Section B: Enterprise options

This section contains some of the resources and information you might need to help you work through the decision-making process in Section A ('Making the change').

Each of the chapters in this section describes one industry in detail. Each chapter contains the following information:

- **Thinking about . . .**
  A short summary of the industry, the situation in Queensland, where the industry is heading and the industry's risks and costs.

- **Critical factors**
  Specific information about the industry and its enterprise options, divided into the factors that are critical to that industry sector and related directly to the decision-making checklist in Section A.

- **Gross margins**
  Lists the various inputs you need to know to work out the gross margins for that industry's enterprises.

- **Contacts and further information**
  Lists DPI&F services, industry organisations and information sources on the web and in publications for that industry.
2 Vegetables

2.1 Thinking about growing vegetables

Irrigation is essential. **Unless you will be able to irrigate your crop, don’t even consider growing vegetables.** However, if you are able to irrigate, the following information can help you decide if vegetable production could be a suitable business venture for you. Are you aware of the risks and the costs of growing vegetables?

Depending on your crop and the equipment you have available, becoming a vegetable producer can be costly. Even for the lowest cost crops, such as pumpkins or watermelons, you need to spend a lot of money before you get any return. If you are already in a solid financial position and you want to diversify into vegetables, your chances of success are better than if your financial position is poor and you are trying to generate cash flow by growing vegetables.

Growing vegetables is a high-risk enterprise. Supply and demand are finely balanced for most vegetable crops for most of the year. This means that the prices you receive are rarely much more than the cost of production (variable costs only, not including fixed costs). When a vegetable is in oversupply, your crop might sell for less than its production cost. There might not even be a market for your crop.

When crop prices are high, it is because supply is short. This usually means at least one production area has been affected by bad weather (e.g. rain, frost, hail or drought)—that area could include your land.

Management and timing of operations is critical. Missing an irrigation, spray application or harvest by even one day can decimate your marketable yield, immediately removing some or all of your potential profit.

You need to have enough suitable land to rotate crops and cover, or green manure crops to maintain the health of your soil. In order to avoid diseases or pests building up, only grow one crop or crop family once a year in any field.

The main vegetable growing areas in Queensland are the dry tropics (Bowen–Burdekin), around Bundaberg, the Lockyer and Fassifern Valleys and the Granite Belt, with small areas around Gympie. These areas have the right infrastructure, such as transport and cooling facilities, and competing rural supply businesses to provide production inputs at competitive rates. Outside these areas, the infrastructure might not be available, which will push up your production and marketing costs.

The size of vegetable farms is changing. Farms are getting bigger to take advantage of economies of scale and meet the market demands of the major buyers (the chain stores). There are fewer medium-sized farms. Small family farms often grow small areas of high labour crops (such as chillies and cherry tomatoes) using family labour.

2.2 Critical factors

**Chemical residues**

Organochlorine residues (e.g. DDT, dieldrin or BHC) in the soil from previous land uses may be a problem for some vegetables. Carry out a risk management assessment for organochlorines for each crop you consider growing.

**Community**

Neighbours may see residues and spray drift from farmland as harmful, whether they are or not. If your land borders urban areas, plant windbreaks to reduce dust and pesticide spray drift.

**Climate**

Low temperatures are not generally suitable for growing vegetables. Most vegetable crops are affected by light frosts (–1 °C) and all of them are damaged by heavy frosts (–6 °C and below). Young plants, flowers and fruit are often more susceptible to frost than older plants. Tropical crops (e.g. sweetpotatoes) are chilled by low temperatures—their growth and yield is affected below 15 °C.

Wet or showery weather while the crop is growing make disease more likely and can reduce your ability to apply protective sprays.
Soils

Most vegetables grow on a wide range of soil types, but well-drained, sandy loams are best. Soil pH for most crops should be 6.0–6.5 pH. You can add lime or dolomite if the pH is lower. A complete soil analysis will tell you which is most suitable.

All vegetable crops need good drainage; none will survive prolonged waterlogging. You can mound soil into hills to increase soil depth and improve drainage.

Vegetable crops need a soil that drains quickly after heavy rainfall because you must be able to access the crop to spray, particularly fungicides (wet weather helps diseases develop). You also need easy access when you are harvesting.

If the soil has a high electrical conductivity or ECi (i.e. the soil water in the root zone is salty), yields will be reduced and plants may die unless the salt is leached out by rainfall or good quality irrigation water. A complete soil analysis will record the ECi of the soil in deciSiemens per metre (dS/m).

Acid sulfate soils are prone to poor drainage and waterlogging and are therefore unsuitable for vegetable production.

Topography

Uniform slopes are good but not essential for growing vegetables. Erosion can be a problem on steep slopes and depressions can become waterlogged. The degree of slope also affects the type of irrigation you can use.

Slopes steeper than 10% are too dangerous to operate machinery on and will make it too difficult for you to maintain uniform irrigation.

Irrigation

**If you can't irrigate, don't even consider growing vegetables.** Irrigation is essential to give a reasonable chance of producing an economically viable yield.

A good rule of thumb to use when estimating the amount of irrigation water required for a vegetable crop is 25 mm of rainfall or irrigation per week. Double that in hot weather and halve it in cool weather.

Calculate the amount of water you need. This will depend on:

- soil type—sandy soils need more water than clay soils
- crop
- length of time the crop is in the ground
- irrigation system used—drip (trickle) uses less water than overhead or furrow irrigation
- whether you use accurate irrigation scheduling equipment, which can reduce the amount of water you need
- climate—hot, dry, windy weather dries out crops and soil; good rain reduces irrigation requirements.

Water quality is very important. It is measured as electrical conductivity or ECi, in deciSiemens per metre (dS/m). Poor quality water with a high ECi (i.e. high salt content) can:

- damage soil structure
- damage or kill plants
- reduce yields without obviously signs of damage.

Many plants are more sensitive to salt damage as seedlings. You can use water with a higher salt content if you use drip or furrow irrigation rather than overhead irrigation. You can use water with a higher salt content on sandy soils rather than clay soils.
Infrastructure
One infrastructure item you will need to consider is a cooling facility. To retain freshness and extend shelf life, most crops are cooled to remove their field heat as soon as possible after harvest. Cooling facilities are best situated on-farm, but might be available at the transporter's depot.

To get produce to the markets in good condition, you need a reliable refrigerated transport service. These transporters should have cool room facilities to either cool or maintain the temperature of pre-cooled produce before it is loaded into the refrigerated trucks.

One option for reducing capital costs and gaining a marketing advantage is to supply your produce to a commercial packhouse that has a strong marketing section.

Labour
Many vegetable crops need a lot of labour, particularly for planting and harvesting. Be sure that you will have access to, and can manage, a large reliable labour force when you need it.

Marketing
The main markets for Queensland produce are Brisbane, Sydney and Melbourne. There is also a market for some crops in Adelaide, Hobart, Perth and some smaller provincial markets. Some of these markets have quarantine restrictions. The DPI&F's plant health officers can advise you of the requirements for each crop for each state.

There may be niche markets, for example, at a local outlet or for a different crop, but these can very easily be over supplied, either by you or other suppliers.

Quality assurance
All major retailers require that their suppliers have a quality assurance (QA) system. Invest time, effort and money to achieve the required system and level of QA. Contact your buyer (e.g. market agent) to determine the level of QA needed for your business.

Regulation
You do not need a licence to become a vegetable grower. However, if you want to sell direct to the public, you need to meet legislated food safety requirements. Some interstate markets have quarantine regulations (see 'Marketing' above).

You will need to complete a ChemCert Training course to be able to buy some chemicals. This training is also required for most QA systems. Find out about this training from the DPI&F Business Information Centre on 13 25 23. See Section C ('Guide to services') for more information.

Land use
Changes in the use of your land may be assessable under your local council's planning scheme. You are strongly advised to contact your local council if you are intending any change in use of land associated with a change of agricultural activity and seek advice on rural uses that are self-assessable, code-assessable or impact-assessable.
2.3 Enterprise options

This subsection gives you information about individual vegetable growing enterprises. Table 2.1 gives you much of the detail you need to know about vegetable enterprise options. Look at the table, then read the crop information that comes after it.

Using the crop selector checklist

Table 2.1 includes the main crops grown. Minor crops (e.g. asparagus or okra) have not been included because not enough information is available.

Additional equipment

The ‘Level of additional equipment required’ column in Table 2.1 assumes that your farm already has suitable tractors and cultivation equipment such as rippers, disc harrows, tines, rotary hoe/power harrows and soil-mounding equipment.

Length of crop

Most vegetable producers plant crops as container-grown seedlings. These seedlings generally take 4–6 weeks from sowing until they are ready to plant in the field, so add this time to the times indicated in Table 2.1 to determine the total length of the crop to harvest.

Crops will reach harvest stage more quickly in warm weather than cool weather. The time-to-harvest for crops planted in autumn increases the later they are planted. Spring plantings, on the other hand, grow quicker. A crop you planted in mid-July may be ready to harvest only 1–2 weeks before a crop you planted four weeks later in mid-August.
Table 2.1 Crop selector for vegetables

<table>
<thead>
<tr>
<th>Crop</th>
<th>Soil drainage importance</th>
<th>Soil depth (cm) minimum</th>
<th>Soil EC (dS/m)*</th>
<th>Total water required (ML/ha)</th>
<th>Water quality, EC (dS/m)*</th>
<th>Sensitive to light frost (–1°C)</th>
<th>Level of capital required</th>
<th>Level of additional equipment required</th>
<th>Cooling facilities required</th>
<th>Pest risk</th>
<th>Disease risk</th>
<th>Plant to harvest (weeks)</th>
<th>Length of harvest (weeks)</th>
<th>Timeliness of harvest</th>
<th>Management skills</th>
<th>Labour required to harvest and pack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beans (green)</td>
<td>H</td>
<td>25</td>
<td>1.0</td>
<td>2–4</td>
<td>0.6–1.9</td>
<td>Y</td>
<td>H</td>
<td>Y</td>
<td>H</td>
<td>M–H</td>
<td>M–H</td>
<td>7–11</td>
<td>0–2</td>
<td>VH</td>
<td>M–H</td>
<td>M–H</td>
</tr>
<tr>
<td>Brassicas</td>
<td>H</td>
<td>30</td>
<td>1.8–2.8</td>
<td>3–4</td>
<td>1.2–4.9</td>
<td>N</td>
<td>H</td>
<td>L–M (M–H)</td>
<td>Y</td>
<td>M–H</td>
<td>VH</td>
<td>H</td>
<td>8–16</td>
<td>0–3</td>
<td>M–H</td>
<td>M–H</td>
</tr>
<tr>
<td>Button squash</td>
<td>H</td>
<td>25</td>
<td>3.2</td>
<td>2–3</td>
<td>1.6–4.8</td>
<td>Y</td>
<td>L</td>
<td>L</td>
<td>Y VH</td>
<td>M–H</td>
<td>M–H</td>
<td>6</td>
<td>1–8</td>
<td>VH</td>
<td>M VB</td>
<td>VB</td>
</tr>
<tr>
<td>Capsicums</td>
<td>H</td>
<td>30</td>
<td>1.5</td>
<td>3–4</td>
<td>0.9–2.8</td>
<td>Y</td>
<td>M</td>
<td>L–M (M–H)</td>
<td>Y</td>
<td>M–H</td>
<td>M–H</td>
<td>12–17</td>
<td>3–6</td>
<td>M M M M</td>
<td>M M M M</td>
<td>VH</td>
</tr>
<tr>
<td>Cherry tomatoes</td>
<td>H</td>
<td>30</td>
<td>2.3</td>
<td>4–6</td>
<td>1.2–3.5</td>
<td>Y</td>
<td>L–M (M–H)</td>
<td>Y</td>
<td>M–H</td>
<td>M–H</td>
<td>VH</td>
<td>4–12</td>
<td>8–16</td>
<td>VH</td>
<td>M–M</td>
<td>VH</td>
</tr>
<tr>
<td>Chillies</td>
<td>H</td>
<td>30</td>
<td>1.5</td>
<td>3–4</td>
<td>0.9–2.8</td>
<td>Y</td>
<td>L</td>
<td>L</td>
<td>Y</td>
<td>M–H</td>
<td>M–H</td>
<td>12–17</td>
<td>8–16</td>
<td>VH</td>
<td>M–M</td>
<td>VH</td>
</tr>
<tr>
<td>Chokos</td>
<td>VH</td>
<td>70+</td>
<td>NA</td>
<td>4–8</td>
<td>0.8–1.3</td>
<td>Y</td>
<td>M</td>
<td>M</td>
<td>N</td>
<td>L–M</td>
<td>L–M</td>
<td>16–20</td>
<td>8–18</td>
<td>M–M M–M</td>
<td>M–M</td>
<td>M–M</td>
</tr>
<tr>
<td>Cucumbers</td>
<td>H</td>
<td>25</td>
<td>2.5</td>
<td>2–3</td>
<td>1.4–2.4</td>
<td>Y</td>
<td>L–V VH</td>
<td>L</td>
<td>Y</td>
<td>H M</td>
<td>M</td>
<td>8</td>
<td>1–6</td>
<td>H M M M</td>
<td>M M M M</td>
<td>VH</td>
</tr>
<tr>
<td>Eggplant</td>
<td>H</td>
<td>30</td>
<td>1.1</td>
<td>3–8</td>
<td>1.1–3.2</td>
<td>Y</td>
<td>L</td>
<td>L</td>
<td>Y</td>
<td>M M</td>
<td>M–M</td>
<td>14–18</td>
<td>8–18</td>
<td>M M M M</td>
<td>M M–H</td>
<td>H</td>
</tr>
<tr>
<td>Lettuce</td>
<td>H</td>
<td>30</td>
<td>1.3</td>
<td>2–3</td>
<td>0.9–2.7</td>
<td>N</td>
<td>M</td>
<td>L–M (Y VH)</td>
<td>Y</td>
<td>VH VH</td>
<td>VH</td>
<td>M–H</td>
<td>6–10</td>
<td>0–1</td>
<td>M–H H VH</td>
<td>VH</td>
</tr>
<tr>
<td>Pumpkins</td>
<td>H</td>
<td>30</td>
<td>2.5</td>
<td>2–3</td>
<td>1.1–3.2</td>
<td>Y</td>
<td>L</td>
<td>L</td>
<td>N</td>
<td>L–M</td>
<td>M–H</td>
<td>14–23</td>
<td>1–4</td>
<td>L M M M</td>
<td>M M M M</td>
<td>VH</td>
</tr>
<tr>
<td>Rockmelons &amp; honeydews</td>
<td>H</td>
<td>25</td>
<td>2.2</td>
<td>2–4</td>
<td>1.5–4.6</td>
<td>Y</td>
<td>M–H (M–H)</td>
<td>M–H (M–H)</td>
<td>Y</td>
<td>M–H</td>
<td>M–H</td>
<td>10–12</td>
<td>2–4</td>
<td>VH VH VH</td>
<td>VH VH VH</td>
<td>VH</td>
</tr>
<tr>
<td>Sweetcorn</td>
<td>VH</td>
<td>50</td>
<td>1.7</td>
<td>4–8</td>
<td>0.7–2.2</td>
<td>Y</td>
<td>H</td>
<td>H</td>
<td>Y</td>
<td>VH VH VH</td>
<td>VH VH</td>
<td>VH VH M–H</td>
<td>VH</td>
<td>H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td>H</td>
<td>30</td>
<td>2.3</td>
<td>4–6</td>
<td>1.2–3.5</td>
<td>Y</td>
<td>H</td>
<td>H</td>
<td>Y</td>
<td>VH VH</td>
<td>VH VH</td>
<td>H–M VH VH</td>
<td>VH</td>
<td>VH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zucchinis</td>
<td>H</td>
<td>25</td>
<td>4.7</td>
<td>2–3</td>
<td>2.4–7.3</td>
<td>Y</td>
<td>L</td>
<td>L</td>
<td>Y</td>
<td>VH VH</td>
<td>VH VH</td>
<td>VH VH M M</td>
<td>VH</td>
<td>VH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VH = very high; H = high; M = medium/moderate; L = low; NA = not available; V = varies with crop selected; Y = yes; N = no

* Maximum level before significant yield reduction or crop damage can be expected to occur.

# There are peak harvests in autumn and spring, each about eight weeks long.
Crop information

Read these crop notes along with the information in Table 2.1.

Asian vegetables

A wide range of Asian vegetables grow in Queensland. In addition to the general information in Table 2.1, find specific information on the individual crop you are interested in. These crops only have a small market, so make sure you have a market for your produce before you plant.

Beans (green)

Most green beans are now produced on large farms that harvest 75–80% of the crop mechanically in a once-over process, which strips the plant of beans and leaves. Buyers pay a premium for hand-harvested beans, which are picked up to three times. Over 95% of Gympie growers hand-harvest their green beans. The packhouse at Gympie will pack and market beans for growers under contract.

Brassicas

The main brassica crops (included in Table 2.1) are cabbage, cauliflower and broccoli, but brassicas include brussels sprouts, radish, turnips and many Asian vegetables (see above). Brassicas are grown mostly in the Lockyer and Fassifern Valleys, the eastern Darling Downs and the Granite Belt. The requirements for each of these crops are slightly different, so figures in Table 2.1 are an average. Unlike most other crops mentioned, brassicas prefer cool rather than warm conditions.

Button squash

Button squash is a quick crop from planting to first harvest and requires less outlay to reach the first harvest than some other vegetables. In warm conditions, harvest the crop daily or the squash grow too big for the market. The length of time they can be harvested is often determined by whether or not the plants become infected with a virus. Once aphid-borne viruses infect plants, they may not produce any saleable crop. Cool squash as soon as possible after harvest.

Capsicums

Most Queensland capsicums are grown in the Bowen–Burdekin area and around Bundaberg. These areas can supply capsicums all year round, though their main production is April–December.

Production is becoming concentrated in a few large farms. Capsicums will not tolerate waterlogging and are susceptible to bacterial leaf spot in showery or wet weather. Timing of harvest is not critical because capsicums can be left on the plant to turn red. Red capsicums usually fetch a higher price, but yields are lower than green capsicums because the plant stops setting new fruit while loaded with existing fruit.

Cherry tomatoes

Cherry tomatoes also include pear and grape tomatoes. This crop requires trellising. There are a few large growers, but this is a crop that small family farms often grow because family members pick and pack the crop at a lower cost than employing outside labour.

Chillies

Chillies can be harvested over a prolonged period if the plants stay healthy. Like capsicums, timing of harvest is not critical because chillies can be left on the plant to turn red. Red chillies usually fetch a higher price, but yields are lower than green chillies because the plant stops setting while loaded with existing fruit. Like cherry tomatoes, this is a crop that small family farms often grow because family members pick and pack the crop at a lower cost than employing outside labour (although there are a few large growers).

Chokos

Chokos need a lot of organic matter to grow, so producers often grow them in conjunction with poultry farms where poultry manure is the readily available source of organic matter.

The best prices are paid for chokos in wet weather, when competing vegetables such as beans and zucchinis are unavailable. Unless your soil is over 1 m deep and well drained, you need underground drainage to make sure your plants survive and thrive in wet weather. Choko stems and roots can withstand some frost when dormant; shoots and leaves cannot. Strong, well-built trellises are expensive to establish, but are essential for producing chokos.
Cucumbers
Cucumbers are a quick, easy crop to grow in the field, but the main market now is for continental cucumbers grown undercover. This makes the capital cost required very high.

Eggplant
The eggplant (otherwise known as eggfruit or aubergine) is popular with European and Asian immigrants who grow and consume the vegetable. Eggplants tend to be grown by small to medium-sized farms rather than large farms.

Herbs
The wide range of herbs needs an equally wide range of soils and climatic conditions. Research your market, then the crop, before deciding to grow herbs.

Lettuce
Most lettuce are grown in the Lockyer Valley, Granite Belt and eastern Darling Downs. Buyers pay higher prices in summer, but in areas with warm or hot summers yield and quality are lower, so that the profit drops too. Hydroponically grown lettuces have a small market, but this option requires large financial investment and expert management (see ‘Undercover and hydroponic production’ on page 25).

Potatoes
The main production areas have been the Lockyer and Fassifern Valleys and the Atherton Tableland, but production is increasing around Bundaberg. Potatoes are grown for the fresh market and processing. Each product has different requirements. Winter and spring are the main production times. Potatoes have high capital requirements because they need specialised planters, diggers and brushing/washing equipment.

Pumpkins
Pumpkins can be a low input crop and non-horticultural farmers, such as canefarmers and graziers, often grow them as a cash crop. Prices depend very much on supply and demand and a year of good prices is often followed by a year of low prices.

Rockmelons and honeydews
Rockmelons and honeydews need intensive management. They are often grown by specialist growers who grow no other horticultural crops.

Snow pea
Snow pea production has increased rapidly over the last few years. Most Queensland production is around the Bundaberg–Childers area. This crop requires trellising. Snow peas need cool growing conditions and most production happens during late autumn to early spring. Frost will affect flowers and pods but light frost will not harm the plant. There are a few large growers, but this is a crop that small family farms often grow because family members pick and pack the crop at a lower cost than employing outside labour.

Sweetcorn
Queensland has fresh market and processing industries. The industry is now concentrated on a few large growers, partly because of the high cost of harvesting equipment and cooling facilities. Pests, particularly the heliothis grub, are the main threat to productivity and can cause heavy losses. Cool sweetcorn as soon as possible after harvest.

Sweetpotatoes
Queensland sweetpotato production has increased rapidly for two reasons: growers moving from New South Wales and an overall increase in production. Because more sweetpotatoes are available, buyers are becoming more particular and thus growers are grading more rigorously, which means more roots are rejected in the shed and fewer sent to market.

Capital requirements are high because of the cost of specialised planters, diggers and washing equipment. Disease-free planting material can be expensive, difficult to get, and takes time to bulk up into sufficient quantities for commercial plantings. Soil insects can cause severe damage. Rotate crops to prevent sweetpotato weevil building up rapidly in the field.
**Tomatoes**

Tomato production is mostly in the hands of a few large growers. These growers can virtually guarantee a continual supply of standard product to buyers for much of the year. This crop requires trellising. The tomato industry is highly mechanised, but still requires a lot of labour for harvesting and packing.

**Watermelons**

Watermelons, like pumpkins, can be a low input crop and non-horticultural farmers, such as canefarmers and graziers, often grow watermelons as a cash crop. However, the increasingly popular seedless watermelons require much higher levels of inputs and managerial skill. Growing seedless watermelons is more like growing rockmelons than ordinary watermelons. Prices depend on supply and demand and a year of good prices is often followed by a year of low prices.

