Custard apple information kit

Reprint – information current in 1998

REPRINT INFORMATION – PLEASE READ!

For updated information please call 13 25 23 or visit the website www.deedi.qld.gov.au

This publication has been reprinted as a digital book without any changes to the content published in 1998. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research:

- Chemical recommendations—check with an agronomist or Infopest www.infopest.qld.gov.au
- Financial information—costs and returns listed in this publication are out of date. Please contact an adviser or industry body to assist with identifying more current figures.
- Varieties—new varieties are likely to be available and some older varieties may no longer be recommended. Check with an agronomist, call the Business Information Centre on 13 25 23, visit our website www.deedi.qld.gov.au or contact the industry body.
- Contacts—many of the contact details may have changed and there could be several new contacts available. The industry organisation may be able to assist you to find the information or services you require.
- Organisation names—most government agencies referred to in this publication have had name changes. Contact the Business Information Centre on 13 25 23 or the industry organisation to find out the current name and contact details for these agencies.
- Additional information—many other sources of information are now available for each crop. Contact an agronomist, Business Information Centre on 13 25 23 or the industry organisation for other suggested reading.

Even with these limitations we believe this information kit provides important and valuable information for intending and existing growers.

This publication was last revised in 1998. The information is not current and the accuracy of the information cannot be guaranteed by the State of Queensland.

This information has been made available to assist users to identify issues involved in custard apple production. This information is not to be used or relied upon by users for any purpose which may expose the user or any other person to loss or damage. Users should conduct their own inquiries and rely on their own independent professional advice.

While every care has been taken in preparing this publication, the State of Queensland accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained in this publication.

Queensland Government

Before you START

If you have never grown custard apples before, you will find this section very useful. It is a checklist of the things you need to know before you start. It will help you make the right decision about growing custard apples. The information here is brief and to the point. We provide more detail on important areas in other sections of the kit. Symbols on the left of the page will help you make these links.

Contents

Overview of the custard apple industry

Australia grows about 1000 ha of custard apples, mainly in Queensland and northern New South Wales. In Queensland, the major production areas are the Sunshine Coast, Bundaberg district, Central Queensland and the Atherton Tableland. In New South Wales, most production comes from the Northern Rivers district.

The type of custard apple grown in Australia is unique in the world. It is known botanically as an atemoya and is thought to be a cross or hybrid between the cherimoya (*Annona cherimola*) and the sweetsop or sugar apple (*Annona squamosa*). Both cherimoya and sugar apple are widely grown overseas.

The Australian custard apple industry is based on three main varieties—African Pride, Hillary White and Pinks Mammoth. Hillary White originated as a budsport (a mutated shoot) from Pinks Mammoth and has now largely superseded its parent. This is largely due to its earlier and heavier cropping. Trees are grown in orchards on grafted cherimoya rootstock.

Fruit is harvested from about February to early November with the peak in May/June. Most fruit is marketed in the major metropolitan wholesale markets of Brisbane, Sydney, Melbourne, Adelaide and Perth. An increasing proportion of the crop is now being exported, mainly to south-east Asia.

Know what you are getting into

Custard apple has several attractions for the new grower. Here are the main ones.

- Custard apple has fewer serious pest and disease problems than tree crops like citrus, macadamias and stonefruit; fewer sprays have to be applied and the cost of pest and disease management is lower. With the use of natural and introduced beneficial insects and low-impact insecticides, there is the opportunity to grow the crop in a semi-organic manner.
- The crop has excellent export potential and has well-developed and well-organised market research, market development and quality management systems. Australian Custard Apple Growers' Association (ACAGA) has established the Jadefruit Custard Apple Marketing Group (JCAM) to coordinate independent group marketing for the industry.
- At the high quality end of the market, the crop appears to offer a high return per unit of effort compared to other fruit crops.

There are several constraints, however, to converting these advantages into a profitable business. Here are the important ones.

- Under current orchard management systems in Australia, some custard apple varieties (for example Pinks Mammoth) can have one of the lowest yields per hectare of all tree crops. Profitability,

however, is dependent largely on fruit quality and size, not just quantity. The production of quality fruit requires considerable skill and experience.

Research into trellis and tree training systems has indicated potentially higher yields (up to 45 t/ha in Brazil) from more intensively managed atemoya orchards.

