

Subtropical banana information kit

Reprint – information current in 2004



REPRINT INFORMATION – PLEASE READ!

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

This publication has been reprinted as a digital book without any changes to the content published in 2004. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research:

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- Financial information—costs and returns listed in this publication are out of date.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

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

This publication was last revised in 2004. The information is not current and the accuracy of the information cannot be guaranteed by the State of Queensland.

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

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Queensland Government



Common QUESTIONS

This section contains the most commonly asked questions about growing subtropical bananas. The answers are as brief as possible. Where this is difficult and more detail is required, we refer you to other sections of the kit. Symbols on the left of the page will help you make these links.

Money

What prices can I expect to get for bananas?

Prices are extremely variable and are dependent on the supply and demand of bananas on the market and the quality of fruit. The price for Cavendish in most years ranges between \$5 to \$25 /carton, subtropical banana growers should expect to average about \$10 to allow for the 15 to 20% price premium paid for tropical north Queensland bananas. Note that in times of heavy oversupply, prices could be much less than this. Ladyfinger prices range between \$10 and \$27 /carton with an average price of \$20.

How much money can I expect to make from banana production?

In the subtropics, it is difficult to make a good living from growing Cavendish bananas on average yields and prices. Yields, market prices and cost production vary considerably, and returns are difficult to predict. For example, with non-irrigated Cavendish producing yearly average yields of 1540 cartons/ha and average prices of \$12 /carton, the gross margin (income after production costs but excluding the value of the owner's labour) is only a little over \$6040 /ha. You would need to achieve yield and fruit quality standards well above average and operate a larger than average farm to be viable. Ladyfinger bananas have better income prospects as there is less competition from tropical producers;



Gross margin
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Panama disease effectively restricts subtropical production. Ladyfinger production has never reached oversupply because north Queensland is not an important producer. However, planting of Ladyfingers on the Atherton Tablelands is increasing and this situation may change in future. With a yearly average yield of 500 cartons/ha and a price of \$25/carton, you could expect a gross margin of about \$6310/ha.

Note that capital and fixed (overhead) costs are substantial and are not included in the gross margin calculation. In this example, the value of the owner's labour is also not included; it would be about \$6000/ha (Cavendish) and \$4300/ha (Ladyfinger).

What sort of yields can I expect from bananas?

The first bunch, which is smaller than those from ratoons (subsequent bunch cycles), takes between 16 to 18 months to harvest and after that, a bunch approximately every 12 months may be expected. On that basis, after the first year, expect a yield of between 1300 to 2000 cartons/ha/year for Cavendish and around 500 to 750 cartons/ha/year for Ladyfingers. Very efficient growers may be able to achieve a higher bunch production rate of one bunch every 9 months by ensuring that the follow-on suckers are advanced as much as possible during the development of the previous bunch thus increasing overall yields by 25%.

What is a viable area for banana production?

For a family run operation, around five hectares is considered the minimum viable production area for Cavendish and about seven hectares for Ladyfinger. Around 15 hectares of land in total is needed to maintain a seven hectare production area; the extra land is needed for new plants coming into production, fallow land and infrastructure.

Why does Cavendish fruit from tropical north Queensland achieve better prices?

Mainly because it has achieved a reputation in the marketplace for more consistent fruit appearance and size. This does not indicate that Cavendish bananas from subtropical areas are inferior, in fact in some ways they are superior. It merely indicates that the marketing performance of the north Queensland growers, aided by the larger volume of fruit marketed, has so far been better.

Quarantine regulations

Are there any restrictions in growing bananas in home gardens?

Yes. In Queensland, the *Plant Protection Act 1989* limits the growing of bananas in home gardens. Residential plantings are not allowed without an inspector's approval being obtained prior to planting. Residential

Residential plantings
MUST have an inspector's approval

more info



 Permitted varieties
 Chapter 3 page 26

growers may plant a maximum of ten (10) plants and maintain not more than thirty (30) pseudostems.

In New South Wales, there are no restrictions on numbers of plants that can be kept and Giant Cavendish can be grown with a permit, however Dwarf Cavendish is prohibited. In both states, plants must be obtained from an approved source.

Ladyfingers are recommended as the most suitable variety for home gardens. Note that growing Cavendish bananas in the home garden in Queensland is not permitted.

more info



 Legislation
 Chapter 3 page 25

Do I require a permit to grow bananas?

All plantings of banana plants (commercial and residential) require an Inspector's *Approval to Move and Plant Bananas*, available free of charge from the Department of Primary Industries Queensland and NSW Agriculture. Applications should be submitted at least 30 days prior to the movement of planting material.

more info



 Planting permits/
 material supplies
 Chapter 5 page 182

Selecting land

Is my land suitable for growing bananas?

Bananas will grow on a wide range of soil types but best production requires well-drained soil preferably a clay loam at least 0.5 m deep; a north-east to north-west aspect; protection from cold and strong winds and well above the frost line. Slopes of 15% or less are preferred, as it is easier to design and lay out the plantation and machinery can be operated more safely.

Are there restrictions on clearing land for bananas?

In New South Wales and Queensland, approval for clearing land is usually required under various state and local government regulations. Land over about a 30% slope is regarded as protected land under the Soil Conservation Act and requires special approval for clearing. Contact the Department of Natural Resources and Mines (Queensland) and the Department of Land and Water Conservation (New South Wales) to establish what restrictions apply to your situation.

Varieties

What are the best varieties to plant in the subtropics?

Williams and Mons Mari (both Cavendish types), Ladyfinger and Goldfinger are suitable. Other varieties such as Ducasse and Red Dacca have small niche markets in Australia.

