CITRUS IN THE MURRAY VALLEY

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TABLE OF CONTENTS

THE STORY OF ORANGES

The Ancient Romans believe that the first citrus fruit were brought to Italy by Herperides, the daughter of Atlas, who crossed the Mediterranean Sea from Africa in a giant shell. Actually, oranges and their relatives reached Europe after a longer and more complicated series of journeys.

Citrus trees probably first appeared in the Malay Archipelago more than twenty million years ago. The fruit of the first citrus plants was more bitter than today's oranges. The citrus plants spread to various parts of Asia, and it is believed that the first of the modern citrus tree forms were developed in China. Even today, more citrus varieties can be found in China than anywhere in the world.

From China, the junks of early sailors carried citrus seeds and trees eastward to Japan and the South Pacific, westward to India and Africa and eventually to Italy.

The Roman conquerors helped to spread oranges and other citrus fruit through the lands of their empire. By the tenth century, oranges were growing in all countries of the Mediterranean region.

Crusaders returning from the Holy Lands brought back stories of oranges and this added to their popularity in Europe. For some time, oranges were not usually eaten as fruit in the countries of Europe. Orange trees were prized for their beauty and for the delightful odour of the blossoms and peel.

Christopher Columbus planted the first orange tree in the Western Hemisphere in 1493. He had brought seeds with him and planted them on the island of Haiti, and later expeditions continued the practice. Citrus groves sprang up around Spanish settlements in South and Central America, in Mexico and Florida.

ORANGES IN LEGENDS AND LORE

Wherever oranges have been grown they have found their way into local legends and superstitions, usually as symbols of good fortune.

In England and Italy, oranges were used in witchcraft as a symbol of the human heart. At the same time, oranges and orange blossoms were used in the making of perfumes and cosmetics.

Early seafarers found citrus to be a cure for Scurvy, a disease caused by their vitamin C deficient diet of salted meat and ship's biscuits. Oranges and other citrus are very rich in vitamin C. The Spanish planted citrus wherever they went in order to have a supply of citrus fruit at each stage of their voyages. The English coped with the same problem by having a daily ration of lime juice.

INTRODUCTION OF CITRUS TO AUSTRALIA AND MURRAY RIVER COUNTRY

Seeds of oranges, limes and lemons were first brought to Australia in 1788 by Captain Arthur Phillip, the first Governor of New South Wales. The colony's Chaplain, Reverend Richard Johnson, planted a small orange grove in Bridge Street, Sydney. These became the first orange trees to bear fruit in Australia. The Reverend Johnson, a meek and gentle preacher had the sense to buy some citrus seeds in Rio de Janeiro, Brazil on the way out with the first fleet. He made little progress with his preaching but amassed a small fortune from farming. After the success of his Bridge Street grove he was given a grant of 600 acres near Parramatta (NSW) where, within a few years, he managed to grow some fine fruit trees. The fruit sold for between sixpence and ninepence a piece.

Seedlings from South America were later introduced and by the 1820's all the common species of citrus except grapefruit were growing in and around Sydney. However, during the 1860-70's hundreds of acres of orange trees died from root diseases.

In 1887 the Chaffey Brothers came from California to Mildura and established an irrigation settlement.

The Chaffey's imported Washington Navel and Valencia orange trees from California and these trees became the forerunners of the citrus industry of the Murray River Country.

One of the Chaffey's original Valencia trees planted in the 1890's was removed and replanted in 1962 at the Sunraysia Horticultural Research Institute, Irymple.

THE MURRAY VALLEY CITRUS INDUSTRY

Citrus production in the Murray Valley stretches South East from the South Australian/Victorian border through the highly productive areas of Sunraysia, Mid Murray (Swan Hill and Barham) to the area surrounding Wangaratta.

Broadly speaking, it covers a distance of more than 600 kilometres along the Murray River.

Today, more than 6,500 hectares of citrus are planted for cultivation in the Murray Valley.

There are over 40 packinghouses and 9 juice processors to handle the crop. Merchants handling fresh citrus fruit are predominantly located in the capital city markets whilst the packers and processors are generally located in the production area.

Of all the citrus produced in the Murray Valley, approximately 34% is processed into juice, 22% is sold as fresh fruit mainly in the Melbourne and Sydney Markets and the remaining 44% is exported.

Marketing services through the Murray Valley Citrus Marketing Board provide producers with assistance in sales negotiations, locations of marketing outlets, price negotiations and co-ordination of exports.

