quality of Fino grown on Benton citrange

Field performance

Fino lemon trees are very vigorous and somewhat thorny, with a tendency to produce rootstock suckers. Trees have some frost tolerance and are highly productive with uniform cropping.

Early results from trials at Renmark (SA) and Sunnycliffs (Vic) indicate that Fino lemon produces the largest trees on *C. volkameriana* and the smallest trees on *Poncirus trifoliata*. Some slight overgrowth of the bud union has been observed on Schaub Rough Lemon and the most suckers arose from trees on Benton citrange. Fino on Benton citrange out yielded all other rootstocks and also produced the largest fruit.

Results from the trial site at Kulnura on the Central Coast of NSW indicate that Fino lemon produces the largest trees on Benton citrange and the smallest trees on Fraser hybrid rootstock. Some overgrowth of the bud union has been observed on Benton citrange. The highest crop yields over 5 years were achieved on Nelspruit hybrid 639, Benton citrange and Cox. The most crop efficient combinations were Fino on Nelspruit hybrid 639 and Cox. At the Central Coast trial site around 70% of the annual yield was produced in winter with the remaining 30% produced between spring and autumn. Fino on Cox produced fruit with the highest juice content.

Overall trees on Benton citrange were medium to large with a willowy habit and sparse foliage. Trees on Cox were medium to large with an upright habit and dense foliage. Trees on Nelspruit hybrid 639 were small to medium with a willowy habit and sparse foliage.



Fino fruit grown on Benton citrange rootstock

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Pest and disease

Pest and disease susceptibility appears to be similar to other lemon varieties grown under Australian conditions. Melanose and lemon scab has been observed in coastal plantings.

Extent of plantings

Minor commercial plantings in Australia. Fino lemon was under evaluation at three trial sites across Australia on a range of rootstocks. Trials were established at Renmark, South Australia (1994), Sunnycliffs, Victoria (1997) and Kulnura, NSW (1997) as part of project CT97002 'Production of Quality Lemons' funded by Horticulture Australia Limited, and completed in 2004.

LISBON

Origin

Lisbon lemon is of Portuguese origin and was first grown in Australia in 1824. Lisbon lemon is also popular in California, Arizona, Uruguay and Argentina. The selection currently available (Prior nucellar) was imported into Australia from California in 1965. Another selection known as Limoniera 8A was imported into Australia and released from plant quarantine in 2000. Limoniera 8A is currently the most popular Lisbon lemon selection in California and Arizona.

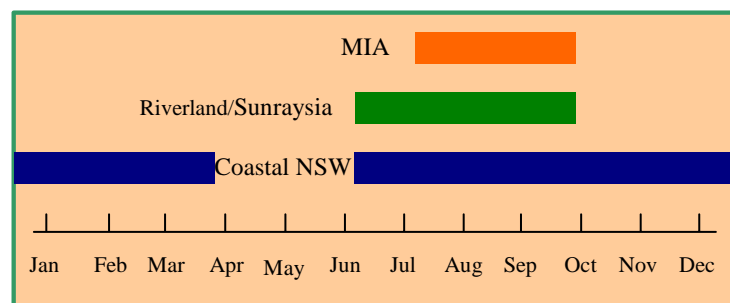
Type

Lisbon is a winter producing lemon, with production of one main crop in winter and early spring.

Market

Fruit is mainly used for fresh domestic markets. Small amounts of Lisbon fruit are used for export markets and juice production. Cool stored Lisbon lemons can attract premium prices on the Australian market between late November and February.

Marketing season (estimated)



Internal quality

Rind is medium in thickness, flesh colour pale greenish-yellow, tender with high juice and acid levels. Seed content varies from seedless to a few per fruit.

External quality

Lisbon fruit are medium in size and elliptical to oblong in shape, with an inconspicuous neck and prominent nipple. Fruit is generally smoother and less ribbed than Eureka lemon and fruit colour is yellow at maturity.

Postharvest performance

Fruit keeps well in cold storage and stands up well to the 'curing' process carried out in California. With proper postharvest handling, fungicides and cool storage treatments the fruit can attract premium prices on the summer lemon market in Australia.



Photo by Greg Moulds

Lisbon lemons tend to be thorny. Thorniness can decrease with tree age.

