

# Papaw information kit

Reprint – information current in 2000



## REPRINT INFORMATION – PLEASE READ!

For updated information please call 13 25 23 or visit the website [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au)

This publication has been reprinted as a digital book without any changes to the content published in 2000. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research: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](http://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- Financial information—costs and returns listed in this publication are out of date.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.dpi.qld.gov.au](http://www.dpi.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 2000. 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 the production of mangoes. 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 papaw before, then you will find this section very useful. It is a brief checklist of the essential things you need to know before you start. It will help you make the right decision about growing papaws. 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.*

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## **An overview of the Queensland papaw industry**

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Queensland grows about 500 ha of papaw, mainly around Innisfail, Mareeba, Proserpine, Yarwun, Gympie and the Sunshine Coast.

The major types of papaw grown include yellow-fleshed dioecious lines and red-fleshed bisexual lines. The yellow-fleshed lines are usually either F1 hybrids or open pollinated, while the red bisexual lines are usually inbred. More red-fleshed varieties are becoming available and these may be either F1 hybrids or inbred and either dioecious or bisexual types.

More than 90% of papaws are grown for the fresh market with the remainder going to a minor processing industry. Fruit are harvested all year round with production peaks during autumn and spring.

The Australian papaw market is relatively small and can easily be oversupplied. There is a low level of consumer awareness of the fruit in Australia and generally low consumption of about 1 kg per head of population per year. The market size could increase but this would depend on successful market development.

With increasing production anticipated, growers will have to accept more responsibility for marketing, rather than being driven by production.

Most papaw growers also grow a range of other crops, for example, sugarcane, banana, mango, avocado, other tree fruits and vegetables. Many growers also raise cattle.

Queensland growers will face more competition from the developing papaw industries in Western Australia and the Northern Territory, as well as from fresh imported fruit from the Pacific region.

## **About the plant**

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The papaw is a soft wooded perennial plant that lives for about five years, though commercial plantations are usually replanted sooner. It normally grows as a single stem up to 4 m high. A crown of large palmate leaves at the top of the stem grows directly from the trunk.

The plant starts to flower five to eight months from planting and the fruit is ready to harvest five to six months after that. The plants grow fastest in warmer climates with good growing conditions. The fruit form in the leaf axils and hang on the tree after the leaves fall. Commercial harvesting continues for about two years until the trees become too tall to pick easily or tree losses become a problem. There are two distinct papaw plant types: dioecious and gynodioecious.

**Dioecious** papaws have male and female flowers on different plants. This means that both male and female plants are needed for fruit production (Figure 1).

**Gynodioecious** papaws, more commonly called bisexual types, have trees that can be female or bisexual. Bisexual flowers have both male and female parts within the same flower and can be self-pollinated.



**Figure 1.** A male (left) and a female papaw plant from a dioecious papaw variety



Understanding the papaw plant  
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The sex of a papaw plant can't be determined until it starts to flower. Growers plant more plants than they need to allow for the removal of unwanted plants at flowering.



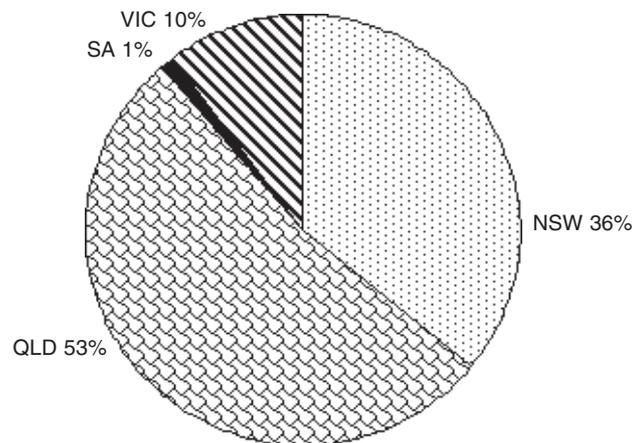
Varieties  
Section 4 page 10

### Know your market and what variety to grow

The variety you grow will depend on the market you wish to supply and the geographic location of your farm. Most of the Queensland papaw crop is consigned to the metropolitan wholesale markets of Brisbane, Sydney, Melbourne, Adelaide and Newcastle (Figure 2). Small amounts are exported and the remainder is sold locally.