Promotion forms a large part of the organisations activities, identifying the Murray Valley as the home of quality citrus.

VARIETIES OF CITRUS FRUIT

The main varieties of citrus grown in the Murray Valley are Valencia orange, Navel orange, grapefruit, lemons and mandarins.

Navel Oranges

The Navel orange, originally from Brazil was widely planted around the year 1860 under the name of Bahia. The name changed from Bahia to Washington Navel when an improved variety was introduced in 1870 from Brazil to Washington DC.

Today, the main varieties of Navels grown are Washington, Leng and of more recent years, the Late Lane. A D Leng discovered the Leng Navel, a mutant of the Washington Navel in 1934 near Mildura. In 1963 Lindsay Lane of Curlwaa, NSW, discovered the Lane Navel.

The greatest differences between the Navel varieties are shown in general in the fruit. Navels start to mature in May.

Navelina: The newest member of the Murray Valley Navel family. It matures early May, has brightly coloured rind, good size and high juice content.

Washington: Considered by many as the best of the eating oranges, normally with a thicker skin than Valencia.

Leng: The fruit has a thinner skin with finer texture than a Washington and is often smaller.

Late Lane: It is of similar size to a Washington Navel but matures later in September/October.

State Departments of Agriculture and Murray Valley Growers have banded together to develop late maturing Navels. It is hoped that these late varieties will help supply the demand for Navel oranges in Summer, as Navels from California, USA, are imported and compete with our Valencia oranges.

Extensive trials of early maturing Navels, earlier than May, are also being conducted.

Valencia Oranges

Production of Valencias has reduced considerably over the past few years, with growers now preferring Navel varieties over the Valencia.

Valencias grown are related to the Newton Valencia, which was introduced from California almost 100 years ago. The fruit is mostly medium to large, usually with some seeds. It has a medium to thick skin, which is fairly smooth.

Valencias start to mature about September but are at their best in November when their skin colour is light orange. Thereafter they tend to regreen *(see Fruit Colouring and Regreening)*. Because of the regreening of the skin, which in no way detracts from the flavour and quality of the fruit, shoppers often pass them by in favour of more orange coloured fruit and yet, many orange growers say that the late season Valencias are the best oranges of all. Valencias are considered the best fruit for juicing, as there is more juice, which, unlike Navel juice does not have the same tendency to turn bitter when stored.

Mandarins

The four main varieties are:

Early Imperials:

Imperials are a small to medium sized mandarin. They are smooth, thin-skinned and easy to peel. Imperials are at their flavorsome best from June to July.

Ellendale:

Generally this fruit is bigger than an imperial and has amore brightly coloured orange skin. Sometimes called a tangor, an Ellendale is actually a cross between a sweet orange and a mandarin. Easy to peel and very flavorsome. Typical season: July to September.

Murcott::

Obscure origin Second most widely planted mandarin in Australia. Smooth skin and longer life in cool storage. Very high juice content. Typical season: August to October.

Minneola Tangelo:

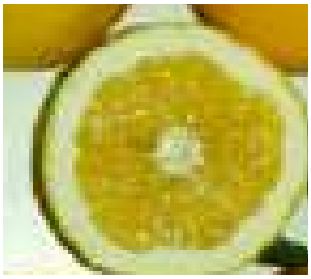
This is relatively new fruit to our markets. It is a cross between a Duncan Grapefruit and a Dancy Mandarin, and has inherited the taste and characteristics of both parents. The skin is smooth, and is coloured a bright reddish orange. The shape is round, with the fruit having a pronounced and distinctive neck, making it immediately recognisable.

Lemons

Lemons are available nearly all year round but are most plentiful during winter and spring.

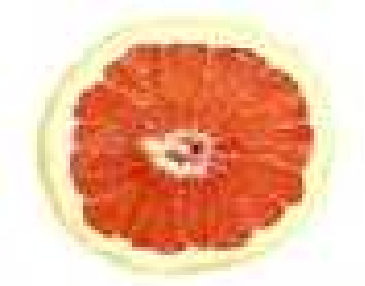
Like other citrus fruit, Lemons are high in natural vitamins, minerals and fibre. The tangy flavour of lemons enhances most dishes.
Being low in sodium, Lemons are an ideal substitute for salt.

Grapefruit



Marsh Seedless is the most significant variety grown. It is favoured because it is seedless and is a high quality fruit. It matures from late April and the harvest season extends through to the following March. They are probably at their sweetest from October onwards.