Field performance

Lisbon lemon trees are large and have a vigorous, upright growth habit. Trees have dense foliage and are very productive. Lisbon lemon trees grown at wide spacings can out-yield Eureka by up to 25 per cent. Trees are much thornier than Eureka lemon. Fruit is produced on the inside of the tree canopy and therefore protected from wind, sun and cold damage. Lisbon is generally hardier than Eureka with greater cold and heat tolerance. It is grown successfully in the cool winter/hot summer inland districts of Sunraysia, the mid-Murray and the Riverland. Production is mainly restricted to winter and early spring. Unlike Eureka, Lisbon is compatible with *Poncirus trifoliata* and Troyer and Carrizo citrange rootstocks. It can also be budded on Rough lemon rootstock but this combination produces very large trees. In the Central Coast growing region, Lisbon lemon on *Poncirus trifoliata* produces a smaller tree than on Troyer and Carrizo citrange rootstocks, but is highly productive.

Pest and disease

In coastal growing areas Lisbon lemon is susceptible to lemon scab, melanose, black spot, broad mites and bud mites. Incidence of citrus scab and melanose can be reduced with regular removal of dead and diseased wood from trees. Leaf miner is a problem in young trees due to the constant production of new growth.

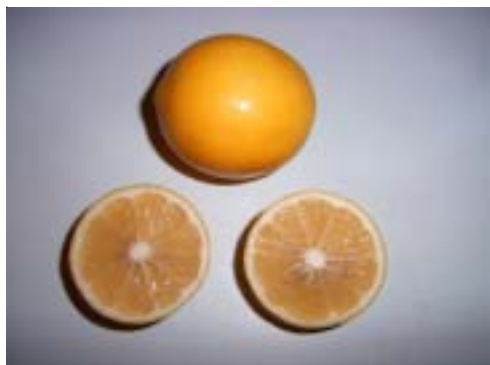
Extent of plantings

Lisbon lemon is widely planted in Australia and is second only to Eureka lemon in area planted. In 1996, there were 0.94 million trees of Lisbon lemon (29% of the total lemon plantings in Australia) and the majority of these (77%) were of bearing age. There has been minor interest in the Limoneira 8A selection since it was released in 2000.

MEYER

Origin

Meyer is not a true lemon and is probably a hybrid between a lemon and either an orange or mandarin. First imported into the USA from China in 1908 by F. N. Meyer. The original clone (Acc. No. 806) was introduced and planted at Narara, NSW in 1944.



Type

Meyer lemon is a popular choice for home gardens because it produces fruit throughout the year. Although planted commercially, its smooth soft rind makes handling, transporting and marketing difficult. Trees tend to have a weeping habit and fruit are borne in terminal clusters on the ends of branches.

Pruning is critical to encourage fruit on the insides of trees where they are protected from wind and sunburn.

Market

Most suitable for the domestic fresh market and processing sectors. Important variety for the home garden but minor as a commercial variety.

Marketing season (estimated)

Main production is in winter with some cropping in spring through summer. Grown in Queensland for its potential to fruit in spring and summer (October to March).

Internal quality

The pulp is a dark yellow colour and tender. Very juicy with low acid and high sugar levels and up to 10 seeds per fruit. The flavour is distinct – similar to a sweet lime.

External quality

Fairly large round fruit (65-75mm) with small to inconspicuous nipple. Attractive yellow-orange rind which is smooth, soft and thin. The peel lacks the typical lemon oil aroma and is not suitable for oil production.

Postharvest performance

Very sensitive to handling damage and Peteca because of its smooth soft rind. The fruit are not normally waxed as they tend to develop Peteca.

Field performance

Grown mostly in Queensland because of its tolerance to tropical hot conditions and potential to produce very big crops. Also grown in New Zealand because of its tolerance to cold and frost.

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Pest and disease

Susceptible to the main pests and diseases of other lemon varieties.

Extent of plantings

Mostly grown in Queensland on the Sunshine Coast around Caboolture and the Glasshouse Mountains, however commercial plantings are insignificant when compared to the other main varieties.

VERNA

Verna lemon is a Spanish variety of unknown origin that accounts for around 60% of Spain's annual lemon crop. It is also grown in Algeria and Morocco. Verna lemon was imported into Australia from Spain and released from plant quarantine in 1994.