**Zucchinis**

Zucchinis are a quick crop from planting to first harvest and require little outlay, compared to most other crops, to reach the first harvest. In warm conditions, harvest zucchinis every day or they grow too big for the market. The length of time they can be harvested is often determined by whether or not the plants become infected with a virus. Once the aphid-borne viruses infect plants, they may not produce any saleable crop. Cool as soon as possible after harvest.

**Undercover and hydroponic production**

An increasing number of growers are choosing to grow a range of vegetable crops undercover using hydroponic systems to irrigate and provide nutrients. Although these systems have the potential to produce high yields of high quality vegetables, they are expensive to establish and require high-level management. In Queensland’s summer, the greenhouses are difficult to cool. Crops suffer from heat stress during heatwaves.

### 2.4 Gross margins

This subsection lists the inputs you need to work out the gross margins for growing a vegetable crop.

Use the gross margin template in Table 2.2 (following page) as a guide to the type of costs you may incur. You might find it helpful to develop a similar layout in a computer spreadsheet program and put in your own expected costs, with an average yield and market price, for a range of vegetable crops. This will give you a guide to the probable outlays and possible returns from these crops. If you are unfamiliar with spreadsheets, talk to your accountant or a professional who can help you.

A general rule of thumb for vegetable crops is that the cost of growing the crop is about one-third of the total variable costs; harvesting, packing and marketing make up the other two-thirds. Note that fixed and capital costs are not included in gross margin calculations. The gross margin template is based on costs and yields for 1 ha of crop. Multiply the results from the spreadsheet by the number of hectares you intend to grow. Unless you have experience in growing vegetables, or regular access to someone who has, start with small, trial areas and expand from there. You will not make a lot of money that way, but you will reduce the risk of losing a lot of money.
Table 2.2 Gross margin template and inputs for growing a vegetable crop

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Amount</th>
<th>$/carton</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price ($/carton)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cartons/ha</td>
<td>0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total revenue</td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ripping</td>
<td>1</td>
<td>$/ha</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Disc-harrowing</td>
<td>2</td>
<td>$/ha</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Cultivation</td>
<td>2</td>
<td>$/ha</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Rotary hoeing</td>
<td>1</td>
<td>$/ha</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Bedding/forming</td>
<td>1</td>
<td>$/ha</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Total land preparation expenses</td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

| Planting                        |        |          | $          |            |
| Seedlings (each)                |        |          | $/ha      |            |
| Transplanter                    |        |          | $/ha      | $          |
| Casual labour                   |        |          | $/h       | $          |
| Total planting expenses         |        |          | $          |            |

| Fertiliser                      |        |          | $          |            |
| Ag-Lime/dolomite (spread)       | 0 t    | $/t      | $          |            |
| Establishment fertiliser        | 000 kg | $/kg     | $          |            |
| Side-dressings (number x rate/ha)|        |          |            |            |
| Side-dressing A                 | x 00 kg| $/kg    | $          |            |
| Side-dressing B                 | x 00 kg| $/kg    | $          |            |
| Side-dressing C                 | x 00 kg| $/kg    | $          |            |
| Micronutrient Y                 | x 0.0 kg| $/kg  | $          |            |
| Micronutrient Z                 | x 0.0 kg| $/kg  | $          |            |
| Sprayer (number of sprays)      | 0      | $/ha    | $          |            |
| Spreader                        | 1      | $/ha    | $          |            |
| Total fertiliser expenses       |        |          | $          |            |

| Weed control                    |        |          | $          |            |
| Herbicide (number x rate/ha)    | x 0 L  | $/L     | $          |            |
| Sprayer (number of sprays)      | 0      | $/ha    | $          |            |
| Plastic mulch (black)           | 0 000 m| $        | $          |            |
| Casual labour                   |        |          | $          | $          |
| Total weed control expenses     |        |          | $          |            |

| Insect control (often applied with fungicides) |        |          | $          |            |
| Insecticide sprays (number x rate/ha)         |        |          |            |            |
| Insecticide 1                                 | x 0 L  | $/L     | $          |            |
| Insecticide 2                                 | x 0 L  | $/L     | $          |            |
| Insecticide 3                                 | x 0 kg | $/kg    | $          |            |
| Insecticide 4                                 | x 0 L  | $/L     | $          |            |
| Insecticide 5                                 | x 0 L  | $/L     | $          |            |
| Miticide 1                                    | x 0 L  | $/L     | $          |            |
| Total insect control expenses                 |        |          | $          |            |
Table 2.2 (cont.)

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disease control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fungicide 1</td>
<td>x 0 kg</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fungicide 2</td>
<td>x 0 kg</td>
<td>$/kg</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fungicide 3</td>
<td>x 0 L</td>
<td>$/L</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Sprayer (number of sprays)</td>
<td>0</td>
<td>$/ha</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td><strong>Total disease control expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

| **Irrigation**             |      |        |      |            |
| Water charges              | ML/ha | $/ML  |      | $          |
| Electricity—single pumped  | ML/ha | $/ML  |      | $          |
| Pump repairs & maintenance | ML/ha | $/ML  |      | $          |
| Drip tube                  | m/ha  | $/m   |      | $          |
| Assume a 10 use life:      |      |        |      |            |
| Layflat 75 mm hose         | m/ha  | 0.1 x $/m |      | $          |
| Layflat to trickle fitting | /ha  | 0.1 x $ each |      | $          |
| **Total irrigation expenses** |      |        |      | $          |
| **Total growing expenses** |      |        |      | $          |

<table>
<thead>
<tr>
<th><strong>Harvesting and packaging</strong></th>
<th>Cost</th>
<th>$/carton</th>
<th>$/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cartons</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carton</td>
<td>0 000</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Harvesting &amp; packing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour—picking</td>
<td>carton/hour</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Labour—packing</td>
<td>carton/hour</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Harvest aid</td>
<td>carton/hour</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Pre-cooling</td>
<td>$0/carton</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td><strong>Total harvesting expenses</strong></td>
<td>0000 cartons</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td><strong>Total harvesting and packing expenses</strong></td>
<td></td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

| **Marketing**               |      |          |      |
| Freight (to Sydney)         |      | $       |      |
| Commission, levies          | 12.5% |          |      |
| **Total marketing expenses** | 0000 cartons | $     | $    |
| **Total variable expenses (growing, harvesting, packing and marketing)** |      | $       | $    |

**Gross margin = total revenue minus total variable expenses**

- Total revenue
- Total variable expenses
- Gross margin/hectare
2.5 Contacts and further information

DPI&F advisory services

Jerry Lovatt

Jerry Lovatt is DPI&F’s Senior Information Extension Horticulturist working for at Bundaberg Research Station. Jerry is the author of the ‘Vegetables’ chapter of this publication and has been specialising in vegetables for the last 38 years. Jerry joined DPI&F in 1967. To contact Jerry, call the DPI&F Business Information Centre on the number below.

DPI&F Business Information Centre

Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays). Contact DPI&F Business Information Centre on 13 25 23 or email callweb@dpi.qld.gov.au

DPI&F website

More than an information repository. DPI&F’s website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business. Visit the DPI&F website at www.dpi.qld.gov.au

GrowSearch

Can search more than 21 000 articles on a database and in a library for specific topics of interest. There is a charge for this service. For more information, please contact:

Phone: (07) 3824 9555
Fax: (07) 3286 7618
Email: growsearch@dpi.qld.gov.au
Postal address: PO Box 32, Cleveland Qld 4163
Website: www.dpi.qld.gov.au (Follow the links to ‘Plants’ > ‘Services’ box.)

DPI&F publications

The Queensland Government Bookshop online sells a wide range of DPI&F publications plus titles from other government departments and commercial publishers.

Website: www.bookshop.qld.gov.au

Some titles are also available from DPI&F offices.

Agrilink information kits

Contain some of the information used in this section. DPI&F has a range of Agrilink information kits, which are available through the bookshop or through GrowSearch.

Website: www.dpi.qld.gov.au (Follow the links to ‘Plants’ > ‘Fruit & vegetables’ > ‘Farm management’ > ‘Agrilink information products’)

Email: agrilink@dpi.qld.gov.au

Books

Ainsworth, N (1991) Growing beans in Queensland, Department of Primary Industries & Fisheries, Brisbane.


DPI&F notes

The contents page for vegetable DPI&F notes is located at [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au) and follow the links to 'Plant industries' > 'Fruit and vegetables' > 'Vegetables'

DPI&F notes, *Producing vegetables for market (or are vegetables an appropriate enterprise?)* 1–5. Visit [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au) and then follow the links to 'Plant industries' > 'Fruit and vegetables' > 'Farm management':

1. 'Successful horticulture enterprises'
2. 'The production environment'
3. 'Matching crop requirements with the production environment'
4. 'Sensible use of irrigation resources during drought periods'
5. 'Temperature requirements and limitations'.

DPI&F notes on some Asian vegetables are located at [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au) and follow the links to 'Plant industries' > 'Fruit and vegetables' > 'Vegetables' > 'Asian vegetables'

Other sources


3 Cut flowers

3.1 Thinking about growing cut flowers

Producing quality cut flowers is probably one of the most difficult activities in commercial horticulture. The cut flower industry also includes the growing of (generally lower value) foliage and there are hundreds of types, cultivars and varieties to choose from. Good quality is essential for cut flowers, even more so than for fruit and vegetables. The visual appearance and longevity of the product directly affects profit levels.

The Queensland cut flower industry was estimated to be worth $125 1 million per year at the farm gate in 2007–08. Australia's major export destinations have been Japan and Europe, but the North American market and emerging Asian countries are importing more Queensland produce and opportunities exist for export expansion. Cut flower growers are spread across Queensland, with significant growing centres in the south-east corner, including Redlands, Toowoomba and the Sunshine Coast hinterland, as well as the Cairns region.

The expansion of the cut flower market relies on two growth areas. The first is an increase in the domestic market. Australians spend less on cut flowers than Europeans or Japanese, but this is slowly changing. Peak demand times for fresh flowers are still Valentine's Day and Mother's Day; however, other occasions, like Secretary's Day and Chinese New Year, are also boosting demand.

The second growth area is the further development of the export market. Australian native flowers and foliages, and South African proteas, are the biggest export items. In recent times the high value of the Australian dollar has significantly reduced the profitability of cut flower exports, forcing many smaller growers out of business. The Australian Flower Export Council (AFEC), Wildflowers Australia, export agents and associations such as the Flower Association of Queensland Inc. (FAQI) are all making efforts to increase the profile of and demand for Australian cut flowers.

But what are the risks? Many new industry entrants do not survive the first two years of production. They fail because of crop failures (through weather, pests, diseases and disorders, inappropriate crop selections for local conditions and other factors), downturns in markets and demand, increasing costs, price falls and other avoidable or unavoidable events. Research and training will help you meet these challenges.

Producing cut flowers can be as rewarding as it is challenging. However, there are hundreds of options within the industry. You must choose the crop(s) and the specific varieties to grow, and make incisive growing decisions, that suit your chosen crop(s) and geographic location.

3.2 Critical factors

Community

A significant proportion of existing cut flower operations in southern Queensland are carried out in close proximity to residential areas. The issue of urban encroachment is a growing concern for many cut flower growers and has focused growers' attention on reducing the potential impacts of their business operations on their neighbours.

Issues such as spray drift, noise and glare from greenhouses can cause concern and generate complaints from neighbouring residential areas. Strategies to minimise these disturbances for example, planting buffer zones of vegetation around property boundaries, are being developed on a site-specific basis.

Climate

Choose crops that will thrive in local conditions. Some flowers grow best undercover—such as tunnels, greenhouses (see 'Undercover and hydroponic growing')—while others are grown in the field. Generally, flower crops need good airflow around and within them to reduce disease. However, they also need protection from strong winds and other weather extremes.

Most flower crops are frost-sensitive, especially while the flowers are developing. Depending on the cultivar and the timing, a severe frost could render the whole year's harvest unmarketable.

---

1 Prospects update—forecasting, analysis and trends, June 2008, Department of Primary Industries and Fisheries, Brisbane.
Soil
You can grow cut flowers in a number of soil types. Some growers buy pre-mixed media and others use soil-less growing media such as coconut fibre (see “Undercover and hydroponic growing”).

The suitability of your soil will depend on your crop and chosen growing method. Send soil samples away for testing to check whether your proposed site is suitable for your chosen crop.

Few flower crops tolerate waterlogging—a moderately fertile, well-drained soil is essential. However, each species has different requirements. Research drainage and soil nutrient requirements before you choose what to plant.

You can improve root zone drainage by growing in raised beds, but this is only a short-term solution if your subsoil drainage is poor.

Irrigation
Water stress severely affects flower quality. Water is a key issue for cut flower growers—in terms of availability, quality and application. Growers must cope with:

- rising prices of town water supplies
- variable quality of other water sources.

Growers must manage:

- noise pollution (pumps)
- soil degradation (salinity/erosion)
- drainage and run-off problems (nutrient loads).

Town water is expensive, but in some areas the water supply from bores and dams is too salty or unreliable for flower production. If you intend to collect and re-use irrigation water, it will need processes such as filtration and chlorination to reduce disease.

Good irrigation methods that match water use to the requirements of your crop will increase yield and quality and help make production more reliable.

Pest and diseases
Most flower crops suffer from pest, diseases and disorders. To reduce blemishes and maintain commercial yields, these need to be controlled.

You can reduce outbreaks by:

- keeping good records
- checking the crop regularly
- monitoring and maintaining hygiene
- maintaining equipment such as spray packs correctly
- learning to recognise problems in their early stages
- using chemicals as directed and attaining the necessary chemical handling and application qualifications
- getting diseases and disorders professionally diagnose
- rotating crops in the field to reduce the build up of certain pests and diseases (such as nematodes, *Fusarium* spp. and *Phytophthora* spp.).

Disinfestation by fumigation may be necessary if your land area is limited or if you are growing flowers in tunnels. Fumigation is usually expensive, and requires licensed operators and hazardous chemicals.

Weeds
Weeds are a constant problem for flower growers. A limited range of herbicides is registered for flower crops. To reduce weeds:

- Use clean artificial soils.
- Use herbicides between rows and chip or hand-weed beds in fields.
- Use organic mulch or weed matting on perennials.
- Eliminate weeds before planting.
- Cultivate the soil and leave it fallow.
Infrastructure

Buying the infrastructure and equipment to undertake commercial cut flower production is costly. How much you need will depend on your situation, which crop you grow, whether you grow under shelter or in the field and how developed your property is. For example, establishing a small commercial flower farm (excluding land) from bare earth could cost $110,000–220,000.

Refer to Subsection 3.4 (‘Capital items’) on page 35 for more information.

Labour

Cut flower growing is labour-intensive, with almost all harvesting done by hand. Most growers also grade and bunch by hand, because only the largest producers can afford machinery for these tasks. The efficiency of harvesting and grading has a significant impact on the profitability of an enterprise.

Much of the routine work associated with growing—such as planting, pruning and disbudding—is also done by hand.

Few serious commercial flower growers are part-time producers. Producing high quality cut flowers requires sustained effort. As in many rural enterprises, you can expect to work 12–15 hours a day in peak season. You will also need casual seasonal pickers/graders/packers at peak harvest times (especially for native growers) and for high demand times (like Valentine’s Day).

Marketing

Over 60 different cut flower and foliage types are widely grown in Queensland. These range from annual to perennial crops, bulbs, herbaceous plants and shrubs, foliages, feature flowers and floral fillers. Some growers specialise in only a few types, while others produce a wide variety. Fluctuations in floral fashions and economic trends affect the popularity of products.

Current market prices for common lines are available from domestic market wholesalers and exporters.

Traditional flowers are divided into major and minor lines. Major lines (roses, carnations, chrysanthemums and gerberas) are the mainstay of the industry and generally retain their market share. Minor flowers include asters, bulb crops, daisies, lavender, orchids, stocks and zinnias.

There is a market for filler flowers and foliage—particularly novel species. Although unusual lines attract buyers, florists may be wary of something with an unknown vase life. The most easily grown crops are also easily oversupplied. During peak production, their low prices barely cover picking and bunching costs.

Substandard produce should never be marketed—customer dissatisfaction damages your business and the whole industry.

A substantial effort should be invested in finding out about the best varieties for growing and marketing, what time of year they are grown and what quantities and colours are required. Find out about post-harvest handling requirements, including packaging and preservative solutions. You need to get a firm idea of what constitutes maturity for harvest, quality expected, bunch size required and prices that can be reasonably expected.

As a new and unproven entrant into the market, few people will commit themselves in advance to taking your produce. Florists and wholesalers are often asked these questions, so they are sceptical about untried producers. Many florists prefer to wait until you have grown some flowers so they can gauge your expertise. Start with a few crops and learn to grow and market them well.

Within Australia, Queensland growers can sell to local or interstate markets. The biggest Queensland wholesale flower markets are based at Rocklea in Brisbane. A significant amount of Queensland flowers are shipped interstate to markets in Sydney and Melbourne. Growers who produce flowers for export usually market their products through export agents, although some larger operations send product directly overseas.
Quality assurance

Quality assurance (QA) systems for most Queensland growers are generally undertaken on an individual farm basis, although some grower collectives have begun small QA and branding initiatives. Increasingly, rigorous QA processes will be demanded from customers and international markets and are likely to become a feature of the industry.

Growers recognise that in today’s business climate there is an ongoing requirement to keep improving the profitability and sustainability of flower growing enterprises. There is an ongoing commitment by state industry peak bodies to give producers the tools they need to manage risks on-farm and improve their business.

Regulation

Legislative requirements vary between crops and markets. Mandatory requirements can include permits and authorities to propagate, cultivate and market certain types and varieties of cut flowers. Find out from institutions such as the Environmental Protection Agency (incorporating Queensland Parks and Wildlife Service), the federal Department of Environment, Water, Heritage and the Arts, the Australian Quarantine Inspection Service (AQIS) and your wholesale or export agents which permits and licences apply to your chosen crop and market.

Cultivating Australian natives identified as ‘at risk’ requires an authorised cultivator permit. Propagators of these plants need to be registered as well. Alternatively, you may need a commercial wildlife licence to bush harvest some species.

Extra expenses may be incurred for some permits, for quarantine clearances on imported plant stock and inspection fees, compulsory fumigation and import tariffs on exported product.

Flowers and foliage can be hosts of plant pests with the potential to cause serious economic and social problems for Queensland’s communities. DPI&F’s biosecurity work minimises the risk through plant health regulations and surveillance, eradication and containment programs for serious pests. More details of the work of Biosecurity Queensland may be found at www.dpi.qld.gov.au and follow the links to ‘Biosecurity’ > ‘Plant health, pests and diseases’.

Land use

Changes in the use of your land may be assessable under your local council’s planning scheme. You are strongly advised to contact your local council if you are intending any change in use of land associated with a change of agricultural activity, and seek advice on rural uses that are self-assessable, code-assessable or impact-assessable.

3.3 Enterprise options

Cut flowers can either be produced in the field or grown in protective structures such as greenhouses and tunnels. Each species will be best suited to only one of these options.

Field growing

Traditional flowers may be field-grown; however, it is less common for Australian natives and proteas to be seen in protected cultivation. The latter are plantation crops and have a distinct harvest time, usually over 3–4 months. It is difficult to manipulate plant growth and time of harvest in many field-grown varieties because of the limited ability to control climatic conditions. This is best achieved within a greenhouse.
**Undercover and hydroponic growing**

Greenhouse flowers can be of better and more consistent quality than field-grown crops because:

- Greenhouses protect crops from the weather.
- You can control the greenhouse environment to reduce pests and diseases.
- You can manipulate plant growth.
- You can use water more efficiently.

Some traditional flower types, such as roses, are currently grown hydroponically. This can be a successful strategy that allows the grower to manipulate nutrients and environmental factors to produce flowers that meet specific market demand times (e.g. Mother’s Day).

Greenhouse and hydroponic production systems cost more to establish, but are increasingly necessary to compete on the domestic market. Assess the potential returns of your chosen crop before you invest in expensive greenhouses and associated infrastructure.

**Lighting**

Some flower crops (such as chrysanthemums, asters and gypsophila) flower in response to day length (or combinations of day length and temperature). Using lights, it is common to manipulate the time of flowering for crops sensitive to day length in order to meet peak demand periods (e.g. chrysanthemums for Mother’s Day) or to produce high-value, out-of-season flowers. This can be done under cover or, less commonly, in the field. For such crops, you may need to factor lighting rigs into enterprise establishment costs and ongoing operating expenses.
3.4 Capital items

This is a list of the type of equipment that can be required for cut flower production:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Field growing</th>
<th>Undercover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop support structures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green house, polytunnels, shade house or other structure</td>
<td>x</td>
<td>√</td>
</tr>
<tr>
<td>Structure covers (e.g. plastic film)</td>
<td>x</td>
<td>√</td>
</tr>
<tr>
<td>Greenhouse benches</td>
<td>x</td>
<td>√</td>
</tr>
<tr>
<td>Cooling units for greenhouse</td>
<td>x</td>
<td>√</td>
</tr>
<tr>
<td>Growing containers for root substrate/hydroponic channels</td>
<td>x</td>
<td>√</td>
</tr>
<tr>
<td>Bore/dam/access to town water main/tanks</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Water reticulation lines</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Irrigation fittings</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Pumps</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Water cleansing systems (e.g. filters/chlorinators) ¹</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Transplanter</td>
<td>√</td>
<td>x</td>
</tr>
<tr>
<td>Fertiliser spreader and/or injector</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Herbicide sprayer</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td>Sprayer (fungicides/insecticides/fertilisers)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Mower/slasher</td>
<td>√</td>
<td>x</td>
</tr>
<tr>
<td>Cultivation equipment</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td>Fencing</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Windbreaks</td>
<td>√</td>
<td>x</td>
</tr>
<tr>
<td>Packing shed</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Cool room ²/forced air cooling system</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Bunching/grading/packing/boxing benches</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Chemical store</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Fertiliser storage area</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Bunch banding machine</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Carton strapping machine</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Scales (separate for chemicals and bunches)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Dipping tank (export)</td>
<td>√</td>
<td>–</td>
</tr>
<tr>
<td>Flower buckets</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Tractor</td>
<td>√</td>
<td>x</td>
</tr>
<tr>
<td>Trailer/ute (harvesting)</td>
<td>√</td>
<td>x</td>
</tr>
<tr>
<td>Trolleys (harvesting)</td>
<td>x</td>
<td>√</td>
</tr>
<tr>
<td>Delivery vehicle</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Propagation house (optional)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Facilities for workers (toilets/ eating area)</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Administration office (telephone, facsimile machine and computer)</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

1 Chlorinator is optional, depending on circumstance.

2 Can be hired if crop is seasonal.

3.5 Gross margins

This subsection lists the inputs you need to work out the gross margins for growing a cut flower crop.