Papaw types  
Section 3 page 5



**Figure 2.** Percentage of Queensland papaw production sent to four states in 1999

Varieties you could consider include the yellow-fleshed hybrid varieties Hybrid 29 and Hybrid 14 in central Queensland and the inbred yellow-fleshed PG lines and Richter selections in south-east Queensland.

The established yellow hybrid varieties, Hybrid 1B and Hybrid 11B, and the red-fleshed Sunrise Solo, are the most popular papaw varieties grown in north Queensland, with Hybrid 29 grown in the lower rainfall areas. Other red-fleshed varieties are increasing in popularity in north Queensland and may be worth testing in central and south-east Queensland.

### Know what you are getting into

Successful papaw production depends on a favourable growing environment, careful planning and crop management, and a commitment to quality. Growers will need to be business-like and adopt food safety and quality assurance programs.

Prepare a thorough business plan before starting papaw production. This will indicate what return you can expect on the investment. We suggest you don't plan to plant more than 1 ha in the first year. It can take up to four years to gain sufficient experience to manage papaws profitably.

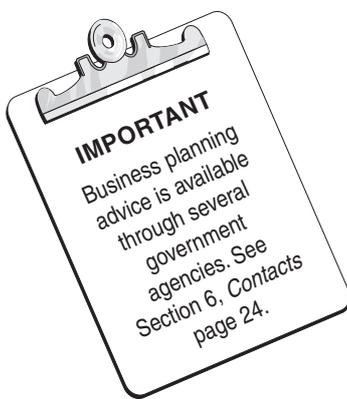
Papaws are a popular first crop with new growers as they are seen as providing a quicker return than most other tree crops. Prices are often depressed during peak production periods, however, and many things can go wrong with the crop.

Over the past few years, papaw has been a popular crop for diversification for sugarcane growers in the Innisfail district. The reasons for this popularity include perceived quick returns, higher profitability from smaller areas of land and low capital for establishment because growers already own the land and most of the required machinery.

In the central and southern districts, there is a high probability of devastating dieback, yellow crinkle and mosaic disease outbreaks in one in five years. The lethal papaw ringspot virus is also present in south-east Queensland. The presence of black spot in south Queensland since 1994 has also added greatly to management costs. In coastal north Queensland, there is a high probability of severe losses to root rot diseases each year. Dieback has also been more prevalent in north Queensland in recent years. Cyclones, floods and extended rain periods can also cause significant or complete losses.

Papaw is a labour intensive crop requiring harvesting and packing at least once a week all year round. In north Queensland, harvesting and packing is required twice a week during most of the year.

The papaw is a fragile fruit that is easily damaged. It needs careful handling to prevent skin blemishes and bruising.



## What you can expect to make

### Yields

Yield and fruit quality varies with location, variety, crop management, disease incidence and the weather. Harvesting begins 10 to 16 months from planting, depending on your location and time of planting.

Marketable yields range from 40 to 90 tonnes per hectare for a 12 month harvest period. This equates to yields of 1.5 to 6 cartons (13 kg) per bearing tree per year. Yields are generally higher in north Queensland than in central and south-east Queensland.