Red Fleshed grapefruit varieties are also being grown, with best times for eating from October to December. The red fleshed varieties tend to be sweeter and are very popular for juice and used in salads.



MAKING A CITRUS TREE- PROPAGATION

Citrus fruit trees were originally grown from seedlings. However, there are a number of disadvantages in raising fruit trees from seedlings. Usually the seedlings are thorny, grow wild, often with few but rougher fruit. Even more importantly, they may not grow to be like the parent trees.

There are ways to propagate citrus trees and other trees and obtain young trees exactly like the parents. The most popular method is by budding or grafting.

The first step in growing budded citrus trees is selecting a suitable rootstock for the type of soil etc. The bud is selected from a high quality, disease free, parent tree of the desired variety.

The operation of budding is quite simple. First, the rootstock is grown from a seed until it's stem is about the thickness of a pencil. Then a bud is cut from a branch of a mature orange tree of the right variety. A cut is made in the bark of the rootstock about 10-15 cm (4-6 inches) from the ground. The flaps of bark are gently pried up, and the bud is slid into the slit on the rootstock. The wound is wrapped with strips of plastic. The wrappings are left in place for about three weeks until the wound is healed.

When the bud sprouts and puts out leaves, the new young tree is tied loosely to a stake so that it will grow up strong and straight.

The tree will begin bearing fruit in the fourth year, and then have a good yield in the fifth. The citrus fruit it bears will be of the same variety as the tree from which the bud was taken.

All citrus trees flower in the Spring and under normal conditions, the greater the number of flowers, the more fruit. Only between 1 - 4% of the flower buds reach maturity.

ROOTSTOCK TREES

Rootstocks available in Australia vary considerably in their resistance to diseases and salinity. They also differ in longevity, mature tree size, tolerance to drought and cold and their influence on fruit quality and production has a significant effect on the success or failure of a citrus orchard.

Types of soils in which the citrus trees are planted, influence the type of rootstock selected. Eg Sweet Orange is suited to virgin Mallee soils whereas Trifoliate is more suited to Grey River soils. The performance of trees planted on Citrange Stock is midway between the two.

FRUIT COLOURING AND REGREENING

The best known citrus fruit subject to regreening is the Valencia orange. Regreening in Valencias takes place during the summer when Chlorophylls (green pigment) in the skin increase and cartenoids (orange pigment) decrease. Temperature is the major factor affecting fruit colouring. Regreening does not affect the internal quality of the fruit.

IRRIGATION

Irrigation is the most costly and time-consuming task involved in growing citrus in arid and semi-arid climates.

Water Requirements:

Mature citrus trees need at least 915 mm (36 inches) of water a year for good growth and production of quality fruit. Allowing for rainfall, evaporation and leaching, about 1150 mm (45 inches) of water should be applied per year.

Irrigation Techniques:

In recent years, increased salt levels in irrigation water has become a major influence on choice of system. Low level or under tree sprinklers are the main technique used, because they provide more efficient use of limited water resources, and they avoid wetting the leaves, preventing the uptake of salt through the leaves. Fixed overhead sprinklers were used by most growers prior to the advent of low-level and under tree sprinkler systems.

DRAINAGE

Many citrus plantings are situated on sand ridges, therefore there is a certain amount of natural drainage. However, where changes in soil type occurs, particularly in low lying areas, drainage is necessary.

SALINITY

Because soils, particularly in the Sunraysia area of the Murray Valley, are naturally salty, citrus trees are liable to absorb salt through their leaves.

NUTRITION

To maintain healthy growth, good fruit quality and maximum yields, citrus trees need a regular and balanced fertilizer program. The main fertilizers applied to citrus trees are the major elements - nitrogen, phosphorus, potassium and magnesium, and the minor elements zinc and manganese.

Leaf Analysis to Determine Fertilizer Program:

Apart from observing tree health, and fruit quality, the most useful method of determining optimum fertilizer program is leaf analysis which will reveal deficiencies, toxicity's or otherwise in the tree.

SOIL MANAGEMENT

Although cultivation is still used in some citrus groves, control of weeks by herbicides, in the tree row at least, is now a more important and effective means of soil management.

Herbicide use:

Possible methods of herbicide use -

- In combination with cultivation: Cultivation is maintained between rows, while the tree rows are treated with herbicides.