Use Table 3.1 (on page 36) as a guide to the type of costs you may incur. You might find it helpful to develop a similar layout in a computer spreadsheet program and input your own expected costs, with an average yield and market price, for a range of cut flower crops. This will give you a guide to the probable outlays and possible returns from different scenarios. If you are unfamiliar with spreadsheets, talk to your accountant or a professional who can help you.

The gross margin template is based on costs and yields for 1 ha of crop. Multiply the results from the spreadsheet by the number of hectares you intend to grow.
### Table 3.1 Gross margin template and inputs for growing a cut flower crop

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Amount</th>
<th>$/stem or bunch</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stems or bunches/ha</td>
<td>0 000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total revenue</strong></td>
<td></td>
<td></td>
<td><strong>$</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enterprise preparation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field growing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ripping</td>
<td>$/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disc harrowing</td>
<td>$/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivation</td>
<td>$/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotary hoeing</td>
<td>$/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedding/forming</td>
<td>$/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undercover growing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growing media</td>
<td>$/m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total land preparation expenses (A)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$</strong></td>
</tr>
<tr>
<td>Planting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seedlings/cuttings</td>
<td>number/hour</td>
<td>$/each</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel/oil transplanter</td>
<td>L</td>
<td>$/L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual labour</td>
<td>hours</td>
<td>$/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total planting expenses (B)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$</strong></td>
</tr>
<tr>
<td>Greenhouse operating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>hours</td>
<td>$/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>Kw</td>
<td>$/Kw</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total greenhouse operating (C)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$</strong></td>
</tr>
<tr>
<td>Fertiliser</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser 1</td>
<td>0 t</td>
<td>$/t</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser 2</td>
<td>000 kg</td>
<td>$/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser 3</td>
<td>x 0.0 kg</td>
<td>$/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micronutrient A</td>
<td>x 0.0 kg</td>
<td>$/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micronutrient B</td>
<td>x 0.0 kg</td>
<td>$/kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>hours</td>
<td>$/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total fertiliser expenses (D)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbicide (number x rate/ha)</td>
<td>x 0 L</td>
<td>$/L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mulch and/or weed mat</td>
<td>0 000 m</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mowing fuel/oil</td>
<td>x 0 L</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Casual labour</td>
<td>0 hours</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total weed control expenses (E)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$</strong></td>
</tr>
</tbody>
</table>
### Table 3.1 (cont.)

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pest &amp; disease control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecticide 1 (number x rate/ha)</td>
<td>x 0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Insecticide 2</td>
<td>x 0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Insecticide 3</td>
<td>x 0 kg</td>
<td>$/kg</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Insecticide 4</td>
<td>x 0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Fungicide 1</td>
<td>x 0 kg</td>
<td>$</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Fungicide 2</td>
<td>x 0 kg</td>
<td>$/kg</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Fungicide 3</td>
<td>x 0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Miticide 1</td>
<td>x 0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Labour— spraying/monitoring</td>
<td>hours</td>
<td>$/h</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td><strong>Total pest control expenses (F)</strong></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

| Irrigation                                     |     |        |      |            |
| Water charges                                  | 0 ML/ha | $/ML | | |
| Electricity— single pumped                     | 0 ML/ha | $/ML | | |
| Pump repairs & maintenance                     | 0 ML/ha | $/ML | | |
| **Total irrigation expenses (G)**              |     |        |      | $          |

| Pruning/disbudding                             |     |        |      |            |
| Labour                                        | hours | $/h | | |
| **Total pruning expense (H)**                  |     |        |      | $          |

| Harvesting & packaging                         |     |        |      |            |
| Cartons                                       | 1 | $/unit | | |
| Bunch sleeves/ties                            | units per carton | $/unit | | |
| **Harvesting & packaging**                     |     |        |      |            |
| Labour—picking                                | Stem or bunches/hour | $/h | $\text{1}$ | |
| Labour—packing                                | Stem or bunches/hour | $/h | $\text{2}$ | |
| Pest treatment chemical (export flowers)      | | | | |
| Labour—pest treatment (export)                | Stem or bunches/hour | $/h | $\text{3}$ | |
| Cooling facility                              | | | | |
| **Total harvesting expenses**                  | 0000 cartons | $ | $ | |

| Marketing                                      |     |        |      |            |
| Freight                                       | | | | |
| Wholesaler/exporter commission, levies        | 0.0% | | $ | |
| **Total marketing expenses**                   |     |        |      | $          |

| Gross margin = Total revenue minus total variable costs |     |        |      |            |
| Total revenue                                    | | | | |
| - Total variable expenses                         | | | | |
| = Gross margin per hectare                       | | | | |

---

1 Calculated as hourly pay rate/(bunches picked per hour/bunches per box).
2 Calculated as hourly pay rate/(bunches packed per hour/bunches per box).
3 Calculated as hourly pay rate/(bunches treated per equivalent hour/bunches per box).
3.6 Contacts and further information

**DPI&F advisory services**

**DPI&F Business Information Centre**

Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).

Phone: 13 25 23  
Email: callweb@dpi.qld.gov.au

**DPI&F website**

More than an information repository. DPI&F's website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.

Website: [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au)

**GrowSearch**

This service specialises in amenity horticulture, including the cut flower industry, and can search through more than 21,000 articles on its tailor-made database. Search this database for topics of specific interest. There is a modest charge for this service.

Phone: (07) 3821 3784 or (07) 3824 9555  
Fax: (07) 3286 7618  
Email: growsearch@dpi.qld.gov.au  
Postal address: PO Box 327, Cleveland Qld 4163  
Website: [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au) and follow the links to 'Plant industries' > 'Services' box

**DPI&F publications**

**Queensland Government Bookshop online**

Sells a wide range of DPI&F publications plus titles from other government departments and commercial publishers.

Website: [www.bookshop.qld.gov.au](http://www.bookshop.qld.gov.au)  
Some titles are also available from DPI&F offices or DPI&F Bookshop on 1800 801 123.

**Books**

These are only a small selection of the publications available.

Carson, C (2000) *Should I grow wildflowers?* Department of Primary Industries and Fisheries, Queensland, Brisbane. (Available from Queensland Government Bookshop online.)


Other organisations

Flower Association of Queensland Inc.
FAQI is the peak representative body for Queensland cut flower and foliage growers. FAQI assists growers with information, marketing, flower promotion, training, industrial relations, representation to government, events, research coordination and industry development.

Phone: (07) 3824 9537
Fax: (07) 3286 3094
Email: faqi@flowersqueensland.asn.au
Website: www.flowersqueensland.asn.au

Australian Flower Industry
This quarterly national magazine is aimed at commercial cut flower and foliage growers. It is available by subscription from FAQI.

Phone: (07) 3824 9537

NSW Department of Primary Industries
NSW DPI has publications, fact sheets and a list of links for growers covering both the traditional and Australian native sectors of the industry.

Website: www.dpi.nsw.gov.au
(Follow the drop down links ‘Agriculture’, then ‘Horticulture’, then ‘Flowers and ornamentals’.)

Australian Flower Export Council
AFEC has a list of key cut flower exports as well as information on the major cut flower export markets and industry contacts.

Website: www.australianflowers.org/AFECindex.htm

Wildflowers Australia
Is a national Peak Industry Body for growers of Australian native and South African proteaceae for cut flowers and foliage. One of its main objectives is to improve the viability and profitability of this sector of the Australian flower industry.

Website: www.wildflowersaustralia.com.au

Rural Industries Research and Development Corporation
The RIRDC website contains full text and summary articles of wildflower research projects.

Website: www.rirdc.gov.au (Click on the link ‘Wildflowers & native plants’.)

Department of Agriculture and Food, Western Australia
The Department of Agriculture and Food in Western Australia has conducted considerable research on cut flowers, particularly wildflowers. Information may be accessed by searching on the terms ‘cut flowers’ on their website’s search engine or follow the links ‘Horticulture’ then ‘Floriculture & nursery’.

Website: www.agric.wa.gov.au

Acknowledgments
Some of the material used in the preparation of this chapter has been sourced from the FAQI fact sheet series and the book Should I grow wildflowers? (edited by Cynthia Carson).
4 Aquaculture

4.1 Thinking about aquaculture

The aquaculture industry is one of the most rapidly developing sectors of Queensland’s primary industries, worth about $75 million annually. The industry has expanded by 7% annually over the past 10 years and is expected to keep expanding as demand for fisheries products increases.

However, the two major crops—prawns and barramundi (which account for over 95% of total production)—are not suitable for the Upper Mary Valley.

Of the three major production systems in the Queensland aquaculture industry—freshwater ponds, saltwater ponds and intensive tank-based recirculating systems—there is some potential for freshwater pond production in the region.

A successful freshwater aquaculture operation is a highly efficient user of land and water resources, and just 10 ha can potentially accommodate a commercial production system (see ‘Infrastructure’ under Subsection 4.2 below). However, freshwater aquaculture systems are expensive to establish and have a high level of financial risk. Aquaculture also requires specific skills and training and a continuous staff presence.

Remember that aquaculture is a relatively high-risk venture—there is always the possibility of complete or partial stock loss through disease, human error or equipment failure. Any loss of stock would significantly reduce income.

Economies of scale apply and larger operations tend to be more cost-effective.

4.2 Critical factors

Chemical residues

Chemical residues from previous activities can accumulate in soil and might make aquaculture crops unsuitable for consumption. Have your soil thoroughly tested for residues before considering an aquaculture enterprise.

Community

Because aquaculture is high-yielding and labour-intensive, it can generate additional on-farm employment.

Proximity to urban areas can increase some risks, such as poaching and vandalism. However, it can also provide additional marketing opportunities.

Flooding

Losing your stock in a flood is not only economically undesirable, it can compromise the protection and management of Queensland’s fisheries resources. Because of this risk, flood-prone sites (where the crest of pond or tank is below the ‘one in 100 years’ flood level) will not be granted an aquaculture approval (see ‘Regulations’ page 41).

Soils

To contain aquaculture ponds, the soil needs to be impervious (more than 20% clay) to eliminate or minimise water seepage. The impervious soil needs to be close to the surface and deep enough to construct ponds in. Avoid these soil types:

- dispersive soils (which tend to crack, sump and erode)
- soils containing silt and sand, or organic matter (which may leak or erode)
- soils containing gravel or sand layers (which may also leak or erode)
- soils containing rock strata (which make construction difficult and may leak).

Soils with a neutral pH (6.5–7.0) are the best choice. Avoid acid sulfate soils (pH generally below 4) to avoid causing environmental harm. Carry out surveys to determine your soil’s properties and structure before planning pond layouts.
A whole-of-government guideline is now available. Guidelines for constructing and maintaining aquaculture containment structures can be found at [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au) and follow the links to ‘Fisheries’ > ‘Aquaculture’ > ‘Licensing, approvals and policies’ > ‘Aquaculture policies, protocols and guidelines’.

**Topography**

Ideally, freshwater aquaculture sites should have a gentle slope of 2–5%. This keeps pond construction costs down and allows gravity to move the water efficiently. You can use flat sites and steeper sites but be prepared to spend more on engineering and pumping.

**Water table**

Aquaculture ponds that are dug into the water table are difficult to manage efficiently or sustainably. Also, if water from ponds gets into the water table it can affect the environment—thus requiring Environmental Protection Agency (EPA) approval, which will usually not be granted (see ‘Regulations’ below).

**Water**

You need a large and reliable source of good quality water for aquaculture. Most operators get their water from farm dams, rivers, impoundments, irrigation channels or underground (bore) water. Chemical laboratories can test water samples for suitability.

**Pests and diseases**

Predators—such as cormorants, water rats and eels—are major pests of freshwater aquaculture. Be prepared to exclude them by installing overhead bird nets and predator-proof perimeter fences, and by screening all intake water. Some of this infrastructure is expensive and may not be necessary at all sites, or at all stages of the production cycle. The EPA also has information available about predator mitigation strategies for aquaculture farms.

All aquaculture crops are susceptible to disease. You can minimise the risk of serious disease through hygiene and husbandry.

**Infrastructure**

Most existing farms already have some of the necessary infrastructure and equipment for aquaculture (e.g. storage sheds, vehicles, tractors, slashers and power supply). However, be prepared to spend more on additional aquaculture works and equipment. A typical freshwater aquaculture operation will cost about $60 000–100 000 per hectare of pond development, even when you already have some infrastructure and equipment.

You should calculate for approximately 1 ha of ponds and associated infrastructure to 2 ha of land.

**Labour**

Aquaculture is labour-intensive. An operation needs one full-time person to every 3–4 ha of ponds. Ponds need regular feeding and monitoring and skilled staff must be present at all times.

**Skills**

Agricultural business management skills are useful for managing an aquaculture operation. However, the technical skills for aquaculture are very specialised. Water quality management—fundamental to any aquaculture operation—requires a good understanding of water chemistry because fluctuations in water quality can result in major stock loss. Consider further training (such as a TAFE course in aquaculture) or employing experienced staff.

**Regulations**

**Aquaculture development activities**

Aquaculture activities under the Integrated Planning Act 1997 (IPA) are divided into two categories: ‘self-assessable’ (certain types of low-impact aquaculture only) and ‘assessable’.
Self-assessable aquaculture developments

Some developments do not require a development permit as they may be carried out by complying with a self-assessable code. If the proposed activity complies with the restrictions of the ‘self-assessable code for aquaculture AQUA01’, then no application or assessment is necessary. It is important that you obtain a copy of the self-assessable code AQUA01 and discuss any concerns with a DPI&F staff member in order to determine whether your proposal may be covered by the code or whether you will require a DA. It is the aquaculturist’s responsibility to comply with the conditions of the code to avoid prosecution under the provisions of IPA or the Fisheries Act 1994.

An aquaculture development that is self-assessable against the Fisheries Act may still require the lodgement of a DA if the development is assessable against a council’s planning scheme. It is therefore essential that council also be consulted before proceeding with a self-assessable development.

Assessable aquaculture developments

‘Assessable aquaculture’ is considered to be ‘material change of use’ and can be authorised by a DA. Further information on applying for a DA is available on the Queensland Government’s IPA website at www.dpi.qld.gov.au/ipa

Local government authorities (councils)

Councils generally act as assessment managers for applications relating to aquaculture. As well as managing and coordinating the assessment process, councils will assess the aquaculture proposal against local requirements and planning. DPI&F, along with other government agencies, may act as concurrence agencies and assess various aspects of aquaculture operations against other legislation such as the Environmental Protection Act 1994 (for effluent discharge) and the Water Act 2000 (for allocating water entitlements). An assessment fee is charged to cover the cost of assessing applications.

Department of Primary Industries and Fisheries

DPI&F are a concurrence agency for all development applications involving aquaculture and assess aspects of the application that pertain to aquaculture operations (including biosecurity, health) and aquatic habitats and pest fish (including marine plants and declared Fish Habitat Areas) under the Fisheries Act.

More details about how DPI&F manages aquaculture are available at www.dpi.qld.gov.au and follow the links to ‘Fisheries’.

Environmental Protection Agency

The EPA will have a concurrence role for any activity that is considered an ‘environmentally relevant activity’. This includes:

- any activity that discharges water to the environment
- any aquaculture operation with more than 5 ha of water.

Department of Natural Resources and Water

Access to some water sources may require an NRW approval. If your farm already holds an irrigation approval and intends to use some of that water for aquaculture, then NRW will have to approve aquaculture as an appropriate water use.

4.3 Enterprise options

This subsection gives you information about individual aquaculture enterprise options.

There are several crops suitable for freshwater ponds, including silver and jade perch, and redclaw crayfish. Read the information below to find out more about the needs of these crops.

Other freshwater species appear suitable for the Mary Valley but production practices are more complicated or the industry needs more development (see ‘Other freshwater species’ below).

This section also looks at saltwater ponds and intensive tank-based systems and how appropriate they are for the Mary Valley region.
Silver and jade perch

Markets
At the current farm gate price of around $8–12/kg (whole fish), market opportunities appear limited. There is a niche market for live perch in the domestic Asian restaurant trade, but this market is already well supplied.

Timelines and climate
Fingerlings are currently produced by hatcheries in spring and summer and are generally available from January to April. In the Mary Valley, silver perch grow best in spring and autumn when water temperatures are 23–28 °C, whereas jade perch grow best in summer when water temperatures are above 26 °C.

Fish can be harvested all year round and take approximately 15 months to reach a market size of 300–800 g. Both species are susceptible to winter syndrome diseases during the cooler months, particularly if water temperatures drop rapidly.

Redclaw

Markets
At the current farm gate price of around $14–16 for whole live redclaw, there are significant opportunities for expanding the domestic market and establishing exports. However, the live market is difficult to service and the industry is trying to persuade consumers to accept frozen product.

Timelines and climate
Redclaw breed all year, except in winter. Farms can purchase juveniles or breed their own stock. Redclaw are a tropical species and grow best when water temperatures are around 28 °C. In the Mary Valley area, growth is best over the summer months. Redclaw can be harvested all year round and take approximately one year to reach a market size of 40–80 g.

Other freshwater species
Other fish that may be suited to the region’s climate include Murray cod and golden perch. Murray cod appear to have sound commercial potential but are a relatively difficult fish to produce. It is recommended that Murray cod production only be undertaken by experienced fish farmers. Commercial production of golden perch is at an early stage of development and farming practices are not yet well defined. Barramundi is not a suitable species for pond culture in the Mary Valley because temperatures are too cold for efficient production.

Less suitable options
Saltwater ponds
There are no sites with access to seawater in the upper Mary Valley. Therefore, prawn farming and other forms of salt and brackish water farming are not generally considered suitable for the region.

Intensive tank-based recirculating systems
A variety of fish (including barramundi, Murray cod, sleepy cod and jade perch) can be grown in intensive, climate-controlled, recirculating tank systems. Although the technology behind these sophisticated systems is improving, they currently have a poor track record of commercial viability. Because these systems require a significant capital outlay but use little land, water, or existing on-farm infrastructure, they do not appear to be a particularly appropriate option for the diversification of existing farms.

4.4 Gross margins
This subsection lists the inputs you need to work out the gross margins for an aquaculture crop.

Use the gross margin template in Table 4.1 (following page) as a guide to the type of costs you may incur. You may find it helpful to develop a similar layout in a computer spreadsheet program and input your own expected costs, with an average yield and market price. This will give you a guide to the probable outlays and possible returns.

If you are unfamiliar with spreadsheets, talk to your accountant or a professional who can help you.
### Table 4.1 Gross margin template and inputs for an aquaculture crop

<table>
<thead>
<tr>
<th>Revenue</th>
<th>$/kg</th>
<th>$/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price ($/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kg/ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total revenue</strong></td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>$/unit</th>
<th>$/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hired labour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel oil, repairs and maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fingerlings or juveniles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser and lime</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing, freight and packaging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Licences, permits and registrations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administration and sundries</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total variable expenses</strong></td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

**Gross margin = total revenue minus total variable expenses**

<table>
<thead>
<tr>
<th></th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenue</td>
<td>$</td>
</tr>
<tr>
<td>− Total variable expenses</td>
<td>$</td>
</tr>
<tr>
<td>= Gross margin/hectare</td>
<td>$</td>
</tr>
</tbody>
</table>
4.5 Contacts and further information

DPI&F advisory services

Max Wingfield
Max Wingfield is an Aquaculture Extension Officer working for DPI&F at the Bribie Island Aquaculture Research Centre. Max is the author of the ‘Aquaculture’ chapter of this publication and has been specialising in freshwater aquaculture for the last 18 years. Max joined DPI&F in 1997. To contact Max, call the DPI&F Business Information Centre on the number below.

DPI&F Business Information Centre
Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).
Phone: 13 25 23
Email: callweb@dpi.qld.gov.au

DPI&F website
More than an information repository. DPI&F's website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.
Website: www.dpi.qld.gov.au

DPI&F aquaculture extension
Contact staff at the Bribie Island Aquaculture Research Centre during business hours.
Phone: (07) 3400 2000
Fax: (07) 3408 3535
Email: bribie@dpi.qld.gov.au
Postal address: PO Box 2066, Woorim Qld 4507
Website: www.dpi.qld.gov.au (Follow the links to ‘Fisheries’.)

Other organisations

Department of Tourism, Regional Development and Industry
Phone: (07) 3224 8976
Fax: (07) 3224 5289
Email: Sue.Pillans@dtrdi.qld.gov.au
Postal address: PO Box 168, Brisbane Qld 4002
Website: www.dtrdi.qld.gov.au

Aquaculture Association of Queensland
Phone: (07) 4126 2226
Fax: (07) 4126 2221
Email: busyfsh@isisol.com.au
Postal address: PO Box 415, Childers Qld 4660
Website: www.aaq.com.au
Queensland Crayfish Farmers Association
Phone: (07) 5447 9022
Email: secretary@sqcfa.org
Website: www.queenslandredclaw.org

Queensland Aquaculture Industry Federation
Phone: (07) 3846 2946
Fax: (07) 3846 4734
Email: gldalton@bigpond.com
Postal address: 57–59 Oxford Street, Bulimba Qld 4171
5 Forestry

5.1 Thinking about forestry

The timber and forest products industry in Queensland contributes more than $500 million to Queensland’s economy each year, with approximately 85% of the state’s forest production coming from plantations.

Queensland’s major forest grower is Forestry Plantations Queensland (FPQ)—a statutory-owned corporation, which took over the former DPI Forestry as manager of the Queensland Government’s 199,000 hectare exotic pine, native pine and hardwood forest plantations. These plantations produce around 2 million cubic metres of log timber every year.

Forest product demand in Australia is growing and Queensland is a net importer of timber products from interstate and overseas. Current demand and likely future export opportunities mean that FPQ and private companies are expanding their plantations.

Most Queensland timber products go through a sawmill or processing plant. The market for forest products is influenced by the domestic construction and renovation industry. The South East Queensland processing industry produces sawmill products, veneers, laminates, re-constituted board and treated timber products. Wood chips are also exported through the ports of Brisbane and Gladstone.