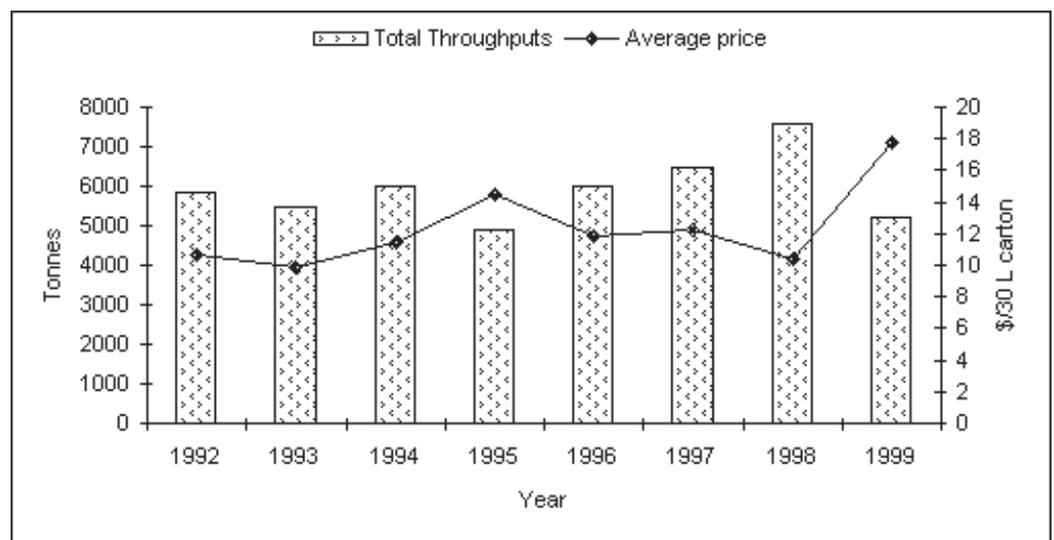


Economics of production  
Section 4 page 6

### Prices and throughput

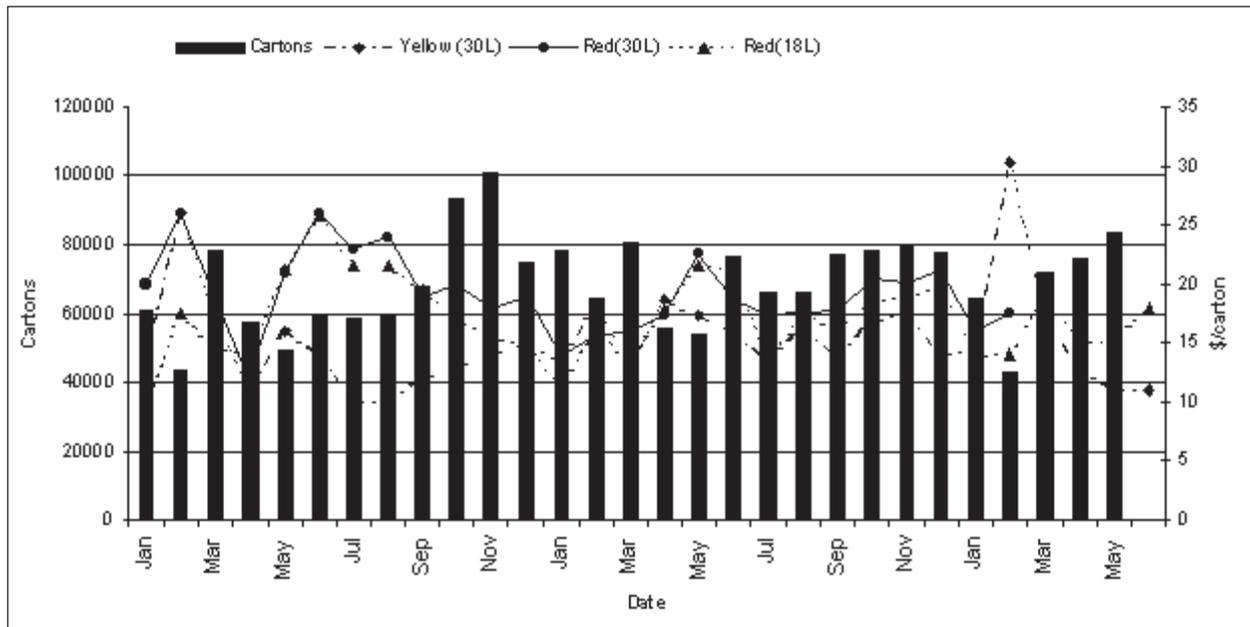
Prices for papaw vary in any one year and from year to year. The price can range from \$4 to \$45 per carton because of variations in supply and fruit quality. Prolonged higher prices are only achieved when significant natural disasters such as cyclones, storms or floods damage a large section of the tropical papaw industry.