- Further new plantings and increases in yield from existing trees will result in a future increase in production with potentially lower prices on the domestic market. While export markets may grow enough to absorb the extra production, many markets are still largely untested, making future prices and returns uncertain. Future prices will also depend increasingly on fruit quality. Success will only be assured when fruit is produced and marketed under some system of quality management. Prospective growers should see this as an essential goal.
- Custard apple trees are generally very large and when fully grown can be difficult to prune, spray and harvest. Special machinery can make spraying and harvesting easier but pruning generally is done by hand; this can be labour-intensive and expensive.
- Hillary White and Pinks Mammoth varieties must be hand pollinated (because of low levels of natural pollination) to achieve profitable yields of high quality fruit. This operation can be labour-intensive and expensive.

  Some North Queensland growers also find it profitable to hand pollinate African Pride to ensure good production for the higher priced market early in the season.

Before embarking on growing custard apples, take time to research the subject thoroughly. Examine potential domestic and export markets, their variety and quality standards, and thoroughly check market price and throughput information. Be cautious about extravagant claims of economic performance and do a thorough business plan.

What you can expect to make

Yields

Yield varies significantly depending on variety. African Pride starts bearing in about the second or third year when about 5 to 10 kg of fruit per tree can be expected. Pinks Mammoth, on the other hand, starts bearing in about the fourth to fifth year when about 5 kg of fruit per tree can be expected. Hillary White is intermediate between the two, with yields of about 5 to 10 kg of fruit expected in about the third or fourth year.

Yields at maturity (tenth year) for orchards with standard planting distances range from about 80 kg of fruit per tree for African Pride to about 100 kg of fruit per tree for Pinks Mammoth. This equates to about 16 t/ha for African Pride and about 13 to 14 t/ha for Hillary

White and Pinks Mammoth. Average yields per tree by age are shown in Table 1.

***Table 1**. Average yields per custard apple tree by age*

Year	3	4	5	6	7	8	9	10
African Pride (156 trees/ha)	10	35	60	70	70	80	80	80
Hillary White (125 trees/ha)	5	15	30	45	60	70	80	90
Pinks Mammoth (125 trees/ha)	-	4	15	25	50	70	80	100

Prices

For African Pride, average prices per 7 kg tray range from about $8 to $10 in the peak of the season (May/June) up to $20 or more for very early fruit (February) or very late fruit (November). For Hillary White and Pinks Mammoth, average prices per 7 kg tray range from about $10 to $15 in the peak of the season (May/June) up to $25 or more for very early fruit in February. Remember that only a small proportion of the crop achieves the higher prices.

more info
Market price information
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Indicators of prices and throughputs for the Brisbane and Sydney markets are shown in Figures 1 to 3. (Information courtesy of Market Information Services, Brisbane and Flemington Market Reporting Service, Sydney.)