Forestry in the Mary Valley area has two advantages. One is the high rainfall of the south-east coast. The other is proximity to existing plantations (because aggregating with existing plantations may make it easier to market timber products and therefore reduce overhead costs) and proximity to industry and the port of Brisbane. However, lack of suitable sites and soils may limit further plantation development.

If your land is suitable, consider growing plantations of one of these timber types:

- exotic pine
- hardwood (eucalypt)
- araucaria (hoop pine)
- rainforest species.

What are the risks and costs of forestry enterprises? **Directly investing in establishing a plantation costs a lot and it takes a long time to earn any revenue—up to 40 years for some species.** Most costs are incurred in the first three years and reduce after five years. As an alternative to landowners directly investing in establishing plantations themselves, forest growers (such as FPQ) will rent suitable land over the life of the plantations or will offer to share establishment costs through a joint venture arrangement. While costs and risks are shared under this arrangement, equally, resultant revenues through timber sales or other environmental benefits such as carbon are shared in proportion to input contribution.

5.2 Critical factors

Community

Plantations can be damaged or destroyed by fire. The risk of fire and other annoyances, such as litter and unauthorised access, increases when plantations lie close to urban areas.

Soils

Like most crops, trees prefer well-drained, deep soil with plenty of rain. The soils in the Mary Valley area are variable and require careful analysis.

Irrigation

Plantations do not require any form of irrigation.
Labour
Once a plantation is established, it does not need much labour. During years 3–6, you only need to carry out thinning and pruning. These operations are not time-critical and can be undertaken over several months. Other activities that may be required up until harvest include management of pests and weeds and fire management (such as maintenance of firebreaks and tracks and fuel reduction burning where appropriate). South East Queensland has a large plantation contractor workforce. Contractors are available for nearly all plantation establishment and maintenance operations, including supplying seedlings. In addition, it is possible to adapt on-farm machinery for plantation operations such as site preparation and weed control.

Marketing
The Sunshine Coast region has a large and well-established forest-growing and timber industry based around exotic pine and araucaria (hoop pine). Markets and productivity rates for exotic and hoop pine are well established. The emerging hardwood plantation sector is less certain because of the need for the timber industry to change from native forest to plantation timber resources (and the associated uncertain future values). Any future incursions of pests and/or diseases may also impact value.

Consider which plantation species are being grown locally and the products that are produced from them. Find out whether market access is assisted through aggregation with existing plantation resources.

Skills
Government and private groups can provide plantation management and farm forestry technical knowledge. Several organisations offer on-ground services, including total management of plantation development. Ask for advice on site suitability and plantation establishment techniques before starting any plantation venture. You can also get help to predict productivity rates for particular sites.

Regulations
Land use
Changes in the use of your land may be assessable under your local council's planning scheme. You are strongly advised to contact your local regional council if you are intending any change in use of land associated with a change of agricultural activity and seek advice on rural uses that are self-assessable, code-assessable or impact-assessable.

Tax considerations
Primary producers can claim inputs for resource development. Planting or tending trees in a plantation or forest that you intend to fell is considered a primary production business. Contact the Australian Tax Office or your accountant for more information.

5.3 Enterprise options
This subsection gives you information about four forestry enterprises:
- exotic pine plantations
- hoop pine plantations
- hardwood (eucalypt) plantations
- rainforest species
With all options you should obtain professional advice on soils, site preparation, species selection and plantation design.

Exotic pine plantations
The market for exotic pine plantation products is good. The Mary Valley area is also close to existing exotic pine plantations and processing facilities, which should make it easier to market timber.

Soil is a critical factor for growing these trees. Exotic pines grow best on sandy soil with at least 35 cm depth above any heavier clay subsoil. Many of the soils in the Mary Valley are not particularly well suited to the most common exotic pine varieties grown on the coastal areas.

A rotation length of approximately 27 years is required.
Hoop pine plantations

There is a well-established market for hoop pine plantation products. The Mary Valley has existing hoop pine plantations and processing facilities, which should make it easier to market timber.

Generally, land that previously supported rainforest is the most suitable for growing hoop pine plantations. These sites have rich clay loam/alluvial soils with good drainage.

Hoop pine plantations take up to 40 years to provide maximum revenue.

Hardwood plantations

Hardwood plantation (eucalyptus species) are grown in South East Queensland for two main products:

- sawlogs, which take about 25 years to produce
- chip for pulpwood, which takes 8–10 years to produce.

Hardwood plantations are a relatively new initiative in Queensland. The future domestic market for hardwood sawlogs is likely to be good because native forest harvesting is decreasing. The challenge is to produce a quality, high-value product. The hardwood chip market will be driven by export demand.

Hardwood plantation species need well-drained soils. They suit ridge/mid-slope locations. Many species are frost-sensitive.

Blackbutt, Gympie messmate and spotted gum grow well on the coast and are good for sawlog production. Other species may also be suitable for sawlog and chip production; make sure you seek professional advice on species and site selection.

Hardwoods are native species and are susceptible to insects and fungal diseases. Most pests and diseases affect productivity only, but some threaten the life of the whole crop.

Rainforest species (also known as cabinet timbers)

Achieving good productivity and form in these timbers is a challenge, so select species carefully. Investigate and identify products and markets before you invest.

As with hoop pine, land that previously supported rainforest is the most suitable for growing rainforest timber species. These sites have rich clay loam/alluvial soils with good drainage.

There are no broad-scale commercial plantings of rainforest species in Queensland other than hoop pine.

Other rainforest or cabinet timbers are generally grown on a small scale in mixed species systems (rather than single species plantations). Mixed species rainforest plantings take more than 40 years to provide maximum revenue and there is limited research to support silvicultural systems.

5.4 Gross margins

Due to the long timeframes involved in forestry investments, gross margins are not relevant for plantation forestry. This is because costs are too variable over the life of a crop and inputs are totally dependent on factors such as site, topography, whether you employ labour or do the work yourself and the variable costs of fertiliser and fuel depending on the location and species planted.

Table 5.1 on the following page is a guide to the type and frequency of the activities you might incur when developing a plantation. The list of inputs is not exhaustive and you should seek professional advice on these inputs and their associated costs as they are dependant on the site, plantation type and timing. A costing schedule can be devised by a forestry consultant once you have selected your site and plantation species.

Once you have estimated your expected costs you should consult an accountant to help you calculate net present value and rate of return.
### Table 5.1 Schedule of plantation establishment activities for sawlog production

<table>
<thead>
<tr>
<th>Activity</th>
<th>Year of activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design/planning/survey</td>
<td>0</td>
</tr>
<tr>
<td>Site preparation including cultivation and firebreak construction</td>
<td>0</td>
</tr>
<tr>
<td>Fertilising</td>
<td>0</td>
</tr>
<tr>
<td>Pre-plant weed control</td>
<td>0</td>
</tr>
<tr>
<td>Plant supply</td>
<td>0</td>
</tr>
<tr>
<td>Planting</td>
<td>0</td>
</tr>
<tr>
<td>Survival assessment and refill</td>
<td>0</td>
</tr>
<tr>
<td>Post plant weed control</td>
<td>0</td>
</tr>
<tr>
<td>Post plant weed control</td>
<td>1</td>
</tr>
<tr>
<td>Form prune (depending on seed source)</td>
<td>1</td>
</tr>
<tr>
<td>Post-plant weed control</td>
<td>2</td>
</tr>
<tr>
<td>First prune</td>
<td>3</td>
</tr>
<tr>
<td>Second prune</td>
<td>5</td>
</tr>
<tr>
<td>Pre-commercial thin</td>
<td>5</td>
</tr>
<tr>
<td>Commercial thin (management costs only)</td>
<td>17 (depending on species)</td>
</tr>
<tr>
<td>Clearfall harvest (management costs only)</td>
<td>25 (depending on species)</td>
</tr>
<tr>
<td><strong>Recurrent costs</strong></td>
<td></td>
</tr>
<tr>
<td>Field inventory carbon/resource</td>
<td>3, 8, 12, 16, 20, 25</td>
</tr>
<tr>
<td>Carbon/resource accounting</td>
<td>3, 8, 12, 16, 20, 25</td>
</tr>
<tr>
<td>Project management</td>
<td>0–1</td>
</tr>
<tr>
<td>Project management</td>
<td>2–5</td>
</tr>
<tr>
<td>Project management</td>
<td>6–25</td>
</tr>
<tr>
<td>Fire protection</td>
<td>Annually</td>
</tr>
<tr>
<td>Pest and disease monitoring/control</td>
<td>Annually</td>
</tr>
<tr>
<td>Site restoration</td>
<td>As required</td>
</tr>
<tr>
<td>Road construction/maintenance</td>
<td>As required</td>
</tr>
</tbody>
</table>
5.5 Contacts and further information

DPI&F advisory services

Leigh Kleinschmidt

Leigh Kleinschmidt is a Forest Manager working for Forestry Plantations Queensland at Beerburrum. Leigh is the author of the ‘Forestry’ chapter of this publication and has been specialising in the forest-growing industry for the last 30 years. Leigh commenced work with the state government in 1978. To contact Leigh, call the DPI&F Business Information Centre on the number below.

DPI&F Business Information Centre

Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).

Phone: 13 25 23
Email: callweb@dpi.qld.gov.au

DPI&F website

More than an information repository. DPI&F's website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.

Website: www.dpi.qld.gov.au

Forestry Plantations Queensland

FPQ is a leader in plantation establishment and management. While the majority of FPQ's plantations are located on state lands, expansion is occurring through land purchase and on other private lands accessed through land rental and joint venture agreements.

To support FPQ's growing plantations, they are seeking new relationships with landholders wishing to rent or enter into joint venture arrangements on their land for plantation establishment. If you are a private landowner or investor, FPQ would like your involvement to grow plantations for sawlog production.

Contact: FPQ Plantation Development Officer
Beerburrum Forestry Office
Red Road, Beerburrum
Qld 4517
Phone: (07) 5438 6654

Department of Natural Resources and Water

The NRW website contains a large number of fact sheets, including Farm timber and Growing rainforest cabinet timbers in Queensland.

Website: www.nrw.qld.gov.au/factsheets/ (Click on 'Vegetation').
Private Forestry Southern Queensland: a link to Landcare groups

Private Forestry Southern Queensland (PFSQ) is a not-for-profit industry association that works to promote, coordinate and assist the development of forestry on private and leasehold lands. PFSQ is linked to a network of organisations and businesses that service the forest industry, including farm forestry and Landcare groups.

Phone: (07) 5483 6114
Website: [www.pfsq.org](http://www.pfsq.org) (on-site advice and services provided by PFSQ will generally attract a fee)

Contacts for Landcare groups in your area are as follows:
Maroochy Landcare Group Inc: (07) 5447 0351
Noosa & District Landcare Group Inc: (07) 5485 2468
Barung Landcare Assoc. Inc: (07) 5494 3151

Brisbane Plantation Project

The Brisbane Plantation Project can provide landowners with suitable lands and the opportunity to diversify their on-farm income through the leasing of land to establish eucalypt plantations for pulpwood production.

Phone: 1800 656 736 or (07) 3288 9919

Timber marketing

Several local sawmilling companies want to increase their timber uptake from softwood plantations of suitable scale (minimum plantation area of 30 ha). These companies are interested in agreements at the time of plantation establishment for purchase of the final crop. They may also be interested in accessing suitable land for plantation establishment through purchase or lease arrangements, and/or providing plantation management services.

Phone: (07) 3254 1989
6 Grain and fodder crops

6.1 Thinking about growing grain and fodder crops

Queensland grows a wide range of broadacre winter and summer grain and fodder crops. However, not all of them are suitable for the Mary Valley area.

Grain crops and fodder crops pose different growing challenges. Overseas demand for grain and the level of the Australian dollar strongly influence grain prices in Australia. Local markets pay a small premium for quality product, so producers can save money on freight and handling if their grain can be sold locally. All fodder crops need to be sold locally because freight costs reduce margins to unacceptable levels when fodder is transported over long distances.

Winter grain crops in Queensland (such as wheat) are grown mainly in the Darling Downs. Grain crops are not suitable for the Mary Valley area because the climate makes disease more likely and reduces the grain quality of winter broadacre crops. Their potential in the region is also limited by likely production quantity, distance to specialty markets and infrastructure requirements.

Winter grazing crops are grown successfully in southern Queensland’s coastal regions, but mostly as part of beef or dairy enterprises. Growing grazing crops on their own is really only economical in the Mary Valley area as part of an association with local cattle enterprises, which keeps freight costs low.

Cotton is a high-value crop grown in central and southern Queensland. Difficulties with cotton production in the Mary Valley area would include disease and insect pest management, rain at picking (April/May), small growing areas, the need for a significant amount of specialised equipment and a lack of ginning facilities within the area.

The major summer grain and fodder crops (grain sorghum, maize, sunflower, soybean, mungbean, millet, forage sorghum and grazing lablab) and the minor crops (navy beans, cowpeas, grain lablab and crop seeds) are better suited to the Mary Valley area. But all these crops have certain needs that you should consider before you make a decision. This section gives you information on suitable crops for the Mary Valley area.

If growing fodder interests you, your most important step will be establishing local reliable markets for your hay or silage. The major risk with all forage crops is the small local market in a normal rainfall year. Finding a market is easier in drought because freight costs are subsidised and the demand for fodder is much higher.

Diversifying into grain crops requires capital investment and specialised advice. What can you do to smooth the transition?

- Consider using the services of a consultant/agronomist to develop new enterprises, particularly in the first few years.
- Visit farms in crop-growing regions of coastal Queensland.
- Form a best-practice group for producing grain and fodder crops to share problems and experiences.
- Obtain professional support through your group.

6.2 Critical factors

Chemical residues

Chemical residues are a significant problem for grain and fodder crops, with legal implications. If purchasers find organochlorine residues in a grain shipment, the whole shipment may be condemned. Farmers that produce contaminated grain will be held legally liable.

Because most grain is fed to humans or stock, be prepared to observe chemical withholding periods. You will be held liable for any residues found in slaughtered stock and meat products if your vendor declarations are not completed correctly. (See also ‘Pests and weeds’ and ‘Marketing’ on the following pages.)

Community

Urban residential areas are being developed close to commercial farms that rely on chemicals to control pests and diseases. This can lead to situations where neighbours raise concerns about the use of chemicals. Be aware that even the legal use of registered chemicals may not quell community concern.
**Climate**
Field crops are affected by wet weather. Extended wet weather during grain drying will downgrade quality and reduce prices. The high rainfall in the Mary Valley area can also make leaf diseases more likely. Choose varieties with higher levels of resistance.

**Soils**
The optimum pH range for most grain crops is 6.5–8.0. You can apply lime or dolomite to soils with a pH below 5.0. Soil pH can drop dramatically if acid sulfate soils are drained.

Hard-setting, surface-sealing soils hinder emerging grain and fodder crops, particularly small-seeded crops like sorghum. Depending on soil pH, you can apply gypsum, lime or dolomite to reduce surface crusting in sodic soils.

A soil test will determine the sodicity rating of your soil and a recent soil test will help you decide what nutrients to use.

Grain crops do not generally tolerate waterlogging. Even short periods of waterlogging reduce crop growth and reduce grain yield and quality.

**Irrigation**
All grain and fodder crops respond well to irrigation, although dryland grain crops can be reliably produced in this region. Irrigation is most important from flowering to the end of grain fill because this is the critical time for water stress.

**Pests and weeds**
You can control grass and broadleaf weeds in grain crops in Queensland with a broad range of pre- and post-emergent herbicides. Follow these procedures:

- Plan your herbicide use because residues may affect later crops.
- Monitor crops carefully and develop integrated pest management practices to minimise your pesticide use.

(See also ‘Chemical residues’ on page 53.)

**Infrastructure**
Although hay- and silage-making requires specialised machinery, you can try producing this crop by using hay- and silage-making contractors until you have established how the option suits you.

You will need to have access to the infrastructure in the list below, depending on the crop you produce.

**On-farm**
- precision planter—preferably a vacuum-operated planter (peanuts are particularly sensitive to handling at planting)
- specialised harvesting equipment—required for all crops
- silos and grain handling equipment, including augers and/or conveyors
- a hay storage shed.

**Off-farm**
- an aerial operator to apply pesticides
- post-harvest grain drying facilities (investigate this possibility even if you plan to dry your crop in the field)
- bulk grain transport.

**Timeframes**
The most critical factors when growing grain are timing inter-row cultivations, pesticide applications and harvest management to ensure a speedy, high quality harvest.
Labour
Grain and fodder crops are not excessive users of labour like some horticultural crops (such as vegetables).

Marketing
Try and develop local markets for your grain to reduce freight and double handling. This is particularly important given fuel prices. Local piggeries, dairies, poultry and beef-fattening enterprises purchase most grain crops. Establish local producers who are willing to pay commercially viable rates.

Be prepared to market specialty crops for the edible bean market, like peanuts and soybean, to specific end-users.

Ask your grain merchant for grain specifications and delivery standards set by the National Agricultural Commodities Marketing Association (NACMA). These standards set the quality standards for all crops and penalties apply for grain that does not meet these standards at point of delivery. The standards include grain quality and prohibited weed seeds.

Grain producers must supply vendor pesticide declarations for all the grain they sell.

Regulation
Land use
Changes in the use of your land may be assessable under your regional council planning scheme. You are strongly advised to contact your regional council if you are intending any change in use of land associated with a change of agricultural activity and seek advice on rural uses that are self-assessable, code-assessable or impact-assessable.

6.3 Enterprise options
This subsection gives you information about individual field crop enterprises.

Table 6.1 (page 56) gives you much of the detail you need to know about grain and fodder crop enterprise options. Look at the table, then read the crop information that comes after it.
Table 6.1 Crop selector

<table>
<thead>
<tr>
<th>Grain crops</th>
<th>Soil pH</th>
<th>Soil depth (cm minimum)</th>
<th>Tolerance of soil compaction</th>
<th>Planting window</th>
<th>Plant to harvest/first cutting (days)</th>
<th>Susceptibility to weather damage at harvest</th>
<th>Pest risk</th>
<th>Difficulty of weed control</th>
<th>Difficulty of disease control</th>
<th>Need for consultant support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorghum</td>
<td>&gt; 5.5</td>
<td>60</td>
<td>L</td>
<td>Nov–mid Jan</td>
<td>130</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Maize</td>
<td>&gt; 5.5</td>
<td>60</td>
<td>M</td>
<td>Sep–late Jan</td>
<td>130</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>M</td>
</tr>
<tr>
<td>Peanut</td>
<td>&gt; 4.5</td>
<td>60</td>
<td>VL</td>
<td>Oct–Dec</td>
<td>160</td>
<td>VH</td>
<td>H</td>
<td>H</td>
<td>VH</td>
<td>VH</td>
</tr>
<tr>
<td>Soybean</td>
<td>&gt; 5.5</td>
<td>60</td>
<td>L</td>
<td>Nov–mid Jan</td>
<td>150</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td>M</td>
<td>H</td>
</tr>
<tr>
<td>Fodder crops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forage sorghum</td>
<td>&gt;5.5</td>
<td>60</td>
<td>L</td>
<td>Nov–Feb</td>
<td>56</td>
<td>L</td>
<td>VL</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Maize</td>
<td>&gt; 5.5</td>
<td>60</td>
<td>M</td>
<td>Sept–early Feb</td>
<td>90</td>
<td>L</td>
<td>VL</td>
<td>M</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Soybean</td>
<td>&gt; 5.5</td>
<td>60</td>
<td>L</td>
<td>Oct–late Jan</td>
<td>120</td>
<td>L</td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Lablab bean</td>
<td>&gt; 5.5</td>
<td>60</td>
<td>L</td>
<td>Oct–late Dec</td>
<td>56</td>
<td>L</td>
<td>VL</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Lucerne hay</td>
<td>&gt;60</td>
<td>100</td>
<td>VL</td>
<td>June–July</td>
<td>70</td>
<td>VH</td>
<td>M</td>
<td>H</td>
<td>VH</td>
<td>M</td>
</tr>
</tbody>
</table>

VH = very high; H = high; M = moderate; L = low; VL = very low
Grain crops

Grain sorghum
Grain sorghum is a relatively drought-tolerant grain crop that does not require much specialised equipment to grow. However, you will need to organise a harvesting contractor before you grow the crop to make sure there is one who will come and harvest the small areas you are likely to grow.

Its seed size makes grain sorghum particularly sensitive to hard-setting soils. The grain sorghum plant’s erect nature reduces the chance of dirt contamination during harvesting. You can have samples tested before any grain is marketed.

Extended wet periods during flowering encourage sorghum ergot—a disease affecting the yield and quality of harvested grain that is also toxic to stock. NACMA standards specify maximum levels for this disease in grain sorghum.

Maize
Maize is the preferred feed grain for most intensive livestock industries and selling maize grain is rarely a problem. Maize requires specialised harvesting machinery. Investigate off-farm grain drying because mature maize can sprout in the cob in wet conditions.

Maize is sensitive to micronutrient deficiencies, which can be accentuated by low soil pH.

Maize can be planted deeper than sorghum because it has larger seeds. This can be important when the soil surface has dried out. Larger seeds also tolerate poorer soil physical conditions (like hard-setting soils) during emergence.

Maize is extremely sensitive to waterlogging.

Contamination with organochlorines and organophosphates is unlikely because maize grows erect.

Peanuts
Peanuts offer high returns but need careful pre-plant preparation and in-crop and post-harvest care.

Peanuts are mainly bought by shellers based at Kingaroy. Much of the crop is handled by the Peanut Company of Australia. Independent shellers also clean, shell, grade and market peanuts.

Never grow peanuts in any soil containing organochlorine or organophosphate residues. Test soils for cadmium as well. Contact the Bureau of Sugar Experiment Stations or the Peanut Company of Australia to cadmium-test your paddocks before you grow peanuts. Choose your peanut paddocks carefully to avoid problems with compaction, waterlogging and chemical residues.

Harvest losses can be high in hard-setting and heavier clay soils. Low soil calcium levels reduce crop yields and quality.

Even short periods of waterlogging devastate peanut growth, yield and quality.

Although peanuts are drought-tolerant, irrigation during flowering and podding increases yields.

Humid coastal conditions increase rust, leaf spot and net blotch, so growing peanuts near the coast will mean applying fungicides regularly. The range of herbicides for broadleaf weed control is limited.

Aflatoxin contamination of peanuts downgrades crop quality. While drought encourages aflatoxin disease, good harvesting and post-harvesting management reduce its severity.

Rodents like eating peanuts and are a major risk. Control them carefully because rodenticide-contaminated nuts will lead to whole shipments being condemned.