The average Brisbane Market price from 1992 to 1999 for yellow papaw was about \$12.33 per 30 L carton (Figure 3). Red papayas are sold in 30 L cartons in the Brisbane market, however, most are sent to Sydney and Melbourne in 18 L cartons. Throughputs for red papaya in Brisbane are not known but an average price of \$15.50 per 30 L carton was achieved. The prices do not include deductions such as agent's commission and levies. Premium prices are paid for well presented packs of uniform, blemish-free fruit with a developed reputation for shelf-life and flavour.



**Figure 3.** Annual Brisbane Market throughputs and prices for yellow papaw only

Sydney (Flemington Markets) prices are usually used as benchmark prices (Figure 4). Prices are fairly elastic and inversely correspond to supply. Markets for yellow-fleshed and red-fleshed papaws are treated independently, as there appears to be definite market segmentation.



**Figure 4.** Historical pricing and throughputs for yellow and red papaw in Sydney between January 1996 and June 1998

### Variable costs

Variable costs include crop operations, harvesting and marketing costs. These costs can range between \$15 000 and \$26 000 to plant and grow 1 ha of papaw. An additional \$40 000 to \$60 000 per hectare is required to harvest, pack, transport and market papaws. Total variable costs will depend on farm location and the management system in place.

The productive life of a papaw plantation is usually two to 2.5 years in north Queensland, two to three years in central Queensland and three to four years in south-east Queensland.

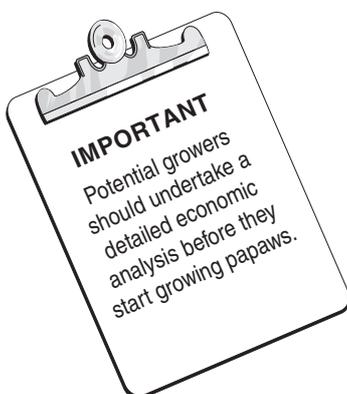
Papaws are usually harvested 10 to 12 months from planting in north and central Queensland and after 16 months in south-east Queensland.

### Expected income

Farm profit for papaw is dependent on yield and price. A small change in market prices can mean the difference between profit and loss. Based on an average production of 6600 cartons per hectare per crop cycle (10 months growth plus 14 months picking) **in north Queensland** and an average price of \$15 per 13 kg or 30 L carton, you would expect a gross income of \$99 000 per hectare. This would mean a gross margin of between \$13 000 and \$44 000 per hectare. A gross margin is the difference between the gross income and the variable costs of production.



Economics of production  
Section 4 page 6



Farm operating costs, fixed costs and living expenses will need to be deducted from the gross return. The gross margin does not include the labour supplied by the grower or the grower's family. These need to be included in a whole enterprise budget.

You will also need to consider the yield performance and the inputs for your particular location and management experience, as they will have a significant impact on your expected income.

## **The capital you need**

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You would need at least \$80 000 to \$120 000 to establish a papaw plantation of 6000 trees (3.5 ha). This includes the cost of trees and their establishment, a permanent watering system, machinery, harvesting equipment and a packing shed but not the cost of a house and land. You will also need a ripening facility in central and south-east Queensland.

## **The farm you need**

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### **Soil**

Papaws perform best on deep, well-drained soils with high organic matter. Most soil types are suitable but avoid heavy clay soils. A topsoil depth of 1 m is preferred for optimum growth and production, with a minimum depth of 0.5 m essential to avoid waterlogging.

### **Drainage**

Good drainage is very important for papaw production to minimise loss of trees to root rots and waterlogging. Papaw does not like wet soils so avoid sites that are prone to seepage or waterlogging. We recommend mounding soil to 75 cm in higher rainfall areas to increase drainage from the root zone for disease management and up to 30 cm for erosion control.

### **Slope**

Slopes of less than 15% are recommended for efficient labour and machinery management, safety and access, and to reduce the erosion risk.

### **Water**

Irrigation is essential to maintain tree growth, leaf cover, fruit set and production. The maximum water requirement is about 160 L/tree/week for under-tree minisprinklers (also known as microsprinklers) and 50 L/tree/week for drippers or driplines. Overhead irrigation is not recommended.



Papaws can be damaged by salty water. Avoid irrigation water of more than 1.2 deciSiemens per metre.