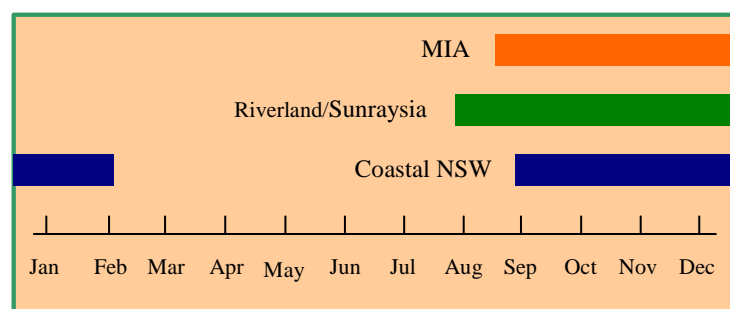
Type

Verna is a late maturing lemon that produces large fruit and low seed numbers. Verna produces a single crop in southern Australia and on the NSW Central Coast can produce several crops throughout the year.

Market

Verna lemon was imported with the aim of producing high quality summer lemons in Australia. Lemons marketed during summer attract premium prices on the Australian domestic market. Australia currently imports lemons from California during this period.

Marketing season (estimated)



Internal quality

Verna lemon is virtually seedless and has less juice than Eureka lemon. Verna has tender pulp and good acid content. The rind of fruit from the main crop is medium to thick but is thinner in second and third crops. Preliminary assessment of trial fruit grown at Renmark indicates that fruit with the highest juice content were from trees grown on *Poncirus trifoliata* and Benton citrange.

External quality

Fruit from the main crop is large in size and often excessively large from young trees. Verna fruit has a pronounced nipple and well developed neck. Fruit shape is oval/elongated in shape and intense yellow in colour. Rind texture is coarse and oily.

Postharvest performance

In a storage trial on the Central Coast of NSW fruit were harvested from two rootstocks (Benton citrange and Cox hybrid) in August 2000 and put into cool storage (10°C and 90% RH) until January 2001, a period of 20 weeks. Fruit spoilage



Photo by Greg Moulds
Verna lemon

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rates due to infection by blue and green moulds were 15% for Benton citrange and 30% for Cox hybrid. Fruit from Cox hybrid trees has higher spoilage rates as a result of cold damage to the fruit. Fruit weight loss was 36% for Benton citrange and 44% for Cox hybrid.

Field performance

Trees are large, spreading and productive. Verna produces a main crop in late winter and spring in southern Australia, and in coastal NSW several crops are produced throughout the year. Under Spanish conditions Verna usually flowers twice a year and in some years a third crop is produced. The second crop ('Secundus') is of inferior quality and of little commercial importance. Spanish growers will sometimes force the tree (through water stress) to produce a larger third crop known as 'Verdelli' with fruit maturing in summer. To obtain good quality fruit under Spanish conditions, Verna needs arid conditions and poorer soil. Late harvesting of fruit has a tendency to induce alternate bearing, especially following 'Verdelli' treatment. The long-term compatibility of Verna on *Poncirus trifoliata* and Troyer and Carrizo citranges is unknown at this stage but early observations at Dareton indicate that the Verna scion overgrows *Poncirus trifoliata* rootstock.



Verna can produce very heavy crops but is prone to biennial bearing



Verna fruit grown on Benton citrange rootstock

Early results from trials at Renmark (SA) and Sunnycliffs (Vic.) indicate that the largest trees are on *Citrus volkameriana* rootstock and the smallest are on *Poncirus trifoliata* rootstock. Some overgrowth at the bud union has been observed on Schaub Rough lemon and *Citrus volkameriana* and the most suckers arose from Verna on Schaub Rough lemon. At Renmark, Verna on Benton citrange had the highest yield and Verna was more productive than Fino lemon. At Sunnycliffs, Verna on *Citrus volkameriana* and Cox hybrid produced the highest yields, however Verna was less productive than Fino. Results from the trial site at Kulnura on the Central Coast of NSW indicate that Cox hybrid and *Citrus volkameriana* produced the largest trees and Fraser hybrid produced

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the smallest trees. Some overgrowth at the bud union has been observed on Fraser hybrid and Benton citrange. The highest crop yields over 5 years were from Verna on Benton citrange, Nelspruit hybrid 639 and Cox. The most crop efficient combinations were Verna on Nelspruit hybrid 639 and Benton citrange. Verna is less productive than Eureka and Fino lemons. On 4 year old trees 80% of the crop is produced in winter with the remaining 20% harvested between summer and autumn.

Verna on Nelspruit hybrid 639 produced fruit with the highest juice content.

Verna trees on Benton citrange and Cox rootstocks were of medium size, with an upright habit and dense foliage.

At all trial sites in Australia Verna appears to have a much later maturity period than either Eureka or Fino. At the Kulnura trial site the winter crop was still half to three quarters green when Eureka and Fino were completely coloured.