You need access to specialised equipment for planting, inter-row cultivation and harvesting, including:
• precision planter—preferably a vacuum planter or inclined plate planter
• boom spray to apply pesticides
• harvesting equipment, including a puller, windrower and harvester
• belt elevators (to prevent damage)
• access to post-harvest storage, drying, cleaning and grading facilities. (Negotiate with suppliers before you plant the peanuts).

Harvesting needs to occur on time. Poor weather during this period affects quality and returns.
Soybeans
Soybeans are used primarily in the edible bean market or the oil market. Different markets can specify certain varieties so investigate contracts before you grow soybeans and understand how the final price is determined.

When harvesting, choose belt elevators to handle soybeans and peanuts because the edible bean market only buys produce with little damage.

Soil contamination is common because soybean pods are set close to the ground and harvesting is close to ground level. Never grow soybeans in soils contaminated with organochlorines or organophosphates.

Eliminate pesticide drift (like endosulfan) onto other crops and pasture because residues affect meat and may damage Queensland’s international beef markets.

All pulse crops are sensitive to physical soil problems such as surface sealing and compaction. Soybeans are sensitive to waterlogging, even for short periods, so they need to be planted on free-drained soils or raised beds.

Soybeans need a lot of water during pod fill. You can time your planting to take advantage of wet weather but soybeans also respond well to irrigation.

Control weeds early on because the range of herbicides for broad leaf weed control in soybeans is limited.

Monitor your crop regularly and develop an integrated pest management strategy to reduce pesticide use and to encourage beneficial insect control of some insect pests in soybeans.

Fodder crops
The climate and most soils of the Mary Valley area suit the production of some fodder crops, particularly sorghum, maize, soybean, cowpea and lablab bean. Fodder crops of wheat, barley and oats are possible but the short winter growing season limits their potential yield.

Oats
Oats are grown as a winter forage crop for cattle. Oats can be used for grazing or fodder conservation.

Cane and cane tops
Cane is a coarse, roughage-type fodder that is only used as a last resort in times of extreme drought.

Failed sugarcane crops make better nutritional hay than tops, but are still only regarded as roughage or drought feed.

Maize
Most maize grown for fodder is made into silage by dairy farmers. Contractors are available to cut and transport maize used for silage. However, maize silage usually cannot be transported economically over more than 30 km.

Fodder maize needs more nutrients and fertiliser than sugarcane.

Growing fodder crops of maize requires better growing skills than forage sorghum. Otherwise, factors are the same as maize grown as a grain crop (see ‘Maize’ under ‘Grain crops’ on page 57).

Forage sorghum
Dairy farmers do not usually feed forage sorghum as silage. However, the advantages are that forage sorghum will grow in areas of lower rainfall and higher temperature than maize. Forage sorghum also requires less specialised equipment than maize. Investigate whether contractors can bale crops because equipment is expensive to buy. Forage sorghum is usually baled into small and large bales.

Soybean
Make sure you have a market for soybean hay. Soybeans are more tolerant of soil acidity than either cowpeas or lablab beans. Both soybean and cowpea are easier to handle as a hay crop than lablab beans.
Lablab bean

Lablab bean is best used as a grazing crop. It is a useful fodder plant in the coastal tropics because it resists Phytophthora root and stem rot. You may need a rotary cutter-bar mower to handle the trailing vine-like growth of the plant when cutting for hay or silage. Lablab bean is also very sensitive to waterlogging.

Hay crops

Pasture

Pasture grasses and legumes that can be made into hay include grasses—rhodes, setaria, panic, kikuyu and paspalum—mixed with white clover, siratro, and glycine.

In a normal rainfall season there is little market for pasture hay. Small square bales of good quality pasture hay (grass cut at early flowering plus a legume component) may find a market among local recreational farmers.

Irrigated lucerne

Investigate the local market for hay because transport costs can be high. Market and price depend on quality and drought conditions. However, milled or chafed weather-damaged lucerne hay might sell to the home garden mulch market.

Lucerne grows well on freely draining, deep soils. However, one day of waterlogging can destroy entire lucerne stands.

Irrigation is essential. You may have to invest a lot in haymaking equipment if contractors are not available.

Hay versus silage

Making hay can be difficult in high rainfall coastal environments because high-yielding, bulky crops are difficult to dry in the paddock. There are two main problems:

- You might have to turn crops many times so that they dry evenly.
- Soil dust stirred up by these operations can contaminate the hay crop with pesticide residues.

In a difficult haymaking environment it might be more efficient if crops like maize or forage sorghum were either fed directly to stock as green chop or made into silage.

The main advantage of hay over silage is that it is transportable over much longer distances and marketable in both small and large bales.

6.4 Gross margins

This subsection lists the inputs you need to work out the gross margins for growing a field crop.

Use Table 6.2 on the following page as a guide to the type of costs you may incur. You may find it helpful to develop a similar layout in a computer spreadsheet program and input your own expected costs, with an average yield and market price, for a range of field crops. This will give you a guide to the probable outlays and possible returns from these crops.

If you are unfamiliar with spreadsheets, talk to your accountant or a professional who can help you.
### Table 6.2 Gross margin template and inputs for growing grain and fodder crops

<table>
<thead>
<tr>
<th>Revenue</th>
<th>$/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected price ($/t on-farm)</td>
<td></td>
</tr>
<tr>
<td>Expected yield (t/ha)</td>
<td></td>
</tr>
<tr>
<td><strong>Total revenue ($/ha)</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses ($/ha)</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$/unit</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td></td>
</tr>
<tr>
<td>Heavy till</td>
<td></td>
</tr>
<tr>
<td>Medium till</td>
<td></td>
</tr>
<tr>
<td>Light till</td>
<td></td>
</tr>
<tr>
<td>Boom spray</td>
<td></td>
</tr>
<tr>
<td>Plant</td>
<td></td>
</tr>
<tr>
<td>Harvest—contract</td>
<td></td>
</tr>
<tr>
<td>Harvest—own header</td>
<td></td>
</tr>
<tr>
<td>Fallow sprays (L or g)</td>
<td></td>
</tr>
<tr>
<td>Seed (kg/ha)</td>
<td></td>
</tr>
<tr>
<td>Fertiliser (kg/ha)</td>
<td></td>
</tr>
<tr>
<td><strong>Pesticides</strong></td>
<td></td>
</tr>
<tr>
<td>Herbicides</td>
<td></td>
</tr>
<tr>
<td>Insecticides</td>
<td></td>
</tr>
<tr>
<td>Fungicides</td>
<td></td>
</tr>
<tr>
<td><strong>Total variable expenses ($/ha)</strong></td>
<td>$</td>
</tr>
</tbody>
</table>

**Gross margin = total revenue minus total variable expenses**

<table>
<thead>
<tr>
<th>Gross margin = total revenue minus total variable expenses</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenue/hectare</td>
<td></td>
</tr>
<tr>
<td>– Total variable expenses/hectare</td>
<td>$</td>
</tr>
<tr>
<td>= Gross margin/hectare</td>
<td>$</td>
</tr>
</tbody>
</table>
6.5 Contacts and further information

DPI&F advisory services

DPI&F Business Information Centre
Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).
Phone: 13 25 23

DPI&F website
More than an information repository. DPI&F’s website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.
Website: www.dpi.qld.gov.au

DPI&F publications

Queensland Government Bookshop on-line
Sells DPI&F publications plus titles from other government departments and commercial publishers.
Website: www.bookshop.qld.gov.au

Books
Wood, IM (1997) Fibre crops: new opportunities for Australian agriculture
Summer crop management notes and Winter crop management notes (available on CD-ROM)
Contact: DPI&F Information Centre, Toowoomba
Phone: (07) 4688 1514

Other general sources
The contacts listed below can supply information on a wide range of field crops. Below this subsection, you will find information sources for specific crops discussed in this section.

Pacific Seeds
Postal address: PO Box 337, Toowoomba Qld 4350
Phone: (07) 4690 2666
Fax: (07) 4630 1063
Website: www.pacseeds.com.au

Pioneer Hi-Bred Australia Pty Ltd
Website: http://Australia.pioneer.com
Phone: 1800 076 018
Email: Pioneer.Australia@pioneer.com

Lefroy Seeds Pty Ltd
Website: www.lefroyseeds.com
Postal address: PO Box 7506, Toowoomba MC Qld 4352
Phone: (07) 4690 1300
Fax: (07) 4634 3905
Incitec Pivot Limited
PO Box 1322L, Melbourne Vic 3001
Phone: (03) 8695 4400
Fax: (03) 8695 4419
Website: www.incitecpivot.com

GrainCorp
Postal address: PO Box 136, Toowoomba Qld 4350
Phone: (07) 4639 9222
Fax: (07) 4639 9200
Website: www.GrainCorp.com.au

National Agricultural Commodities Marketing Association (NACMA)
Postal address: PO Box 448, Turramurra NSW 2074
Phone: (02) 9402 9402
Fax: (02) 9144 3526
Email: admin@nacma.com.au
Website: www.nacma.com.au

Australian Grain Harvesters Association
Email: info@agha.org.au Website: www.agha.org.au

Peanuts
Peanut Company of Australia
Postal address: PO Box 26, Kingaroy Qld 4610
Phone: (07) 4162 6311
Fax: (07) 4162 4402
Email: peanuts@pca.com.au
Website: www.pca.com.au

Peter Hatfeld (Peanut consultant)
Postal address: PO Box 26, Kingaroy Qld 4601
Phone: (07) 4162 7477

Ian Crossthwaite (BGA Services)
Postal address: PO Box 782 Kingaroy, Qld 4601
Phone: (07) 4162 2311
Maize

Maize Association of Australia
PO Box 964, Shepparton Vic 3632
Website: www.maizeaustralia.com.au
Phone: (03) 5821 7811
Fax: (03) 5821 7822

Soybeans

Australian Oilseeds Federation
Rosemary Richards, Executive Director
Postal address: PO Box R1826, Royal Exchange NSW 1225
Email: bof@australianoilseeds.com
Website: www.australianoilseeds.com
Phone: (02) 9427 6999
Fax: (02) 9427 6888

Northern Australian Soybean Industry Association
Postal address: PO Box 7250, Toowoomba Mail Centre Qld 4352
Phone: (07) 4630 1944
Fax: (07) 4630 1918

Pulse Queensland
Postal address: PO Box 151, Highfields Qld 4352
Phone: 0408 923 474
Fax: (07) 4696 8505
Email: pulse.gordon@bigpond.com
Website: www.pulseaus.com.au
7 Subtropical fruit

7.1 Thinking about growing subtropical fruit

The subtropical fruit industry in Queensland is estimated to be worth around $1140 million. A significant part of this industry is located in South East Queensland, including the Mary Valley area.

Subtropical fruit crops need high-input, high-management production systems that cost a lot to establish and maintain.

Successful fruit crop production has more critical factors than just a good growing environment. Profitable horticulture needs careful business planning, crop management skills and a commitment to quality. Subtropical fruit production also needs a lot of labour. Irrigation is essential for quality and yield.

What are the risks and costs of producing subtropical fruit? Fluctuating yield, market prices and weather conditions all influence the profitability of horticultural fruit crops.

Growing fruit is a long-term commitment. Orchard crops take several years before to come into production. Once you are producing, expect several years to pass before you are experienced enough to profitably manage your crop. Some crops can take 10 years or more to reach their full potential.

Many production areas outside the Mary Valley area already dominate the industry because their conditions overwhelmingly favour some types of subtropical fruit. For example, citrus production in the dry climate of the Central Burnett dominates the citrus industry; tropical North Queensland dominates banana and papaw production.

The shape of the subtropical fruit industry is changing. There is a trend in the industry for production areas on individual farms to become larger in order to meet the demands of the major buyers—the chain stores—and to maintain income from lower margins per unit of produce.

7.2 Critical factors

Chemical residues

Organochlorine pesticide residues may still be present in the soil from previous land use and may be a problem for some crops.

These residues may contaminate root crops (such as ginger) that retain soil after harvest. Crops that are harvested off the ground (such as macadamias, passionfruit and strawberries) can also be contaminated by soil.

Carry out a risk management assessment by checking farm records for past use of these chemicals and testing soil samples for the presence of residual chemicals.

Community

Activities that sometimes concern nearby residents are:

- control of pests and diseases with chemicals
- noise and light pollution from animal scaring devices and machinery
- soil erosion
- water run-off.

Neighbours can perceive some farm activities as harmful, whether they are or not. Whatever the case, your management and your finances might be affected.
**Climate**

Cold weather is a problem for many subtropical fruits. Even though mature fruit trees may survive a minor frost (–2 °C), immature trees will often be damaged or even killed. Early spring frosts can damage blossoms in crops such as stonefruit and pecans, even though the trees themselves are frost-hardy. Low temperatures affect some crops; for example, temperatures below 13 °C cause skin dullness in bananas and nights below 12 °C prevent Kensington Pride or Bowen mangoes from pollinating.

High humidity and wet or showery weather make many diseases more likely.

High wind reduces growth and fruit set, damages leaves and blemishes fruit, which makes them susceptible to diseases. Strong winds can damage trees.

**Soils**

All perennial and annual horticultural crops need well-drained soil—none will survive waterlogging. You need at least 1 m of well-drained topsoil; mounding or ridging can improve the drainage and soil depth of marginal soils.

However, extensive drainage work produces its own problems. Correcting drainage with open field drains and in-ground pipe systems is usually prohibitively expensive.

Sites that are susceptible to flooding are high risk. A single flood at any time in the life of an orchard, even one lasting only a few hours, can kill trees whose productive lifespan might otherwise be more than 25 years.

Soil pH and fertility are important, but these can be adjusted economically and do not affect your choice of crop.

**Topography**

Most subtropical fruit crops need frost-free sites. In the Mary Valley area this will mean avoiding valley bottoms or other sites that trap cold air. Steep slopes hamper safe and efficient machinery use and may erode easily.

Gently sloping (up to 5%), north-east slopes are the best sites because they get the most sun and are generally the most sheltered from wind.

**Irrigation**

Irrigation is essential to maintain tree growth, leaf cover, fruit set and production of quality fruit in most subtropical fruit crops. Both the amount of water and its quality affect production.

The amount of water required depends on:

- soil type—sandy soils need more water than clay soils
- irrigation system—drip or trickle systems use less water than sprinklers
- irrigation scheduling equipment—helps apply the correct amount of water and reduces nutrient-leaching by drainage water
- climate—hot, dry, windy weather dries out crops and soil; effective rainfall reduces irrigation needs.

Most crops do not tolerate salty irrigation water. Water with high electrical conductivity (ECi), which indicates a high salt content, can damage and kill plants. Yields can be reduced, however, without obvious signs of damage.
Pests and diseases

Horticultural crops are susceptible to many pests and diseases. These affect not only the health of trees and reduce yields, but also affect crop marketability because even small blemishes can devalue fruit. Be prepared to identify and monitor pests and diseases and take prompt action. Crop consultants are available in South East Queensland to assist growers.

Bird and flying fox damage can result in significant losses. Your entire crop may be lost in unprotected orchards. Plan for a protection system suitable for your site and budget. Several control methods are available, but total exclusion netting provides a physical barrier that protects crops under all conditions.

Infrastructure

Establishing an orchard requires major capital investment, and then further investment over several years while the orchard is immature and no income is being produced. Depending on the crop, you can wait up to 12 years for trees to become mature and reach their yield potential.

Other capital expenditure for on-farm infrastructure may include some or all of the following, depending on the crop:

- large tractor and cultivation equipment for land preparation*
- medium tractor for crop maintenance (slashing and spraying) and harvest work
- utility vehicle
- slasher
- fertiliser spreader
- picking/harvesting trailer
- cherry picker for harvesting some tree crops
- separate spray units for herbicides and pesticides
- equipped workshop
- equipped office
- ripening room*
- dams/bores for irrigation water storage
- irrigation system—pumps and mains, sub-mains, laterals, sprinklers
- orchard netting or sound/light deterrent systems to prevent bird and flying fox damage
- fertigation system
- pruning equipment*
- harvest aids (ladders, secateurs, bags and bins)
- hydrocooler (equipment used for cooling fruit in very cold water)
- forced-air cool room
- packing shed*
- sorting/grading and packing equipment*
- post-harvest dipping, spraying and washing equipment*
- dehusking equipment and storage/drying silos (for macadamia nuts).

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

Off-farm infrastructure requirements may include:

- efficient refrigerated transport for freighting produce to market (freight contractor)
- a packhouse and/or market cooperative for contract packing and collective marketing (if you choose not to do your own packing and marketing)
- processors (for pecan and macadamia nuts, ginger, pineapples)
- a wholesaler or merchant at the central markets to handle your produce.
Timeframes
Tree crops take several years to produce fruit to their full potential. This has far-reaching financial implications that you need to carefully consider. Timelines vary between crops. See Table 7.1 (page 70) for information on specific crops.

Labour
Subtropical fruit needs large amounts of labour at certain times in its production. Organising and managing labour for harvesting and packing is often the most intense part of growing fruit. Most crops have a short harvest during which you must pick and grade large quantities of fruit.

Pruning and thinning some crops also demands a lot of labour because these operations cannot be mechanised.

Marketing
Markets exist locally, nationally and overseas for subtropical fruit. Accessing those markets as a small grower is not easy.

The main domestic markets for Queensland produce are Brisbane, Sydney and Melbourne. Adelaide, Hobart and Perth, and Queensland’s regional centres have smaller markets.

Niche markets—such as local retail outlets or farmers markets—can easily be oversupplied, either by you or other growers.

Most fruit crops are highly perishable and need a reliable refrigerated transport service to deliver quality produce on time. Several freight contractors specialising in fruit transport operate in the Mary Valley area.

Some fruit crops have existing or potential export markets. However, export markets have complex and specialised requirements and are normally available only to large growers, marketing groups or cooperatives that can guarantee supply over a longer time. Export requires strict attention to quality standards and quarantine requirements.

Several market groups and packing co-ops in South East Queensland specialise in specific crops. Cooperative marketing, often through packhouse groups, is an excellent alternative for smaller producers who produce reliable, quality fruit that can be marketed under a single entity.

Successful marketing involves:
- communicating regularly with people in the market chain, as well as other growers
- keeping up-to-date with changes in production and marketing technology
- research and experimentation with new ideas
- willingness to adopt better systems
- a good understanding of the needs of your customers.

Quality assurance
Consumers and retailers demand QA standards for all food, including fruit. These standards cover chemical residues, lack of contamination, and freedom from foreign matter. There is also demand for quality parameters, such as shelf life, colour and flavour.

All major retailers require their suppliers to have a food safety QA system in place. If you send your produce to a packhouse with a QA system, their system may reduce the level of accreditation that you need.
Skills
You need careful planning and management to grow and market fruit crops successfully. The skills you require include:

- thorough knowledge of the crop you are growing from consistent observation and recording of events during the growth cycle
- the ability to make appropriate and timely decisions
- operational skills including leaf and soil analysis, fertilising, irrigation scheduling, weed management, pest monitoring, pruning, maturity assessment, harvesting, packing and marketing
- the ability to train and control the labour that grows, harvests and packs your crop.

Some crops demand more management than others. Look at the management skill rating in Table 7.1 (page 69) to find the level of knowledge and skill necessary for each crop.

Regulations

Government regulation
Regulation does not affect fruit production significantly, but you need to be aware of some government regulation regarding:

- banana growing
- water access
- chemical use.

Banana plant material movement and the eradication of plants infected by certain diseases is controlled by DPI&F to restrict the spread of serious diseases.

In the Mary Valley area, using irrigation water from permanently or intermittently flowing watercourses requires a NRW water licence. Contact NRW to verify if a licence is required in your situation. Using irrigation water from water run-off storage dams and bores may require local government approval so check with your local council.

You might need accreditation to buy, use and apply certain chemicals. Check with your local DPI&F office or chemical vendor.

Commercial and market regulations
Plant breeder’s rights and contractual market arrangements give legal monopoly over commercialisation of some varieties for a prescribed period. Ask your source of planting material about your obligations, if any.

Restrictions apply to crops entering some interstate markets to prevent pests and diseases spreading. However, appropriate interstate certification agreement accreditation gives growers access to these markets.

Some industries have established specific grading and packing standards and producers are obliged to meet such standards.

Land use
Changes in the use of your land may be assessable under your local council’s planning scheme. You are strongly advised to contact your local council if you are intending any change in use of land associated with a change of agricultural activity and seek advice on rural uses that are self-assessable, code-assessable or impact-assessable.

7.3 Enterprise options
This subsection gives you information about individual subtropical fruit enterprises.

Table 7.1 on the following page gives you much of the detail you need to know about subtropical fruit enterprise options. Look at the table, then read the crop information that comes after it.