- No Cultivation/total weed control: the entire grove soil surface is treated with herbicides to maintain a weed-free surface.

Benefits of using herbicides:

- More economical than cultivation
- Improved yields
- Improved fruit quality and possibly earlier maturity
- Better water penetration and less soil erosion
- Reduced root injury from cultivation therefore better root growth
- Reduced frost risk because of cleaner and more compact soil surface.

CONTROLLING TREE SIZE AND SHAPE

Pruning:

Pruning is done by growers to eliminate dead wood & weak wood, cut out crossing limbs or low hanging branches, and encourage growth.

Hedging:

Recent trends are towards closer planting distances of trees, therefore the trees will eventually grow into a hedgerow. Mechanical hedging is used to limit tree size and shape so that the maximum surface area is exposed to the sun, to produce the greatest possible yield per hectare.

PESTS AND DISEASES

Citrus growers must cope with a variety of pests and diseases. The climate and environment in the Murray Valley minimises or eliminates many of the pests and disease that occur in more humid, coastal areas. The insect pest of citrus are scale insects, especially Red Scale. These small insects attach themselves to the fruit, branches and leaves, covering themselves in a waxy, protective coating. They spoil the appearance of the fruit and weaken the tree. Most growers have adopted biological control on this pest. Other pests such as mealy bug, light brown apple moth and snails, also occur. If it is necessary to use insecticides to control insect pests, care must be taken not to upset biological programs. During wet seasons, fungal diseases can appear. These are controlled by applying preventative sprays such as Bordeaux. Many virus diseases can be controlled by proper selection of Rootstock.

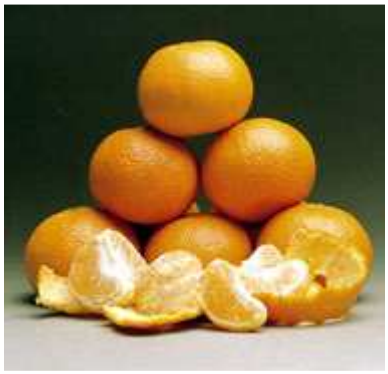
HARVESTING

Currently citrus fruit in Australia is hand picked, although mechanical harvesting methods are being researched. The fruit is pulled or snipped (as in the case of mandarins) from each tree and placed in a canvas bag hung around the picker's shoulders. This bag is emptied into a wooden or plastic field bin for transferring to the packing shed or juice processing plant.

POST HARVEST HANDLING

The treatment freshly picked citrus fruit receives can be quite different depending on whether it is to be eaten fresh or processed into juice.

Before the fruit is packed, it is washed, dried, and a thin coating of wax is applied to replace the natural wax removed by washing. The fruit is checked for damage and defects, graded into sizes and packed into cartons or net bags. Fruit destined for juice is taken to the juice processing plant where the extracted juice is converted to concentrate and later reconstituted or sold as fresh pure citrus juice or fruit juice drink.



CROP YIELDS IN THE MURRAY VALLEY

Management techniques, climatic conditions and rootstocks all influence crop yields. The average annual yield that could be expected of the various types of mature citrus trees is as follows:

Valencia	140 kg per tree
Navel	60 kg per tree
Lemons	200 kg per tree
Grapefruit	240 kg per tree
Imperial mandarin	130 kg per tree
Ellendale mandarin	110 kg per tree

SOME POINTS OF INTEREST ON ORANGES AND OTHER CITRUS FRUIT

Oranges and other citrus is grown commercially in the states of Australia except Tasmania.

They are produced under both natural rainfall conditions and under irrigation.

They do best under irrigated conditions due to their liking for an arid climate where insect pests and fungus diseases are rare.

Some of the irrigated areas in Australia are recognised as producers of the best quality citrus in the world.

The main requirements of citrus trees to obtain the best results are:

- A well drained sandy soil.
- An arid climate with a plentiful supply of irrigation water.
- Plenty of sunshine. This determines the amount of sugar in the fruit and this is turn determines flavour.
- Some frost which will help to give colour to the rind.

Citrus fruits have various uses for manufacturing purposes.

- Fresh juice
- Frozen concentrate
- Cordials
- Pasteurised canned juice
- Jam making
- Cleaning products

Oranges and other citrus are generally recognised as the best source of vitamin C. Balanced intake of both vitamins A and C may reduce the risk of some forms of cancer and assists the body in the healing process, strengthening body tissue, blood vessels and bones.