### Climate

Papaw is a tropical plant that grows best in warmer climates. It can be grown successfully in warm, frost-free locations in coastal south Queensland. Cool winter conditions will slow growth. Frost-free sites are essential, as papaw plants are susceptible to frost damage. Soil temperatures below 15°C will limit growth. In south-east Queensland northerly and north-easterly aspects are preferred to promote winter growth and fruit set.

The temperature of the locality influences the type of flowers and fruit that are formed on a tree.

### Wind

Wind reduces growth and fruit set, damages leaves and blemishes fruit. Protection from damaging south-easterly, westerly and northerly winds is essential. Windbreaks are recommended for all farms.

## The machinery and equipment you need

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The equipment requirement includes:

- tractor
- slasher
- 4WD trayback utility
- separate sprayers for herbicides and pesticides
- picking trailer, harvest-aids
- packing/machinery/chemical sheds
- dipping/spraying/washing equipment
- cold room
- ripening room
- cultivation equipment
- irrigation system
- tensiometers or capacitance probes
- picking poles
- fertiliser spreader.

You may not need to buy some equipment if contract cultivation services are available in your area.

## The labour you need

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The papaw crop is labour intensive. Two people should be able to manage 1 ha of bearing trees without assistance. This includes fertilising, watering, pest, disease and weed control, picking and packing.



Windbreaks  
Section 4 page 25

Casual labour is needed to help with harvesting and packing on larger plantations. If you have a mixed enterprise farm, you may need to hire extra casual labour if chores for crops overlap.

You will need skills in labour management and the ability to train staff as training and supervision of casual staff is essential for harvesting and packing. The ability to organise casual labour is also necessary.

## Other considerations

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

The marketing of papaws needs to be highly organised. Most papaws are sold as fresh fruit at the major metropolitan wholesale markets. You need to maintain close contact with your wholesaler and visit the major market in which your fruit is sold at least once a year. Smaller quantities are sold direct to retailers or consumers or sent for processing.

Profitability is dependent on a commitment to quality. Accurate record keeping and strict financial management are essential. Trends in papaw marketing are changing rapidly and you should maintain close contact with your wholesale agent(s) and local producer association.

To be successful, the orchard must be run as a business. Increasingly, growers will need to have an understanding of and be skilled in:

- supply chain management
- quality assurance and food safety programs
- marketing strategies
- environmental management
- financial management
- pest and disease identification, monitoring and management.

The management of major insect pests and diseases is essential. Growers need to identify and monitor pest and disease activity and take prompt action.

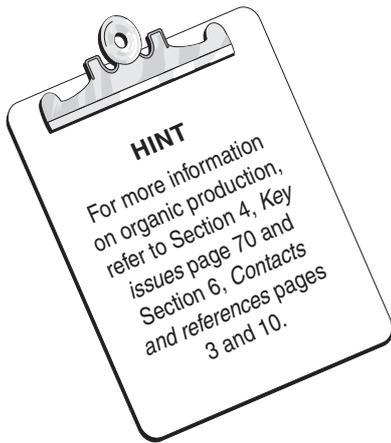
Quality assurance and food safety programs are becoming a prerequisite for sale of product to some supermarkets. You may need to have a quality assurance and/or food safety system in place. There are several systems that can form the basis for your system including the Approved Supplier Program, Freshcare, HACCP, SQF 2000<sup>CM</sup> and ISO 9002.



Marketing  
Section 4 page 61



Quality management  
Section 4 page 65



## Organic production

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Organic papaw production is of interest to some growers but it has some drawbacks due to pest and disease pressures and a lack of suitable organic control options.

Growers should consider the following factors in commercial papaw production before excluding synthetic fertilisers and pesticides:

- There are no effective biological controls for fruitspotting bug. Damage can be reduced by not planting near dense bush.
- Most Queensland soils have low organic matter and nutrient levels. Considerable time and effort may be required to build up these levels.
- There is no effective non-chemical control for the fungal problem black spot, which can cause severe leaf drop and result in unmarketable fruit.

If you do plan to grow papaws organically, select a location away from other papaw patches and dense scrub to reduce the impact from leaf diseases and infestation from insect pests.