Using the crop selector checklist
Table 7.1 includes the main crops grown. Minor crops (e.g. figs or longan) have not been included because not enough information is available.
Table 7.1 Crop selector

<table>
<thead>
<tr>
<th>Crop</th>
<th>Soil pH (water)</th>
<th>Soil drainage (importance)</th>
<th>Soil depth (cm) minimum</th>
<th>Water requirement (ML/ha)</th>
<th>Water quality ECi (dS/m)</th>
<th>Sensitive to light frosts*</th>
<th>Wind tolerant</th>
<th>Pest risk</th>
<th>Bird/flying fox risk</th>
<th>Disease risk</th>
<th>Plant to first harvest (years)</th>
<th>First mature yield (years)</th>
<th>Harvest dates in Mary Valley area</th>
<th>Management skills</th>
<th>Labour required at harvest</th>
<th>Labour required to maintain crop</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Avocados</strong></td>
<td>5.0 – 5.5</td>
<td>H</td>
<td>200</td>
<td>Up to 5</td>
<td>≤0.6</td>
<td>M</td>
<td>M</td>
<td>H</td>
<td>L</td>
<td>H</td>
<td>2</td>
<td>6</td>
<td>May–Sept</td>
<td>H</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td><strong>Bananas</strong></td>
<td>4.6 – 5.5</td>
<td>H</td>
<td>100</td>
<td>Not essential**</td>
<td>≤0.6</td>
<td>H</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>H</td>
<td>2</td>
<td>3</td>
<td>All year, but avoid winter production</td>
<td>H</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td><strong>Citrus—limes and lemons</strong></td>
<td>6.0 – 6.5</td>
<td>H</td>
<td>100</td>
<td>Up to 8</td>
<td>&lt;1.8</td>
<td>H</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>3</td>
<td>10</td>
<td>All year, but mainly Feb–April</td>
<td>H</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td><strong>Custard apples</strong></td>
<td>6.0 – 6.5</td>
<td>M</td>
<td>100</td>
<td>Up to 5</td>
<td>≤0.8</td>
<td>H</td>
<td>L</td>
<td>H</td>
<td>M</td>
<td>M</td>
<td>3</td>
<td>10</td>
<td>April–July</td>
<td>H</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td><strong>Ginger</strong></td>
<td>5.0 – 6.0</td>
<td>H</td>
<td>30 plus</td>
<td>Up to 10</td>
<td>≤0.6</td>
<td>H</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>VH</td>
<td>≤1</td>
<td>NA</td>
<td>Feb–Aug</td>
<td>H</td>
<td>VH</td>
<td>M</td>
</tr>
<tr>
<td><strong>Low-chill stonefruit—peaches, plums &amp; nectarines</strong></td>
<td>5.5 – 6.5</td>
<td>H</td>
<td>100</td>
<td>Up to 12</td>
<td>≤0.6</td>
<td>H</td>
<td>L</td>
<td>VH</td>
<td>VH</td>
<td>VH</td>
<td>2</td>
<td>4</td>
<td>Sept–Oct</td>
<td>VH</td>
<td>VH</td>
<td>VH</td>
</tr>
<tr>
<td><strong>Lychees</strong></td>
<td>5.5 – 6.0</td>
<td>H</td>
<td>100</td>
<td>Up to 8</td>
<td>&lt;0.5</td>
<td>H</td>
<td>VL</td>
<td>VH</td>
<td>VH</td>
<td>VH</td>
<td>M</td>
<td>4</td>
<td>10</td>
<td>Jan–Feb</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td><strong>Macadamias</strong></td>
<td>5.0 – 5.5</td>
<td>H</td>
<td>50</td>
<td>Not essential**</td>
<td>≤3.0</td>
<td>H</td>
<td>L</td>
<td>M</td>
<td>L</td>
<td>M</td>
<td>5</td>
<td>12</td>
<td>Mar–Sept</td>
<td>H</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td><strong>Mangoes</strong></td>
<td>6.5</td>
<td>M</td>
<td>100</td>
<td>Up to 5</td>
<td>≤2.0</td>
<td>H</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>4</td>
<td>10</td>
<td>Jan–Mar</td>
<td>H</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td><strong>Papaws</strong></td>
<td>5.5 – 6.5</td>
<td>H</td>
<td>50</td>
<td>Up to 5</td>
<td>&lt;1.2</td>
<td>H</td>
<td>L</td>
<td>H</td>
<td>M</td>
<td>M</td>
<td>1</td>
<td>2</td>
<td>Sept–March</td>
<td>H</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td><strong>Passionfruit</strong></td>
<td>5.5 – 6.5</td>
<td>H</td>
<td>70</td>
<td>Up to 5</td>
<td>≤0.8</td>
<td>H</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>L</td>
<td>1</td>
<td>1</td>
<td>Jan–July</td>
<td>H</td>
<td>H</td>
<td>M</td>
</tr>
<tr>
<td><strong>Persimmons</strong></td>
<td>6.5 – 7.0</td>
<td>H</td>
<td>100</td>
<td>Up to 5</td>
<td>≤0.8</td>
<td>L</td>
<td>M</td>
<td>H</td>
<td>M</td>
<td>VH</td>
<td>3</td>
<td>5</td>
<td>Feb–Apr</td>
<td>H</td>
<td>H</td>
<td>VH</td>
</tr>
<tr>
<td><strong>Pineapples</strong></td>
<td>4.5 – 5.5</td>
<td>H</td>
<td>30 plus</td>
<td>Not required</td>
<td>NA</td>
<td>H</td>
<td>H</td>
<td>M</td>
<td>L</td>
<td>L</td>
<td>2</td>
<td>3</td>
<td>Feb–June &amp; Sept–Oct</td>
<td>VH</td>
<td>VH</td>
<td>H</td>
</tr>
<tr>
<td><strong>Strawberries</strong></td>
<td>6.0 – 6.5</td>
<td>H</td>
<td>30 plus</td>
<td>Up to 5</td>
<td>≤0.6</td>
<td>H</td>
<td>M</td>
<td>VH</td>
<td>H</td>
<td>M</td>
<td>≤1</td>
<td>NA</td>
<td>June–Oct</td>
<td>VH</td>
<td>VH</td>
<td>M</td>
</tr>
</tbody>
</table>

VH = very high; H = high; M = medium/moderate; L = low; C = Cooling required; NA = not applicable; < = less than

* The rating reflects the fact that even though a light frost may not kill the plant, it could damage fruit and flowers.
** Irrigation not essential in areas with 1250 mm or more annual well-distributed rainfall per year.

**Avocados**
Avocado trees need excellent drainage and deep soil.

Good returns rely heavily on the production of quality fruit with good flavour, little or no skin damage and freedom from pests and diseases. Avocados require skilful management of orchard operations and post-harvest care. Avocados are not as perishable as many other fruit crops but a cool room is a good idea if you are packing on the farm. Packhouse and market groups operate in South East Queensland.

Large orchards have been established in the Childers–Bundaberg area where dry conditions are advantageous for disease control and production costs are lower.

**Bananas**
Southern producers achieve lower yields and lower fruit quality than North Queensland producers. Bananas are normally grown on warm, north-facing slopes in South East Queensland to minimise exposure to low temperatures. Banana ripening has to be done under carefully controlled conditions and this is normally done by banana wholesalers.

**Citrus—limes and lemons**
Limes and lemons are harder than other types of citrus and can be grown in coastal regions (see ‘Other crops’). However, their market is limited and prices are low outside late winter and early spring when trees are normally not cropping in southern Queensland.

**Custard apples**
The domestic market for custard apples is still developing and the fruit has potential for the Asian export market. Pruning, crop manipulation and harvesting require high management skill and are labour intensive. Some varieties need to be hand-pollinated.

**Ginger**
Ginger is a capital-intensive and labour-intensive industry with a limited market for the fresh product. Processors at Yandina and Caboolture service a small group of growers growing ginger for processing for confectionery and culinary use, rather than for sale as fresh ginger.

Soils must be well drained and free of rocks. Slopes should be less than 1 in 10 and north or north-easterly aspects are preferred. Good supplies of high quality water are essential. Wind protection is needed on most sites. It is preferable to spell land for at least two years between crops for the control of nematodes and soil-borne diseases.

Key management issues include sourcing clean planting material, soil-borne pest and disease control, irrigation and labour for harvesting.

**Low-chill stonefruit—peaches, nectarines and plums**
Buyers pay good prices for early season (September–October) low-chill stonefruit (which can be grown in areas with warm winters), but from early November higher quality mid-chill and high-chill varieties (from cold winter areas) come into the market and prices fall dramatically.

Year-round intensive and skilled management of the orchard is required to achieve good quality early fruit. Frost from July to September can damage buds, flowers and young fruit. Low-chill stonefruit production is extremely labour-intensive. Orchards are normally netted to protect fruit from birds and flying foxes.

**Lychees**
Lychees are becoming a popular fruit in the Australian market and grow well in South East Queensland on well-drained soils. Lychees are very attractive to birds and flying foxes so be prepared to use orchard netting to control these animals. Some growers hydrop-cool fruit prior to sorting and packing and an efficient high-humidity cool room is essential for fruit storage after packing.
Macadamias
A native of South East Queensland, macadamias are suited to subtropical conditions, but be prepared to control several important pests and diseases. Pruning and harvesting can be mechanised but you need to farm at least 20 ha to justify capital expenditure on this specialised equipment (as well as on-farm de-husking equipment, drying facilities and storage silos). Most growers sell 'nut in shell' to processing companies for nut extraction and further value-adding.

Macadamias have a developed export market but prices fluctuate depending on world supply and demand.

Mangoes
Fruit from North and Central Queensland and the Northern Territory dominate the early and mid-season mango market. Late season crops can be produced in South East Queensland but yields of the Bowen or Kensington Pride variety—preferred by the Australian market—are unreliable and fruit is prone to disease in the humid coastal areas.

New varieties, which have good potential for both the domestic and export markets, are protected by contracts that cover growing and marketing rights and are not readily available.

Papaws
South East Queensland papaws compete in the marketplace with North Queensland papaws, which are produced under more favourable growing conditions and are often preferred by the consumer. The Australian papaw market is relatively small and can easily be oversupplied.

In South East Queensland conditions, papaws have to be grown on warm, sheltered sites that are often on slopes, making them difficult to manage.

Passionfruit
Fruit can be produced within 12 months of planting, but you should not rely on a quick return and profit because the crop is difficult to manage and it may take several years to build your expertise; the industry also goes through a regular cycle of boom and bust.

Buyers pay high prices for late winter and spring fruit but a crop is difficult to produce at this time of the year in South East Queensland. In contrast, prices can fall to below production cost during the peak season from February until July.

Varieties are variable in performance and are very sensitive to environment and management. Trial different varieties on your site before planting large areas. Only hybrid varieties suit the subtropical climate.

Persimmons
Persimmons have a limited market in Australia, but are a potential export item to Asian countries. Both markets demand high quality fruit. Aim to produce early fruit with skilled management—New Zealand persimmons compete for the later season market.

Be prepared to use orchard netting to protect the crop from birds, flying foxes and fruit-piercing moths.

Pineapples
Pineapples are grown in southern Queensland for processing and fresh consumption, but the different markets have different demands. Fruit produced for processing is sold to the Golden Circle Ltd cannery by contracted growers under a supply quota system.

The smooth Cayenne type grown for the cannery has a low sugar content during the winter months and is too sour for the fresh market. Better fresh market varieties are available only from commercial organisations that hold both contractual rights to the planting material and the marketing rights for the fruit product.

Pineapple is a complex crop that does not follow a simple 12-month cycle. You need a good understanding of pineapple crop cycles and varieties to judge the timing of planting and artificial initiation of flowering crucial to efficient harvesting and production.

Because pineapples grow in raised beds with no other vegetative cover, soil erosion can be a problem.
Strawberries
Some areas in South East Queensland region suit winter and early spring production of strawberries if the growing site is well drained, warm and frost-free. Strawberries require very intensive management from March (planting) through to October (when most growers in South East Queensland stop production because of low prices and hot weather).

Strawberries are an expensive crop to establish and manage, so trial them on a small scale for at least a season before you plant larger areas.

Other crops
The crops in this subsection can be grown in South East Queensland, but they are not ideal options for the Mary Valley area for various reasons explained here.

Bush foods
Some bush food crops may grow into significant industries but current problems—lack of reliable planting material, limited management information and limited markets—make them risky options.

Coffee
In Australia, coffee must be harvested mechanically to be economical. For this to be possible, coffee cherries have to be managed to mature at the same time. Strategies have been developed to allow this in the dry summers of the Atherton Tableland and the cool winters of northern New South Wales, but not in South East Queensland’s climate. Well-drained, deep soils are essential because coffee does not tolerate waterlogged soils.

Figs
This perishable crop is grown on a limited scale in southern Queensland for a limited market. Little management information is available.

Kiwi fruit
The potential of this crop in southern Queensland is limited by competition from efficient New Zealand growers and their domination of the domestic and export market.

Longan
Management of longans is similar to lychees, but the market is much less developed.

Mandarins, valencias and navel oranges
Mandarin, navel and valencia orange production is concentrated mainly in the dry inland Central Burnett area in Queensland where the dry climate suits these fruit. Hot, humid and wet summers make these citrus crops difficult and expensive to grow in coastal southern Queensland.

Olives
Olives are a Mediterranean climate crop and need average daily temperatures of 12 °C or less in July to initiate cropping. Olive trees are therefore unlikely to yield commercial crops in coastal southern Queensland.

Organic production
The hot, humid and wet summers of coastal southern Queensland do not favour the production of organic fruit crops because pests and disease can be very difficult to control under these conditions.

Pecans
Pecans can be grown in southern Queensland but little management information is available for this area. Production in Australia is limited mainly to one large property in northern New South Wales; processing is limited to one facility in Toowoomba.

Table grapes
The hot, humid and wet summers of coastal southern Queensland make the region unsuitable for table grapes because pests and disease can be very difficult to control under these conditions.
7.4 Gross margins

This subsection lists the inputs you need to work out the gross margins for growing a subtropical fruit crop.

Use Table 7.2 below as a guide to the type of costs you may incur. You may find it helpful to develop a similar layout in a computer spreadsheet program and input your own expected costs, with an average yield and market price, for a range of fruit crops. This will give you a guide to the probable outlays and possible returns from these crops.

If you are unfamiliar with spreadsheets, talk to your accountant or a professional who can help you.

A general rule of thumb for fruit crops is that the cost of growing the crop is about 30% of the total variable expenses; harvesting, packing and marketing make up the remaining 70%. Note that fixed and capital costs are not included in gross margin calculations.

Table 7.2 Gross margin template and inputs for growing a subtropical fruit crop

<table>
<thead>
<tr>
<th>Revenue</th>
<th>$/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price/carton</td>
<td>$</td>
</tr>
<tr>
<td>Cartons/ha</td>
<td>cartons</td>
</tr>
<tr>
<td>Total revenue per hectare (price/carton x cartons/ha)</td>
<td>$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>No. of times per year</th>
<th>Units/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slashing—labour</td>
<td></td>
<td>hours</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Slashing—machinery</td>
<td></td>
<td>hours</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Weed spraying—labour</td>
<td></td>
<td>hours</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Weed spraying—machinery</td>
<td></td>
<td>hours</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Weed spraying—chemical</td>
<td></td>
<td>L</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Total weed control expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pest &amp; disease control</th>
<th>No. of times per year</th>
<th>Units/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spraying—labour</td>
<td></td>
<td>hours</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Spraying—machinery</td>
<td></td>
<td>hours</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fungicide 1—chemical</td>
<td></td>
<td>L/kg</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fungicide 2—chemical</td>
<td></td>
<td>L/kg</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Insecticide 1—chemical</td>
<td></td>
<td>L/kg</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Insecticide 2—chemical</td>
<td></td>
<td>L/kg</td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Pest scouting— labour or contract</td>
<td></td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Total pest &amp; disease control expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>
Table 7.2 (cont.)

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>No. of times per year</th>
<th>Units/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nutrition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaf analysis—sample kit</td>
<td>kit</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil analysis—sample kit</td>
<td>kit</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser spreading—labour</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser spreading—machinery</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser 1 (e.g. urea)</td>
<td>kg</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser 2 (e.g. potassium sulphate)</td>
<td>kg</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertiliser 3 (e.g. superphosphate)</td>
<td>kg</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Micronutrients (foliar)</td>
<td>L/kg</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lime/dolomite</td>
<td>kg</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total nutrition expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td><strong>Irrigation (includes checking sprinklers &amp; fertigation labour)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation—labour</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation—machinery</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total irrigation expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td><strong>Canopy management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual pruning—labour</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical pruning—own machinery or contractor</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total canopy management expenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>
Table 7.2 (cont.)

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>No. of times per year</th>
<th>Units/ha</th>
<th>$/unit</th>
<th>$/ha</th>
<th>Total $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting &amp; marketing</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picking—labour</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picking—machinery eg cherry picker, cartage to shed</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cartons</td>
<td>carton</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorting and packing—labour</td>
<td>hours</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-harvest treatment chemicals</td>
<td>L/kg</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freight to central markets</td>
<td>/tray</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Levy</td>
<td>/tray</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agent’s commission (12.5%)</td>
<td>%</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pallet hire, tape, corners, etc.</td>
<td>pallets</td>
<td>$</td>
<td>$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total harvesting & marketing expenses | $ |
| Total annual variable costs/hectare (sum of all totals) | $ |

**Gross margin = total revenue minus total variable costs**

| Total revenue/ha | $ |
| Total variable costs/hectare | $ |
| Gross margin/hectare | $ |
7.5 Contacts and further information

DPI&F advisory services

Peter Rigden
Peter Rigden is a Horticultural Extension Officer working for DPI&F at the Maroochy Research Station. Peter is the author of the ‘Subtropical fruit’ chapter of this publication and has been specialising in tree crops for the last 12 years. Peter joined DPI&F in 1997. To contact Peter, call the DPI&F Business Information Centre on the number below.

DPI&F Business Information Centre

Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).

Phone: 13 25 23
Email: callweb@dpi.qld.gov.au

DPI&F's horticultural extension staff can be contacted for assistance through the DPI&F Business Information Centre.

DPI&F website

More than an information repository, DPI&F’s website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.

Website: www.dpi.qld.gov.au

Useful websites

www.dpi.qld.gov.au (Follow the links to ‘Plant industries’ for information on most horticultural crops.)
www.dpi.qld.gov.au (Follow the links to ‘Plant industries’ > ‘Fruit and vegetables’ > ‘Fruit and nuts’.)
www.dpi.qld.gov.au (Follow the links to ‘Plant industries’ > ‘Fruit and vegetables’ > ‘Vegetables’.)
www.dpi.qld.gov.au (Follow the links to ‘Environment’ > ‘Organics’.)

GrowSearch

This is an information service for producers of ornamental, horticultural and nursery crops. They can be contacted on the DPI&F website at www.dpi.qld.gov.au and follow the links to ‘Plant industries’ > ‘Services’ box.

DPI&F publications

The DPI&F has published detailed information for the following crops: avocado, citrus, custard apple, lychee, macadamia, mango, papaw, passionfruit, persimmon, wine grapes, low-chill stonefruit, strawberry, and subtropical banana. These publications contain information about:

• things you need to know before you start growing the crop (climate, soils, historical prices and examples of financial costs and returns)
• how to grow the crop (establishing, producing and marketing)
• detailed information on important decisions
• full-colour pictures of common problems with recommended solutions
• contacts and references.
Queensland Government Bookshop

Sells many of these information publications, plus a wide range of other DPI&F publications and titles from other government departments and commercial publishers.

Website: [www.bookshop.qld.gov.au](http://www.bookshop.qld.gov.au)

Photocopies of out of print information publications can be obtained from GrowSearch Australia (phone (07) 3824 9555).

Many of the information publications are available for reference at the Maroochy Horticultural Research Station (47 Mayers Road, Nambour), between 9 am and 5 pm Monday to Friday (except on public holidays).

Other publications


Carr, A (1992), *Buying the farm for horticulture: site it right*, DPI&F

These publications are available for reference at:

Maroochy Research Station

47 Mayers Road, Nambour Qld 4560

Phone: (07) 5441 2211

Other organisations

Department of Natural Resources and Water (NRW)


8 Beef

8.1 Thinking about beef

Beef production is the most significant agricultural activity in Queensland. The annual value of the beef industry is currently worth about $3.3 billion.

The majority of beef enterprises on the floodplains and adjacent foothills of the Mary Valley upstream of Gympie are predominantly sub-commercial, part-time, small area grazing landholder and lifestyle units. There are very few full-time commercial beef units.

Most grazing land previously used for dairy or beef enterprises would include fencing, cattle yards and established pastures. For new beef enterprises, the start-up costs would include all of the above facilities plus the cost of cattle. It could take more than 12 months to reach full production, especially where new sown pastures have to be established.

Breeding, growing and fattening enterprises are all suited to this area. The most productive soils for beef production are the alluvial soils along the floodplain. The hill slopes adjacent to the river flats are generally less productive because of shallower soils and reduced moisture-holding capacity.

8.2 Critical factors

Soils

The predominant soils types on the floodplains and relict terraces in the Mary Valley are deep sandy loams to clay loams of reasonable fertility. The soils on the hill slopes adjoining the floodplain are mainly loamy surface texture-contrast soils over clay subsoils.

Routine soil testing for acidity and nutrient levels is recommended.

Soil salinity is not a significant problem in the Mary Valley upstream of Gympie.

Waterlogging can be a problem on low-lying flats, especially following periods of heavy rainfall and stream flooding.

Pests and diseases

Weeds have, or could have, serious economic, environmental or social impacts if they are not controlled. You are legally responsible for any declared weeds on land under your management, and that includes controlling plants declared as weeds under the Land Protection Act 2002.

Three of the most serious declared weeds in the Mary Valley district are giant rats tail grass, fireweed and annual ragweed. Some declared and non-declared weeds can also cause stock poisoning.

Cattle ticks and internal parasites need to be managed well to ensure profitable beef production. Using cattle with at least 50% Bos indicus content will greatly reduce the effect of these parasites, particularly ticks.

Infrastructure

A small set of cattle yards to handle 100 head, which includes a crush, head bails, calf crush and loading ramp, would be essential.

Obviously a property must have a boundary fence to contain cattle. Internal fencing will be necessary to effectively manage pasture and cattle. The placement of these internal fences will depend on land and pasture type and the size of the herd.

Establishment costs for new sown pastures can range from $300–400/ha, depending on the fertiliser and lime requirements.

Existing pastures may require renovation, topdressing and oversowing with legume seed to bring them up to full production.
Nutrition

Good management of the nutrition of cattle is a key element of profitable beef production. Breeding cows need good nutrition to be able to produce a calf each year. Cows also require good nutrition to produce the large quantities of milk that allow calves to grow well enough to meet the requirements of the vealer and bobby calf markets.

As most of the pastures are summer-growing, winter can be a time when the nutritional value of pasture falls below that required to keep the cow in good condition and producing well. Supplementary feeding is often necessary during this period.

Regulations

State government

Properties with livestock need a property registration number issued by DPI&F. This allows livestock to be monitored and traced back to the property of origin in the event of pest and/or disease outbreaks. When selling cattle, other Acts require:

• stock to be National Livestock Identification System (NLIS)-tagged with the registered property number
• stock to be branded before being sold
• relevant paperwork (such as the national vendor declaration/waybill) to be completed.

For more detailed information relating to legislation, contact your local DPI&F biosecurity inspector.

Land use

Changes in the use of your land may be assessable under your local council’s planning scheme. You are strongly advised to contact your local council if you are intending any change in use of land associated with a change of agricultural activity and seek advice on rural uses that are self-assessable, code-assessable or impact-assessable.

8.3 Enterprise options

The three major beef production enterprise groupings suitable for the Mary Valley area:

• breeding and selling butchers’ calves, store steers or vealers and store weaners
• growing out store steers
• buying and fattening yearlings, two-year-old steers or cull cows.

Breeding

Many beef enterprises require a herd of breeding cows. The breed of these cows and how they are managed will depend on the particular enterprise chosen for production of vealers and butchers’ calves. A cow that has the ability to produce large quantities of milk is essential. As a general rule, breeding cows should be at least half Bos indicus content to reduce the need for parasite control and to better cope with periods of poor nutrition.