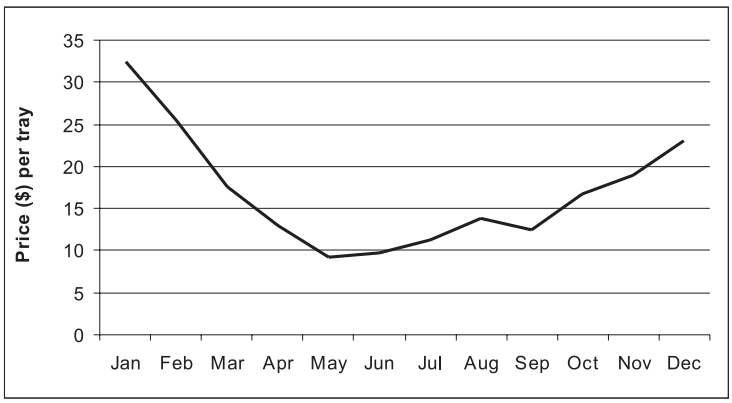

***Figure 1**. Average monthly price for 7 kg trays of custard apples at the Brisbane market 1995 to 1998*

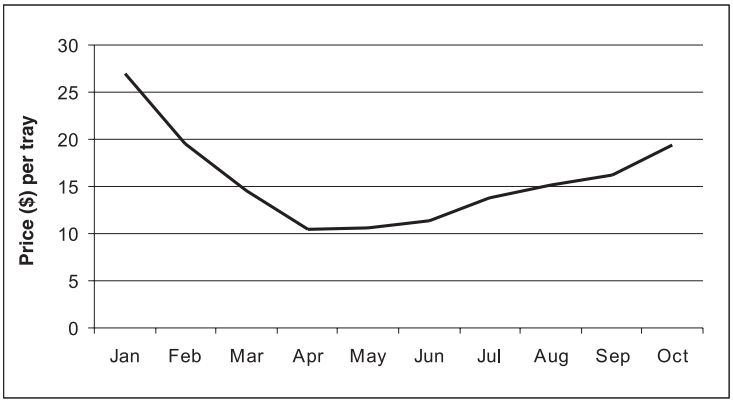

***Figure 2**. Average monthly price for 7 kg trays of custard apples at the Sydney market 1995 to 1998*

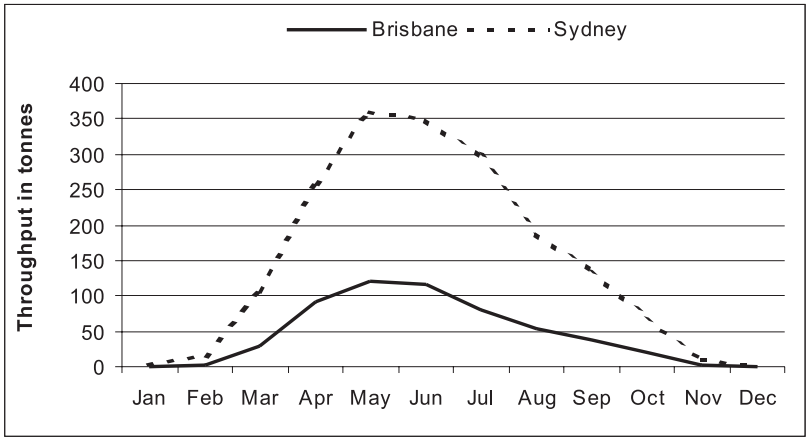

***Figure 3**. Average monthly throughput for custard apples at the Brisbane and Sydney markets 1995 to 1998*

Production costs

Production costs range from about $2500 to $3000 per hectare per year during the first three years to about $20 000 per hectare per year at maturity in the tenth year. This includes all growing and marketing costs such as fertilisers, chemicals, fuel, harvesting, packing, freight and agent's commission. The figures assume that mature trees yield about 10 to 12 trays per tree and casual labour is hired to assist the farm family with thinning, picking, packing and hand pollination. Fixed costs (rates, depreciation and loan interest) are not included.

Gross margin and cash flow

No income is received until the second or third year for African Pride and the third to fifth year for Hillary White and Pinks Mammoth. Annual expenses exceed annual income until about the fourth year in African Pride and about the fifth to sixth year in Hillary White and Pinks Mammoth.

For a typical mixed orchard of African Pride and Hillary White, gross margin (income from sale of fruit less production costs) ranges from about $3500 per hectare in the fifth year to about $15 000 per hectare in the tenth year. Accumulated income does not exceed accumulated expenses until at least the eighth year in African Pride and the ninth to tenth year in Hillary White and Pinks Mammoth.

Economics and gross margin
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When capital costs and fixed and overhead costs such as permanent labour, insurance and depreciation are also considered, accumulated income does not exceed accumulated expenses until about the thirteenth year.

The capital you need

Excluding the cost of house and land, an estimated $200 000 is required to establish an 8 ha custard apple orchard. This covers the

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cost of basic machinery (including a tractor and spray unit), irrigation system, cold room, packing shed, land preparation and tree establishment.

The farm you need

Soil

Custard apples are best suited to sandy loam soils, but well-structured clay loams are suitable. Although the main feeder roots are relatively shallow, at least 1 m of well-drained soil without heavy clay or rock is needed to avoid root rot and ensure good tree performance. Where the topsoil is less than 1 m deep, plant the trees on mounds.

Where possible, avoid soils where tomatoes, potatoes, eggplant, capsicums and ginger were previously grown. These crops are potential hosts of the disease bacterial wilt, to which custard apple is also susceptible. The disease threat is worst in poorly drained soils.