Pest and disease

Pest and disease susceptibility appears to be similar to other lemon varieties grown under Australian conditions.

Extent of plantings

Minor commercial plantings in Australia. Demand for budwood from Auscitrus has been low. Several early commercial plantings are planned for removal as a result of unfavourable fruit quality characteristics (primarily fruit shape) and the failure of trees to produce more than one crop in southern Australia. On the Central Coast of NSW, Eureka is preferred over Verna.

Verna lemon was under evaluation at three trial sites across Australia on a range of rootstocks. Trials were established at Renmark, South Australia (1994), Sunnycliffs, Victoria (1997) and Kulnura, NSW (1997) as part of project CT97002 'Production of Quality Lemons' funded by Horticulture Australia Limited and completed in 2004.



The shape of Verna fruit can be variable

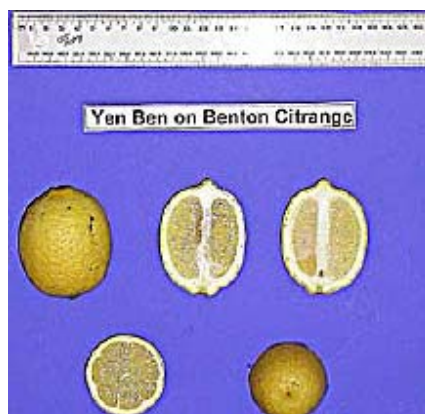
YEN BEN

Origin

Yen Ben lemon was selected as a sport of Lisbon lemon at 'Benyenda' near Burrum Heads, Queensland in the late 1930s. Yen Ben has been trialed in New Zealand since 1978 where it has become a popular lemon variety due to its good fruit quality characteristics.

Type

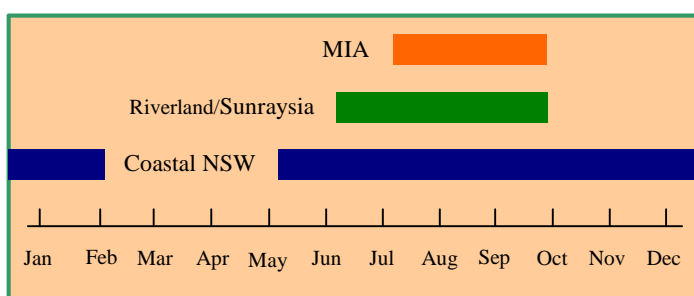
Yen Ben is a winter producing lemon and is most similar to Lisbon lemon. On the Central coast of NSW multiple crops are produced throughout the year with the majority of fruit harvested in winter.



Market

Domestic and possible export potential. There are only small plantings of Yen Ben in Australia at present but based on the New Zealand experience, fruit may have export potential for the Japanese market.

Marketing season (estimated)



Internal quality

Yen Ben lemon has high juice content that is maintained during long-term storage. Rind is thinner than both Eureka and Lisbon lemons. Low seed numbers, usually averaging around two seeds per fruit.

External quality

Yen Ben lemon produces smaller sized fruit than Eureka lemon. Fruit from the main winter crop has an average weight of around 120-130g per fruit. Yen Ben lemon produces fruit with a smooth textured, thin rind. Yen Ben fruit grown in New Zealand are recognised as having a high quality external appearance superior to other lemon cultivars.

Postharvest performance

Postharvest performance of Yen Ben lemon in Australia is unknown.

Field performance

Yen Ben lemon has a growth habit similar to Lisbon lemon and is comparatively thorny, especially in young trees. In New Zealand Yen Ben lemon produces a small but productive tree on *Poncirus trifoliata*. In New Zealand trees flower 4-5 times per year with 75% of the crop maturing in winter-spring. 500 trees/ha at year 10 were producing 40-45 tonnes/ha. There is little information currently available on the field performance of Yen Ben lemon under Australian growing conditions. A few trees at a lemon scion/

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rootstock trial at Kulnura showed Yen Ben on Benton citrange had a mean yield of 13kgs at 4 years. the trees are generally small to medium with a willowy habit and sparsely foliated.

Pest and disease

Pest and disease susceptibility appears to be similar to other lemon varieties grown under Australian conditions.



Extent of plantings

There are currently minor commercial plantings of Yen Ben lemon in Australia. In 1991 there were around ten thousand Yen Ben trees planted in New Zealand and there has been a subsequent rapid increase in new plantings. Yen Ben lemon is currently under evaluation in a range of lemon variety/rootstock trials in southern Australia.