Breeding cows are culled for poor production and age. Cull cows are sold through saleyards or direct to meatworks. They are a significant source of income to the beef enterprise.

The breeding herd can produce butchers’ calves, vealers, store weaners or store yearlings.

Butchers’ or bobby calves can be produced all year round and are sold off the cow at 2–3 months old at about 100 kg liveweight. If you plan to produce butchers’ calves, your herd’s breeders will need to have a good milking capacity to feed the calves. These calves are generally marketed through calf saleyards.

Vealer production is a specialist enterprise. You need to combine the right cattle, grow top quality pasture, and manage the enterprise well. In most years only about half of the weaners will be able to achieve the vealer trade specifications; the rest will have to be sold as store weaners. Vealers are born from July–September and sold while they still have their milk teeth (at 6–8 months) and a 130–170 kg carcase weight. Supplementary grain feeding may be required to assist in finishing the vealers to market specifications.

Vealers are generally marketed direct to local butchers or sold through the saleyards. Cull cows from the breeder herd are sold direct to the meatworks, or through the saleyards.

Store cattle are generally sold through the saleyards to finishers both within the Mary Valley area or to properties further west in the Burnett district. These buyers either grow the cattle to a weight suitable to enter a feedlot or to a finished market either local trade or export.
**Purchased stores**

As said above purchased stores are finished for a variety of markets either to sell to a feedlot to be finished on grain or finished on the property suitable for the domestic or export markets.

**8.4 Gross margins**

This subsection lists the inputs you need to work out the gross margins for producing beef.

Use Table 8.1 below as a guide to the type of costs you may incur. You may find it helpful to develop a similar layout in a computer spreadsheet program and input your own expected costs, with an average yield and market price, for a range of beef enterprises. This will give you a guide to the probable outlays and possible returns.

If you are unfamiliar with spreadsheets, talk to your accountant or a professional who can help you. The computer package Breedcow/Dynama is designed to help beef producers examine the economics of a range of enterprise options.

**Table 8.1. Gross margin template and inputs for beef**

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Gross margin template and inputs for beef</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livestock sales</td>
<td>Number x kilograms x cents/kilogram = Total</td>
</tr>
<tr>
<td>Butchers' calves</td>
<td>x x =</td>
</tr>
<tr>
<td>Vealers</td>
<td>x x =</td>
</tr>
<tr>
<td>Store weaners</td>
<td>x x =</td>
</tr>
<tr>
<td>Store steers</td>
<td>x x =</td>
</tr>
<tr>
<td>Cull cows</td>
<td>x x =</td>
</tr>
<tr>
<td>Cull bulls</td>
<td>x x =</td>
</tr>
<tr>
<td><strong>Total revenue</strong></td>
<td>= $</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>Livestock purchases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Store weaners</td>
<td>head x kg x $ /kg =</td>
</tr>
<tr>
<td>Cow replacements</td>
<td>head x kg x $ /kg =</td>
</tr>
<tr>
<td>Bull replacement</td>
<td>head x kg x $ /kg =</td>
</tr>
<tr>
<td>Commission on sales</td>
<td>% x $ =</td>
</tr>
<tr>
<td>Freight in &amp; out</td>
<td>head x $ /head =</td>
</tr>
</tbody>
</table>
8.5 Contacts and further information

DPI&F advisory services

Russ Tyler
Russ Tyler is a Principal Extension Officer (Beef) working for DPI&F at Brian Pastures Research Station Gayndah. Russ is the author of the “Beef” chapter of this publication and has been specialising in beef production and management for the last 40 years. Russ joined the Department in 1968. To contact Russ, call the DPI&F Business Information Centre on the number below.

DPI&F Business Information Centre
Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).
Phone: 13 25 23
Email: callweb@dpi.qld.gov.au

DPI&F website
More than an information repository. DPI&F’s website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.
Website: www.dpi.qld.gov.au

DPI&F publications
The Queensland Government Bookshop online
Sells a wide range of DPI&F publications plus titles from other government departments and commercial publishers.
Website: www.bookshop.qld.gov.au
Some titles are also available from DPI&F offices.
9 Turf

9.1 Thinking about turf farming

Queensland has an established and highly competitive turfgrass production industry. Industry estimates indicate that there are 152 producers throughout Queensland, in the tropical north, the Toowoomba and Darling Downs area and in South East Queensland. In Australia, 72% of product is sold within a 100 km radius of the farm.

The economic value of the industry at the farm gate in Queensland is estimated at $70 m in 2007–08. Like other rural industries, producers battle rising input costs (such as fuel, fertiliser and labour). Selling below cost to gain a short-term competitive advantage is a problem within the industry.

When considering moving into turf production it is vital to consider what the likely demand might be for your product and what your competitive edge is. This may be based on service, varietal choices, locality or some other attribute. As circumstances change, the situation needs to be reviewed and the emphasis may need to shift to something new.

Unlike many other farming enterprises, many turf farms are vertically integrated—that is, they not only grow sod, but often deliver, install and sometimes even maintain it. These enterprises face additional layers of complexity and require a diversified set of skills to do the job well. The turf itself is often reasonably easy to grow, but new entrants need to break into a relatively limited market niche, in which existing producers have well-established networks.

9.2 Critical factors

Farm requirements

Farm size varies from a few hectares to hundreds of hectares. The average turf farm size in Queensland is 16–17 ha. Small farms Australia-wide average 9.6 ha and medium-sized farms 37.7 ha.

The land must be able to be leveled to create a plane surface for harvesting equipment. Flat country or gently rolling hill country is suitable, if accompanied by deep sandy loam or clay loam soils. Heavy clay and stony soils are unsuitable. Sandy soils may be used if organic amendments are added to improve water-holding capacity and sod strength at harvest. The optimum soil pH is 6.0–6.5.

Turf is often grown on river flats; however, most turf will not survive anything other than transitory flooding. Weeds on such sites (e.g. nutgrass and giant rat’s tail grass) are a potential problem and must be eradicated completely before the first crop is planted. Left untreated, such weeds are not only a production problem, but spread to the customer as well.

Climate

While many turf cultivars have a tolerance of ground frosts, the specifics of this tolerance need to be checked on an individual basis. Sites subject to frosts and colder hollows will have slower growth, increasing the turnaround time and reducing profitability, even with cold-tolerant cultivars.

Production requirements

Turf farming is an intensive and highly specialised horticultural enterprise. To an outsider, turf production may look deceptively like broadacre cropping; however, it has high management inputs and production costs and product wastage is expensive for growers. Quality turf production requires well-managed nutrient, pesticide and water inputs.

Turf is normally established from sprigs and meticulous attention to weed control, pest and disease control, irrigation and nutrition is essential to grow the crop successfully. Occasionally naturalised stands of Queensland blue couch are managed to eradicate non-grass species and to encourage the development of harvestable (but low-value) sod. Pests and diseases can severely affect all types of turf and some are very difficult to control.
Turfgrass has a very limited root zone, so accurate and timely soil moisture management is critical; multiple irrigation applications per day may be needed, especially when establishing turf. Access to a reliable supply of good quality water is critical for most turf varieties. The average amount of water applied per hectare per annum in Australia is 6.5 ML. This figure will vary depending on the species used, crop stage, incident rainfall and evaporation rates. Efficiencies can be achieved with good irrigation design and by tailoring watering to the soil conditions and crop requirements. The water requirement is highest during grow-in phases of the crop and during hot, dry periods.

At each harvest a small amount of soil (about 1 cm) is taken with each cut with a similar quantity of organic material. Turf producers normally add organic matter, such as well-composted chicken or feedlot litter or vermicompost, prior to planting and again after harvest as a topdressing to stimulate regrowth.

Labour

The average turf farm in Queensland employs the equivalent of two full-time staff, plus casuals. Many farmers supply a turf-laying service, which involves either employing and managing your own team of labourers, or hiring a contractor. In a competitive labour market, sourcing and retaining skilled labour is a concern for some producers.

Some areas of farm operation are expensive if they are inefficient. One such area is the manual stacking of pallets at harvest, which is the single greatest use of labour. Poor farm layout can also increase costs by increasing the travel time between tasks.

Varieties

There are nine species of turfgrass commonly grown in Southern Queensland: green couch (*Cynodon dactylon*), hybrid couch (*Cynodon dactylon x Cynodon transvaalensis*), Queensland blue couch (*Digitaria didactyla*), soft leaf buffalo grass (*Stenotaphrum secundatum*), zoysia (*Zoysia japonica* and *Z. matrella*), kikuyu (*Pennisetum clandestinum*), sweet smother (*Dactyloctenium australe*) and seashore paspalum (*Paspalum vaginatum*).

Each of these species has differing cultural requirements and most of these species have numerous cultivars that may need particular management practices. Most turf producers specialise in few cultivars that suit their own growing conditions and their client base. When a new cultivar comes onto the market its performance characteristics may not be fully known for different environments (yours and your customers), making the decision to grow it or not more difficult.

Access to improved varieties

The Plant Breeders Rights (PBR) system has encouraged the importation and Australian breeding and selection of new turfgrass varieties. Selection criteria include characteristics such as cold tolerance, shade tolerance, improved density and disease resistance.

PBR cultivars are often supported by marketing campaigns and attract premium market prices and profits. Smaller growers and new entrants to the industry may find that the up-front licensing fees and the ongoing contractual obligations difficult to meet. This often forces new growers to use ‘commodity’ unlicensed cultivars. These are not as profitable due to their lower price.

Certification

Unlike many other horticultural industries, the Australian turf industry does not have an independent certification scheme for planting stock/seed.

For PBR protected varieties, the Australian licensees take responsibility for ensuring that their stock is as described. Imported varieties are sourced from certified stock (usually from the United States). In Australia, PBR protected varieties are often delivered with certification documents. However, with repeated propagation, common ‘commodity’ cultivars with the same name can mutate into clearly different forms. For a new grower, this may mean that the farm is established with forms that are not true-to-type and that may perform differently to expectations.
Knowledge requirements

Turf farmers require not only skills and knowledge in growing and marketing the crop, and running a business, but they are asked by clients to supply varieties to suit the specifications of particular sites.

Grassed areas are used for residential, commercial, school, sports and recreational activities. Turf farmers need to have a good understanding of turf varieties and the uses and conditions they are best suited for. Be prepared for customers who ask for advice before and after they buy. Expect to answer questions on:

- specific varietal characteristics (such as density, texture and colour)
- shade/sun tolerance
- drought tolerance
- wear resistance
- soil type
- cold weather tolerance
- establishment advice
- herbicide tolerance
- long-term turf care (including fertilising, weed control, watering and mowing).

Harvesting

Once harvested, most producers send the sod to market on the day it is cut (to prevent turf drying out). It is common for turf producers to harvest ‘on demand’ for clients. For example, a client will ring in the morning and ask that five pallets of turf be delivered that afternoon. For small operations this responsiveness means that it is more difficult for the producer to leave the farm for any length of time.

Whilst harvesting can be highly automated, the machinery required is very expensive (approximately $120 000) and is generally used on very large-scale enterprises. With a small hand cutter harvesting is usually a two-person operation, with cut sod being stacked onto pallets for trucking. Rolling and stacking sod is physically demanding work requiring a good level of fitness.

Harvesting is an acquired skill. The machinery needs to be driven in straight rows at the correct depth. Sod harvested too early or cut too shallow will break up. Rhizomatous species (such as green couch) are clear harvested, whereas stoloniferous forms (such as blue couch) are left with green ribbon strips to enable regrowth. Harvesting aims to retain as much soil on the property as possible, while making provision for the rapid reestablishment of cut sod.

Once the sod is cut, it should be delivered and installed as soon as possible. The harvesting process shaves off the majority of the grasses root system and it immediately begins to dry out. An additional danger is that core temperatures can build up within the pallet load and the product can stew.

On average each turf block would be harvested one and a half times per year.

Quality

The turfgrass industry is in the process of developing quality standards for cut sod and recommended installation practices. Premium quality turf should be the cultivar or variety specified, have no weeds present, be dense and green and have no evidence of disease or pest problems. For lower-grade turf, offered at a price discount, some weed grasses are permissible (e.g. blue couch contaminating a green couch sward). In some instances special turfgrass sod blends are marketed. In these cases the presence of more than one specified species/cultivar would not prevent the turf from being of premium quality, if all other quality attributes are present.
Marketing and finances

Input costs (such as labour, fuel, fertiliser, insurance and equipment costs) are rising at a faster rate than the returns achieved for turf. Many people in the industry are not aware of what their real costs are. In some areas there is over-production relative to the local demand. This is frequently followed by price cutting to move product and undercut the competition. In this scenario everyone loses.

Within the turf industry it is common for producers to sell directly to customers. A common strategy is to bundle services such as site preparation, installation and after-care into the sales mix. Discounts are offered where add-on services are purchased.

In an Australia-wide survey, 65.5% of variable costs were tied to production, 27.5% to administration/sales/marketing and 7.2% of costs into landscape services. Businesses that sell direct need to invest in advertising and use other marketing techniques. Bigger operations will employ a sales manager. An accounts officer is needed to issue invoices, collect money and follow up on overdue accounts.

Thirty five per cent of turf sales are direct to homeowners. These sales attract a higher price as they are targeted at retail level; however, these sales are time-consuming and incur more transaction costs. Other sales are to landscapers (20%), developers (18%), retail garden centres (11%), other turf farms (7%), for golf and sports surfaces (5%) and brokers (3%).

Some growers act as satellite sites for big turf farmers. Turf is sold under contract, normally at a discount, to larger growers for distribution by them. This gives the larger turf producers the option of tendering for very big contracts and allows the small grower to focus on the production side of the business.

Larger turf farms are able to implement economies of scale and have better access to improved varieties. Their greater capitalisation and improved logistics allows them to transport product over greater distances and even to gain entry into specialised export markets.

Water issues

Access to water for growing turf has been a major concern for South East Queensland producers. Compounding the problem has been water restrictions that impact on the ability of the customer to establish and maintain turf. This has caused a depression in demand in affected areas.

Community

Turf farms are often located in peri-urban areas, adjacent to residential areas or areas that may be earmarked for residential development. Farmers have to contend with issues raised by neighbours—noise made by pumping equipment and machinery operation, dust and odor control (e.g. where composted manures are in use). This can cause significant disruption to business. Factor in a buffer zone around the farm to separate the business from the neighbours.

Environmental issues

Turf farms are often located adjacent to water courses. Provision must be made for a vegetative buffer zone between the farm and these waterways.

Production needs to be managed to prevent fertiliser and chemicals from entering surface and subsurface water. Composted animal litter is commonly used to provide nutrients and to bulk up the soil following harvest. Ideally, litter piles need to be stored on bunded concrete slabs to prevent the contamination of runoff water following rainfall.

Land use

Check with your local council’s planning department to see if a material change of use approval is required before entering into turf production. Depending on the circumstances this can prove expensive if, for example, an environmental impact statement is required.
Capital items
Turf farming requires significant capital investment. This includes tractors, sprayers and irrigation equipment and some specialised machinery, including:
- mowing equipment
- turf cutters
- heavy goods vehicle and forklift for bulk delivery and unloading at the customer’s site.
- compost spreader
- spray equipment (separate tanks for herbicide)
- fertiliser spreader
- access to cultivation equipment for land preparation and leveling
- rollers
- pallet system.

You will also require:
- machinery sheds
- office with telephone/facsimile/computer/printer
- fencing
- chemical store
- irrigation infrastructure (supply lines, pumps, fittings, etc.)

9.3 Gross margins

Table 9.1 Gross margin template and inputs for growing turf

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Amount</th>
<th>$/m</th>
<th>Total $/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metres cut/hectare</td>
<td>00000</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Wastage (at least 5%)</td>
<td>00</td>
<td>–</td>
<td>– $</td>
</tr>
<tr>
<td>Royalties</td>
<td>0000</td>
<td>–</td>
<td>– $</td>
</tr>
<tr>
<td>Less industry levy*</td>
<td>0000</td>
<td>$0.015</td>
<td>– $</td>
</tr>
<tr>
<td>Total revenue</td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>/h</th>
<th>$/unit</th>
<th>$/h</th>
<th>Total $/h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbicide (number x rate/ha)</td>
<td>0 L</td>
<td>$/L</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Cultivation/ harrowing fuel/oil</td>
<td>0 L</td>
<td>$/L</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fumigation</td>
<td>0 kg</td>
<td>$/kg</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fertiliser 1</td>
<td>0 t</td>
<td>$/t</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fertiliser 2</td>
<td>000 kg</td>
<td>$/kg</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Fertiliser 3</td>
<td>00 kg</td>
<td>$/kg</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Labour</td>
<td>hours</td>
<td>$/h</td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Total land preparation</td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

* Compulsory if more than 2 ha is harvested per year.
Table 9.1 (cont.)

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>/h</th>
<th>$/unit</th>
<th>$/h</th>
<th>Total $/h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sod</td>
<td>500 m²</td>
<td>$/m²</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Equipment, oil and fuel</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>hours</td>
<td>$/hour</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td><strong>Total planting</strong></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td><strong>Growing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water charges</td>
<td>0 ML/ha</td>
<td>$/ML</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Electricity for pumps</td>
<td>Kw</td>
<td>$/Kw</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Irrigation system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>repairs and maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecticide 1</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Insecticide 2</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Fungicide 1</td>
<td>0 kg</td>
<td>$/kg</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Fungicide 2</td>
<td>0 kg</td>
<td>$/kg</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Fungicide 3</td>
<td>0 kg</td>
<td>$/kg</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Miticide</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Herbicide 1</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Herbicide 2</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Herbicide 3</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Mowing (fuel/oil)</td>
<td>0 L</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Mower blades</td>
<td>units</td>
<td>$/unit</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>hours</td>
<td>$/hour</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td><strong>Total growing costs</strong></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td><strong>Harvest and post-harvest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting—fuel</td>
<td>0 L/ha</td>
<td>$/L</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Turf cutter blades</td>
<td>units</td>
<td>$/unit</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Cutting and stacking—labour</td>
<td>hours</td>
<td>$/hour</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td>Pallet collection</td>
<td></td>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td><strong>Total harvest and post-harvest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.4 Contacts and further information

DPI&F advisory services

DPI&F Business Information Centre
Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).

Phone: 13 25 23
Email: callweb@dpi.qld.gov.au

DPI&F website
More than an information repository. DPI&F’s website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.

Website: www.dpi.qld.gov.au (main DPI&F page)
Website: www.dpi.qld.gov.au/turf (turf-specific information)

GrowSearch
An information search service and library with an interest in turfgrass. For a modest fee, you can conduct information searches and receive documents on subjects of interest.

Phone: (07) 3821 3784 or (07) 3824 9555
Fax: (07) 3286 7618
Email: growsearch@dpi.qld.gov.au
Postal address: PO Box 327, Cleveland Qld 4163
Website: www.dpi.qld.gov.au (Follow the links to ‘Plant industries’ > ‘Services’ box.)

Books

Beard, JB (1973) Turfgrass: science and culture, Prentice Hall, New Jersey, US.

DPI&F Prospects update—forecasting, analysis and trends June 2008, Department of Primary Industries and Fisheries, Queensland.


Other organisations

Queensland Turf Producers Association
The peak industry organisation in Queensland has an excellent website with information regarding industry issues, statistics, events, a members list and a number of links to other useful websites concerned with turf farming.
Phone: (07) 3824 9574

Turf Producers Australia Ltd
The national turf Industry is represented by Turf Producers Australia Ltd.
Phone: (08) 9332 0541

Australian Golf Course Superintendents Association Ltd
The Australian Golf Course Superintendents Association Ltd provides information and research results of interest to turf producers.
Phone: (03) 9548 8600
Fax: (03) 9548 8622
Website: [www.agcsa.com.au](http://www.agcsa.com.au)
10 Wine grape

10.1 Thinking about growing wine grapes

Until now, the Queensland wine grape industry has been centred in the Granite Belt around Stanthorpe and with one vineyard at Roma. Recently, wine grapes have been planted in earlier maturing districts such as the South Burnett, Darling Downs, and the Sunshine Coast and Gold Coast hinterlands. Queensland accounts for about 0.3% of the total Australian wine grape production and has experienced unprecedented growth over the past 10 years.

In 2005, the area planted was estimated at over 1200 ha, yielding 5000 tonnes of grapes valued at about $5 million. Until 2005, the demand for Queensland-grown wine grapes has generally exceeded supply. Since then, the entire Australian industry has been affected by oversupply and the rate of new plantings in Queensland has slowed significantly over the last five years.

Most of Queensland’s 180 wine grape producers operate small vineyards, less than 5 ha in size, although there are some larger producers in each region. There are 155 registered cellar door/wineries but most crush less than 50 tonnes/year. The main varieties of wine produced include Shiraz, Cabernet Sauvignon, Merlot, Chardonnay, Semillon and Verdelho. Smaller quantities of other varieties are also produced. Wine grape growing is strongly associated with agritourism and just growing grapes is not enough—cellar door and other tourist attractions are part of the mix.

Most of Queensland’s wine is sold at the cellar door and on the domestic retail market but export sales are expected to increase. A range of Queensland wines continue to perform well at local, interstate and international wine shows.

10.2 Critical factors

Growing wine grapes and establishing a winery involves a significant financial and personal commitment. The most productive and successful vineyards are those that have been well planned with risks minimised. Growing wine grapes is a challenging and rewarding enterprise, but it is a relatively high-cost operation.

The time delay between planting and production means that wine grape prices can fluctuate considerably in relation to supply and demand. The relatively high prices received through the 1990s encouraged widespread planting and prices have since slumped.

Profit is a product of tonnage grown, quality of grapes produced, cost structure and market conditions. High yields may give good returns as long as quality is maintained. Low yields must produce a premium product for a niche market wine attracting high prices. Note, however, that only a very small proportion of wine sold in the Australian market has a price per bottle greater than $20.

Queensland’s warm climate with relatively high summer rainfall means it is not easy to grow high quality grapes. Management has to be first class. Timely control of pests, diseases and weeds, access to labour and equipment at pruning and harvest, and an adequate supply of good quality water are essential.

Although a wide range of wine grape varieties can be grown in Queensland, some do better than others in different locations. The choice of varieties and rootstocks for a particular growing region is a complex one. In particular, you should ensure that there will be a market for the varieties chosen. Ideally, you should have a contract with a winery in advance of planting.