Slope

Slopes of up to 15% are suitable provided the orchard is designed to minimise erosion. Steeper slopes present a major erosion risk and make it difficult to operate machinery safely. Avoid these wherever possible.

Aspect

Custard apples have soft brittle wood and are extremely susceptible to wind damage, especially when carrying a full crop. Rubbing and exposure to drying winds also easily damages the fruit skin. A protected site is essential to ensure good yields and to reduce fruit marking and limb breakage. North to north-easterly slopes are usually the warmest and most protected from winds. Windbreaks are recommended in all situations but are essential on all slopes facing east, south and west.

Climate

The major climatic factors limiting commercial production of custard apples are temperature and humidity. Warm, well-protected, frost-free sites in districts receiving a predominantly summer rainfall are most suitable. The following factors should be considered when selecting the site.

Temperature and frost

Frosts can kill or severely damage both young and bearing trees. Frost-free sites are therefore essential.

Custard apple fruit are susceptible to skin discolouration and splitting where prolonged temperatures below about 13°C are experienced during the later stages of fruit development. To minimise this, sites with a relatively warm early winter are preferred.

Temperatures of 25° to 28°C during flowering (October to February) are favourable for good fruit set. At temperatures above 28°C, custard apples produce more growth and fewer flowers, and drying of flower parts increases. For this reason, custard apples are not suitable for coastal tropical or hot inland areas.

Relative humidity

A relative humidity of 70 to 80% is best for fruit set and the development of good fruit shape. Avoid dry inland areas where relative humidity during fruit set is likely to be below this level.

Water supply

Uniform soil moisture throughout fruit set and fruit development ensures high yields and helps prevent fruit splitting. Irrigation is essential if high quality fruit is to be grown.

In areas with good summer rainfall, a water reserve of 5 megalitres per hectare of orchard is necessary to maintain production in a dry year. As custard apples are sensitive to salt in the irrigation water, water salinity should not exceed an electrical conductivity of 800 microSiemens/centimetre (μS/cm).

The machinery you need

Essential equipment:

- permanent watering system such as under-tree minisprinklers
- 50 kW tractor
- weedicide sprayer (knapsack or handgun/tank/pump)
- power sprayer for pests and diseases (air blast sprayer preferred)
- splatter sprayer for applying fruit fly bait
- protective equipment for use when spraying
- slasher or mower
- ladders for harvesting
- picking buckets or bins
- trailer or utility for farm transport of fruit
- chemical storage area
- pruning equipment (secateurs, saws, loppers)
- cold room, preferably with forced air cooling facility
- undercover area with sorting/grading table for packing and storage.

Optional equipment includes:

- fertiliser spreader
- mechanised pruning equipment such as pneumatic/hydraulic secateurs
- specialised fruit grading equipment
- fruit pulp thermometers.

Small orchards may reduce capital costs by becoming part of a packing cooperative and by buying second-hand equipment.

The labour you need

Two people can generally handle up to 7 ha of mature trees without the need for permanent labour. However, casual labour will generally be required to assist with harvesting and packing. Extra casual labour may also be required if Hillary White or Pinks Mammoth trees are being hand pollinated.

Other considerations

An integrated crop management approach is recommended. This requires willingness to either employ specialised consultants for pest monitoring and water management or to learn these monitoring systems yourself.

During harvesting peaks, large quantities of fruit must be handled in a short period. This requires good organisational and labour management skills.

Pruning and hand pollination are essential operations in most orchards. As the trees are large, these operations require the extensive use of ladders, particularly in mature orchards. This requires a certain level of physical fitness and agility.

Knowledge of marketing and a commitment to quality throughout the entire production and marketing system are becoming essential if returns are to be maximised. Regular communication with people in the market chain, as well as other growers, is an integral part of this process.

To be successful, the orchard must be run as a business. This is a complex operation requiring many skills such as the ability to:

- interpret information supplied by pest management and irrigation consultants;
- interpret results of leaf tissue and soil analyses and correctly apply the recommended fertilisers;
- record the cycle of tree growth and fruit production;
- maintain accurate farm records;
- manage labour efficiently;
- become involved in market development by the industry;
- monitor receipts and expenses and maintain good financial records.

As production and marketing technology changes, it will also help if you are prepared to experiment with new ideas.