We recommend that you research wine grape growing extensively and prepare a thorough business plan before you buy land or start planting vines.
10.3 Enterprise options

Farm requirements

Climate
The preferred site should be free from late spring frosts and not overexposed to wind. Relatively dry weather during ripening (January to April) is important. Heavy rain and high humidity during this period will cause delayed ripening and fungal diseases that may be difficult to control. Hot conditions that stress vines excessively interfere with berry development. Hail in early spring or late in the season as grapes are ripening can also cause economic loss.

It is important to choose grape varieties that are suited to the local climate. In general, Queensland has warm conditions and relatively high summer rainfall. Grape varieties that tolerate wet weather are most suitable. Matching grape variety to climate is critical and can best be achieved by selecting varieties already grown successfully in parts of the world with a similar climate.

Soil
The best soils for successful wine grape production are well drained and not highly fertile. High fertility may cause excessive vegetative growth, which will be difficult to manage. The soil pH should be between slightly acidic (pH 6.0) to slightly alkaline (pH 7.5), but imbalances may be corrected.

It is essential to conduct a detailed soil survey to determine depth, texture, and water-holding capacity, and identify variations across the farm. It is advisable to test for nematodes because these microscopic parasites of grape roots are prevalent in soils throughout Queensland. A high nematode count suggests you should use resistant rootstocks.

Slope and aspect
Avoid slopes greater than 20%. Steep slopes increase the risk of erosion, requiring earthworks to minimise it. Slopes must also be safe for machinery use.

Aspect refers to the direction a slope faces. In Queensland, aspect does not limit wine grape growing. North-facing slopes are warm and advance harvest time, while south facing slopes are cooler and delay harvest time. In very hot conditions north and west facing slopes should be avoided if possible, as the heat load may stress the vines.

Water
It is necessary to survey the available water supplies. Include a study of the water catchment area (both on-farm and off-farm) feeding on-farm storages, as well as the quantity and quality of water available. Water sources may include bores, rivers and on-farm dams. Check with NRW for the status and availability of pumping licences for streams.

As a guide, you will need 3–5 million L of storage/hectare of vineyard or a bore flow rate of 1500 litre/hour/hectare of vineyard. Avoid water with a total salinity greater than 2000 microSiemens/cm (1200 mg/L), a sodium content greater than 450 mg/L (20 milliequivalents/litre or meq/L), or a chloride content greater than 150 mg/L (4 meq/L). If overhead irrigation is used for watering or frost control, sodium and chloride content should not exceed 100 mg/L (3 meq/L).

Planting material
It is highly recommended that you obtain planting material from a reputable source that has adequate procedures guaranteeing virus-free status and that takes precautions to prevent the spread of any pests and diseases. Grafted plants resistant to phylloxera and nematodes are highly recommended. While there is currently no evidence of phylloxera in the grape-growing areas of Queensland, it is possible that it will one day arrive. If and when it does, the only solution will be to have vines grafted to resistant rootstocks.
Services
Access to facilities such as power, phone, transport and farm suppliers will be needed. Close proximity to the winery allows grapes to be processed promptly after harvest and helps communication between grower and winemaker.

Previous land use
Knowledge of previous land use on the farm is important. Agricultural chemicals such as Tordon®, Glean® and organochlorines can persist in soils and adversely affect vine growth. They may also limit access to wine export markets. Badly eroded land should be avoided as it is costly to repair.

Be careful that purchased mulches do not contain chemical residues (e.g. Tordon® or organophosphates) and be wary of chemicals that were used to kill woody weeds on the property before it was planted to vines.

Populations of nematodes damaging grapevines can build-up on previous crops (such as tomatoes or legumes), so use planting material grafted onto resistant rootstocks.

Other requirements
Avoid districts where hormone herbicides (e.g. 2,4-D) are commonly used with cereal cropping. Vineyards should be no closer than 10 km from such areas.

Production requirements
Machinery
Costs of essential equipment in Table 10.1 (page 93) are indicative and based on 2007 pricing. Some of this equipment may be available second-hand, which will reduce the initial cost.
### Table 10.1 Essential machinery for establishing a vineyard

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Equipment description</th>
<th>Approximate cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractor</td>
<td>40–70 kW with machine suitable for pruning and harvesting.</td>
<td>$40 000–70 000</td>
</tr>
<tr>
<td>Slasher/ mulcher</td>
<td>Consider side-throw units that lay mulch under vines.</td>
<td>$3000–7000</td>
</tr>
<tr>
<td>Fungicide spray unit</td>
<td>A range of modern air-blast sprayers is available. These help with efficient crop protection, resulting in high quality fruit. Older-style machines are not recommended.</td>
<td>$10 000–20 000</td>
</tr>
<tr>
<td>ATV bike</td>
<td>Fitted with an under-vine herbicide spray unit.</td>
<td>$10 000</td>
</tr>
<tr>
<td>Pruning equipment</td>
<td>Pneumatic or battery pruning equipment is highly desirable unless a contract pruner is used.</td>
<td>$4000–6000</td>
</tr>
<tr>
<td>Vine trimmer</td>
<td></td>
<td>$3000–6000</td>
</tr>
<tr>
<td>Harvesting equipment</td>
<td>Bins, trailers, buckets, snips. The equipment depends on destination of fruit and the crushing arrangements with the winemaker. If you intend to use machine harvesting, allow for the costs of tipping bin trailers. The number depends on the size of the vineyard.</td>
<td>$5000–10 000 Equipment for machine harvesting may cost up to $20 000</td>
</tr>
<tr>
<td>Optional</td>
<td>Other equipment needed from time to time, which can be hired or supplied by a contractor, includes a fertiliser spreader, seeder, post-hole auger and wire spinner.</td>
<td></td>
</tr>
</tbody>
</table>

### Labour

Setting up a vineyard involves land preparation, erecting trellises, installing an irrigation system and planting vines. For the first two years, vines need training every two to three weeks during spring and early summer, and regular chemical application for disease and pest control. In mature vines, there is winter pruning, chemical spraying (at least fortnightly) for most of the growing season, as well as slashing or mowing, fertilising and managing the irrigation system.

For best berry (and wine) quality, fruit must be harvested as quickly as possible once it has reached the winemaker’s preferred maturity. This means harvesting usually takes place within three or four days.

It is often cost-effective to use contractors, to avoid purchasing equipment that is used infrequently and to ensure the job is done professionally. It is highly recommended that skilled contractors be used for the installation of trellises and irrigation system.

Table 10.2 (page 94) gives estimates of time and labour requirements for vineyard operations.
Table 10.2 Time and labour requirements for vineyard operations

<table>
<thead>
<tr>
<th>Operation</th>
<th>Time and labour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planting vines</td>
<td>150–200 vines/day/person</td>
</tr>
<tr>
<td>Erecting trellis—installing end assemblies</td>
<td>100–140 hours/hectare</td>
</tr>
<tr>
<td>Erecting trellis—installing intermediate posts</td>
<td>20–50 hours/hectare</td>
</tr>
<tr>
<td>Erecting trellis—installing wires</td>
<td>20–30 hours/hectare</td>
</tr>
<tr>
<td>Installing irrigation</td>
<td>120–160 hours/hectare</td>
</tr>
<tr>
<td>Training young vines</td>
<td>140–180 hours/hectare</td>
</tr>
<tr>
<td>Hand pruning</td>
<td>250–500 vines/day/person</td>
</tr>
<tr>
<td>Moving foliage wires</td>
<td>10–20 hours/hectare/year</td>
</tr>
<tr>
<td>Slashing, spraying, shoot trimming</td>
<td>40–50 hours/hectare/year</td>
</tr>
<tr>
<td>Hand harvesting</td>
<td>300–500 kilogram/day/person</td>
</tr>
</tbody>
</table>

Two full-time people can effectively manage a vineyard of up to 20 ha with casual help during pruning and harvesting. A 40-hectare vineyard would require an additional permanent employee, while two to three additional permanent staff would be required for an 80-hectare development. Staff numbers can be reduced if the vineyard is highly mechanised.

Many vineyards are established by owners with other occupations. In these situations, a manager should be engaged to maintain day-to-day oversight of the vineyard. Consultants and/or contractors may be hired to supervise operations.

It is helpful to be close to a reliable source of casual labour for vine training, pruning and harvesting.

**Varieties**

**Choosing varieties to plant**

Firstly, you must be able to anticipate market demand for the varieties chosen. Ideally you should have a contract with a winery before planting.

**Variety site interaction— which varieties suit my conditions?**

Local climate and soil type will be significant factors in your choice of wine grape varieties.
Matching variety to climate

It is essential to select wine grape varieties most suited to your local conditions, so first check which varieties are already growing well in your region. If you are in a new wine-growing area or in a region where certain varieties haven’t been tried, compare your climate with that part of the world already growing those varieties successfully.

For example, Queensland’s Granite Belt climate is quite similar to the central Rhone region where Shiraz is widely grown. This means that Shiraz is already the most widely planted and arguably the most successful Granite Belt wine. White varieties grown in the same area in France are Marsanne, Roussanne and Viognier. While these are not yet widely grown in the Granite Belt, they show some promise. Viognier in particular stands up well to wet weather near harvest time. Roussanne, on the other hand, is quite susceptible to bunch rots.

The rest of Queensland is relatively warm, so varieties native to warmer wine-growing regions in the world should be suitable. One variety that has emerged as a favourite under most Queensland conditions is Verdelho (from Portugal).

A number of Italian varieties could do well in Queensland and the Spanish premium variety Tempranillo also has good potential. However, plantings of these varieties are still relatively small and in experimental stages.

Relatively high summer rainfall is a limiting factor in Queensland so choose grape varieties that stand up well to wet weather. Varieties that have very compact bunches, such as Pinot Noir, Sauvignon Blanc and Riesling, are highly susceptible to bunch rots and should be avoided.

There has been some success with Bordeaux-style reds such as Cabernet Sauvignon, Merlot, Cabernet Franc and Petit Verdot. These varieties have relatively loose bunches, making them less susceptible to bunch rot. They also ripen later, avoiding problems with late summer rains.

In wet and humid regions near the coast, it may only be possible to grow hybrid (non-\textit{Vitis vinifera}) varieties. Hybrids are often tolerant of wet weather but may not provide an adequate wine quality for a competitive market. Chambourcin is probably the best of the hybrid varieties currently available.

Matching variety to soil type

One of the most important considerations during vineyard establishment is to match your soil type with an appropriate variety. You should know how soil type varies across the planting block and try to minimise variability in the vineyard.

Generally, a friable topsoil between 350 mm and 600 mm deep is needed to establish a vine root system. The topsoil should be well drained with good structure and may be sand, sandy loam or clay loam. Heavy clays should be avoided as they will restrict root growth. Below this, subsoil with a slightly heavier texture and higher water-holding capacity is desirable. The subsoil must also be well drained, avoiding perched water tables that restrict root growth.

Carefully matching your variety with the most appropriate soil type will help maintain appropriate vine vigour and achieve optimum vine balance. Very deep topsoils may promote too much root growth leading to excessive vine vigour. Vigorous varieties like Shiraz or Cabernet Sauvignon should not be planted on deep soils as they may develop large canopies, which are difficult to manage and detrimental to fruit quality. Some less vigorous varieties, like Merlot or Chardonnay, may not perform on soils with low fertility or poor water-holding capacity and should be located on better soil types.

Which clones?

Once you have decided which varieties to plant, it is strongly recommended that you obtain clonal planting material from a reputable source that:

- guarantees the clones are virus-free
- uses practices that prevent the spread of pests and diseases
- ensures that the clones are true to type.

There are subtle differences between clones and their performance may vary between sites. There are no performance research results for Queensland, so it is advisable to assess several clones in your vineyard. A mix of clones will provide some complexity to your end product that may be desirable to winemakers.

You may be able to get advice about choosing clones from winemakers, nurseries and local growers.
Choosing rootstocks
There are legal requirements for bringing vines into Queensland. See ‘grape phylloxera legislation’ on page 97 or if you are unsure contact a DPI&F biosecurity officer.

Risk of disease
Growers are advised to plant vines grafted onto rootstocks that are resistant to both phylloxera and nematodes.

Grape phylloxera legislation
If importing vines into Queensland from other states, it is essential that you follow legal procedures. Contact a DPI&F plant health officer if you are not sure of the regulations:

- All interstate sources of planting material and wine grapes (for crushing) must be approved by DPI&F.
- All consignments of planting material and wine grapes must be accompanied by a phylloxera certificate.
- If you become aware of others importing grape material from unapproved interstate sources or without the proper certificate, notify DPI&F immediately. You are safeguarding your vineyard’s future productivity as well as the state’s wine and table grape industry.

Benefits of rootstocks
There are several other benefits of using rootstocks instead of free-rooting vines. They vary between rootstocks and include:

- drought tolerance
- salt tolerance
- mineral uptake (especially potassium, which winemakers minimise because high levels cause a higher pH in wine)
- greater or lesser vigour
- influence on maturity time
- higher yields
- effect on fruit composition or quality.

The effect of these factors can vary considerably between sites and between different scion-rootstock combinations. Currently there are no research data available for Queensland conditions.

Most rootstock research has focused on the effect on yield and vine vigour. The results suggest that as rootstock vigour increases, higher levels of total nitrogen, potassium and a higher pH are observed in the fruit. A high pH is generally undesirable, especially for red grape varieties (as it reduces colour in red wine).
Rooststock cultivars

Most commercially available rootstocks in Australia are derived from four parent Vitis species: V. berlandieri, V. rupestris, V. riparia and V. champini. Parentage determines the characteristics of the rootstocks. For example, rootstocks derived from a combination of V. berlandieri and V. rupestris tend to be drought-tolerant and rootstocks derived from V. champini tend to be very vigorous and high-yielding.

These are the main commercially available rootstocks listed under their respective parentages. All of these have good resistance to phylloxera.

V. riparia x V. rupestris

These generally have low vigour and have been popular in France, but are now losing favour to V. berlandieri x V. riparia crosses:
- Schwarzmann
- 101-14 (not recommended as not sufficiently nematode-resistant)
- 3309 C (not recommended as not sufficiently nematode-resistant).

V. berlandieri x V. riparia

These crosses have moderate vigour, are widely used and have good resistance to nematodes:
- SO4
- Kober 5BB (SA Teleki)
- 5C Teleki.

V. berlandieri x V. rupestris

These are vigorous rootstocks and are considered to be more drought tolerant than the others. All have good resistance to nematodes. They could suit warmer climates best as they have a long vegetative cycle.
- Ruggeri 140
- Richter 99
- Richter 110
- Paulsen 1103.

V. champini

Vigorous and high-yielding. These rootstocks have good resistance to nematodes:
- Ramsey.

Performance trials

As there has been no research done for Queensland conditions, growers are advised to run performance trials in their own vineyards. Experienced nurseries should be able to advise on compatibility between rootstock and scion.

Related information

Important information about grape phylloxera and nematodes is available from www.dpi.qld.gov.au:
- Exotic plant pests—Grape phylloxera (link to ‘Biosecurity’ > ‘Plant health, pests & diseases’ > ‘A-Z list’ > ‘Grape phylloxera’)
- Grape phylloxera alert (link to ‘Plants’ > ‘Fruit & vegetables’ > ‘Fruits & nuts’ > ‘Wine grapes’ > ‘Pests & diseases’ > ‘Grape phylloxera alert’)
- Nematodes in vineyards (link to ‘Plants’ > ‘Fruit & vegetables’ > ‘Fruits & nuts’ > ‘Wine grapes’ > ‘Pests & diseases’ > ‘Nematodes in vineyards’)
- DPI&F biosecurity officer (link to ‘Biosecurity’ > ‘Contact Biosecurity’).
10.4 Economics of wine grape production

Yields
Yields of 7–10 t/ha of high-quality fruit have been achieved in Queensland’s Granite Belt. In the warmer growing areas, with deeper, more fertile soils, yields of up to 15 t/ha may be possible; however, high yields may result in inferior fruit. Achievable yields depend on many factors including trellis system, varieties, water availability, fertiliser program and other management techniques.

Prices
Prices for Australian wine grapes were relatively high through the 1990s but have decreased considerably in 2005–06 due to oversupply nationwide. Prices depend on the demand for a particular variety and fruit quality. At present prices vary from $400/t to $1200/t for high-quality fruit.

Production costs
Production costs, including operating costs and fixed overheads, can vary considerably depending on the level of mechanisation. Production costs can be as low as $300/t for mechanical harvesting and pruning to more than $700/t where pruning and harvesting is done manually.

Timing income
If strong rooted vines are planted and well managed, a small crop can be expected in the third growing season. This first crop may be uneconomic to harvest, particularly if birds are a problem. In more vigorous plantings, a small crop may be achieved in the second year, but should not be budgeted for until the third year.

Capital costs
Set-up costs can also vary considerably depending on the trellis system, irrigation system and whether grafted plants or own-rooted plants are used. A 10 ha vineyard may cost around $370 000 to set up (including land, plant and equipment, irrigation, trellising and ungrafted vines). Grafted plants are recommended, however, and add about $8000/ha to the cost.

Bird netting could add another $7000/ha. Birds can be a serious problem and pose the greatest economic risk in smaller, isolated vineyards. Vineyards planted near large areas of existing trees and vegetation may be prone to bird damage and this should be taken into account when selecting a site.

Conclusion
Prospective growers should consider wine grape production in the Mary Valley in conjunction with a financial advisor to help them decide whether economic returns can be achieved. At the present time, wine grape production is unlikely to achieve economic returns as a stand alone industry. Long-term profitability will depend on the ability of the grower to produce high-quality fruit efficiently and how long the current imbalance between supply and demand continues.
10.5 Contacts and other information

DPI&F advisory services

Mark Harris

Mark Harris is a Wine Industry Development Officer working for DPI&F at Applethorpe Research Station. Mark is the author of the ‘Wine grape growing’ chapter of this publication and has been specialising in wine industry development for the last six months. Mark joined DPI&F in 1995. To contact Mark, call the DPI&F Business Information Centre on the number below.

DPI&F Business Information Centre

Provides fast and easy access to DPI&F information, products and services for the cost of a local call from anywhere in Queensland between 8 am and 6 pm during the week (excluding public holidays).

Phone: 13 25 23
Email: callweb@dpi.qld.gov.au

DPI&F website

More than an information repository. DPI&F’s website can also be your marketing, business, networking, community building, research and development, and market research tool. Use it for training or to attract funding and create business.

Website: www.dpi.qld.gov.au

Books

Nicolas, P (2006) Grapevine clones used in Australia, South Australian Research and Development Institute, SARDI.

Queensland Vine Improvement Association

Vine improvement associations have been set up in each state to provide certified planting material. This is often supplied through nurseries but growers may deal directly with the associations.

Phone: (07) 4684 1310
Email: wattvine@halenet.com.au
Table 10.3 Additional enterprise checklist

<table>
<thead>
<tr>
<th>Criteria for selection</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental impact</strong></td>
<td></td>
</tr>
<tr>
<td>Chemical contamination</td>
<td></td>
</tr>
<tr>
<td>Erosion</td>
<td></td>
</tr>
<tr>
<td>Nutrient contamination of waterways</td>
<td></td>
</tr>
<tr>
<td>Disturbance of acid sulfate soils</td>
<td></td>
</tr>
<tr>
<td>Impact of enterprise on community</td>
<td></td>
</tr>
<tr>
<td>Impact of urban community on enterprise</td>
<td></td>
</tr>
<tr>
<td>Flooding</td>
<td></td>
</tr>
<tr>
<td><strong>Technical</strong></td>
<td></td>
</tr>
<tr>
<td>Climate suitability</td>
<td></td>
</tr>
<tr>
<td>Soil suitability</td>
<td></td>
</tr>
<tr>
<td>Topography (slope, aspect)</td>
<td></td>
</tr>
<tr>
<td>Ability to match irrigation requirements</td>
<td></td>
</tr>
<tr>
<td>Pest susceptibility</td>
<td></td>
</tr>
<tr>
<td>Disease susceptibility</td>
<td></td>
</tr>
<tr>
<td>Suitability of existing on-farm</td>
<td></td>
</tr>
<tr>
<td>Availability of sufficient land</td>
<td></td>
</tr>
<tr>
<td>Existing machinery and equipment</td>
<td></td>
</tr>
<tr>
<td>Degree of comfort with growing risk</td>
<td></td>
</tr>
<tr>
<td>Match of harvest timing and timeliness within current operation</td>
<td></td>
</tr>
<tr>
<td>Availability of required contractors</td>
<td></td>
</tr>
<tr>
<td>Availability of transport</td>
<td></td>
</tr>
<tr>
<td>Availability of processing facilities</td>
<td></td>
</tr>
<tr>
<td>Availability of storage facilities</td>
<td></td>
</tr>
<tr>
<td>Labour requirements</td>
<td></td>
</tr>
<tr>
<td><strong>Marketing</strong></td>
<td></td>
</tr>
<tr>
<td>Clear market potential for the product</td>
<td></td>
</tr>
<tr>
<td>Possibility to produce a better or different product</td>
<td></td>
</tr>
<tr>
<td>Opportunity to build partnerships and alliances</td>
<td></td>
</tr>
<tr>
<td>Level of competition</td>
<td></td>
</tr>
<tr>
<td>Regulatory and quality assurance accreditation required by market</td>
<td></td>
</tr>
<tr>
<td>Existing supply chain arrangements</td>
<td></td>
</tr>
<tr>
<td><strong>Skills and knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>Availability of information</td>
<td></td>
</tr>
<tr>
<td>Other growers in area</td>
<td></td>
</tr>
<tr>
<td>Active industry organisations</td>
<td></td>
</tr>
<tr>
<td>Availability of consultants</td>
<td></td>
</tr>
<tr>
<td>How enterprise fits with personal preferences</td>
<td></td>
</tr>
<tr>
<td>Level of skills/expertise required</td>
<td></td>
</tr>
<tr>
<td>Impact on leisure time</td>
<td></td>
</tr>
<tr>
<td><strong>Financial</strong></td>
<td></td>
</tr>
<tr>
<td>Level of capital required</td>
<td></td>
</tr>
<tr>
<td>Length of time to income</td>
<td></td>
</tr>
<tr>
<td>Cashflow—matches your needs</td>
<td></td>
</tr>
<tr>
<td>Cashflow—predictability</td>
<td></td>
</tr>
<tr>
<td><strong>Impact of government regulations</strong></td>
<td></td>
</tr>
<tr>
<td>Licences</td>
<td></td>
</tr>
<tr>
<td>Material change of use</td>
<td></td>
</tr>
</tbody>
</table>