Cavendish types are the most commonly grown banana as they produce the best yields per hectare. However, subtropical growers have to compete with tropical growers who achieve faster bunch cycles, higher yields and better prices. Cavendish is regarded as the more expensive variety to grow, as plants require propping, more fertiliser, irrigation and more careful attention to pest and disease control.



Varieties
Chapter 3 page 33

Ladyfinger caters to a large niche market and obtains higher prices per carton than Cavendish but yields are lower. However, good prices are only achieved for quality fruit. Ladyfinger is more hardy than Cavendish, particularly in cold, windy or drought conditions. It can be difficult to grow because of its height and susceptibility to *Deightoniella*. Ladyfingers are also very susceptible to the serious Panama disease (Fusarium wilt) for which there is no effective cure. Re-planting in land that has previously grown bananas can be a risky proposition.

Goldfinger is a relatively new variety developed to provide a Panama tolerant alternative to Ladyfinger. It has higher resistance to leaf diseases and nematodes, significantly reducing the need for chemicals. Its culture is similar to Ladyfinger but may require propping in the first year. Its long-term market performance is still being evaluated.

Establishing a plantation

What plant spacing should I use?

This depends upon variety and irrigation use. For Ladyfinger, the standard spacing is approximately 3 to 4 m between plants and 3.2 to 4 m between rows. For Cavendish, the standard spacing is 1.8 to 2.1 m between plants and 3 to 3.5 m between rows. For Goldfinger, the standard spacing is 2.5 to 3 m between plants and 3 m between rows. Use the closer spacings where plants are irrigated and do not compete for limited soil moisture, and/or are in drier environments where there is low disease risk.



Plant spacing and
density
Chapter 3 page 35

How do I plant bananas?

Prepare your land properly and establish a cover crop to protect the soil from erosion and suppress weeds. Mark out your rows; dig a hole at each plant site and plant the tissue cultured plantlets or the planting bits (with the eye about 150 to 230 mm below ground level). If you are using bits, it is important for the eye to be placed on the uphill side. Where planting in or near old banana ground, be sure to protect new plants against nematodes and banana weevil borer.

When is the best time to plant bananas?

The best time to plant is about the second week in September in south Queensland and October to November in New South Wales.

Contact your nearest DPI
plant health inspector.
Phone the DPI Call Centre on
13 25 23

Where do I get clean planting material?

As all banana planting must come from an approved source, start by contacting your local banana inspector. Planting material cannot be sourced from an area within 1 kilometre of a Panama (Fusarium wilt) or banana bunchy top virus infested site. The previous system of field accreditation of planting material sources no longer exists.

The Quality Banana Approved Nursery (QBAN) scheme adopted in Queensland and New South Wales, provides 'clean' tissue cultured plantlets and banana plants grown from tissue culture. Other planting material such as nursery plants, rhizomes (corms), bits and suckers are not included in the QBAN scheme, but must meet the required industry standards to be approved.

Why are tissue cultured plants recommended instead of conventional planting material?

Tissue cultured plants meet required pest and disease-free standards making them ideal for establishing clean blocks and farms. These plants are free from nematodes, banana weevil borer and diseases such as Panama disease and banana bunchy top virus. Off-types can be a problem (usually no more than 3% in the field) and should be rogued out either in the nursery stage or as soon as you detect them in the field. As tissue cultured plants are also more susceptible to banana weevil borer in re-planted land, pay more attention to the treatment of this pest. Under good management they can also produce a bigger, more uniform plant bunch than conventional planting material. Establishment of tissue culture plants may be a problem in non-irrigated plantations.



Tissue cultured
material
Chapter 3 page 35



Vegetative planting
material
Chapter 3 page 36

Should I plant bits or suckers?

Although plants grown from suckers normally produce a crop faster than plants grown from bits, there is little long-term advantage in one over the other. Provided bits are graded for size before planting and all similar sized bits grown together, both bits and suckers will produce plants with good even growth.

Fertilising

What is the best soil pH level for bananas?

A pH value of around 4.8 (CaCl₂ test) or 5.5 (water test) is considered best. This minimises any detrimental effects of low soil pH such as excessive availability of aluminium and manganese, yet represents a value above which there seems to be no economic response to liming materials.

Should I use lime or dolomite?

It is important that you get this right as too much dolomite can be detrimental. Do a leaf and soil analysis to check the levels of your soil



Fertilising
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pH, leaf calcium and leaf magnesium. If this is not possible, it is safest to use only lime but be aware of possible magnesium deficiency.

Can I use foliar fertiliser with my leaf spot sprays?

It is not recommended. As bananas have thick, waxy leaves, very little nutrient is absorbed through the leaves. Apply leaf spot sprays alone and spread fertiliser on the ground where it is most readily absorbed by the plant, or use fertigation. Incompatible spray mixtures may damage leaves and suckers. New technical grade fertilisers currently available may be compatible with certain leaf spot sprays. Read labels carefully.

Should I put fertiliser in the planting hole when planting?

No, at least not fertilisers containing nitrogen or potassium. If you do, there is a risk of the root system being burnt as it emerges from the bit or sucker. This may not be a problem in wet weather, but under dry conditions, you may kill the plant.

It hasn't rained since I last fertilised. Should I fertilise again?

No. In non-irrigated plantations, it will be water that limits growth, not fertiliser. Additional fertiliser at this point will be useless. You need to receive about 15–25 mm or more of rain to make it worthwhile putting on the next application of fertiliser.

Should I apply fertiliser in winter?

In most subtropical areas there is little growth during the June/July period so there is no point in applying fertilisers containing nitrogen or potassium. The general recommendation in irrigated plantations is to apply the last nitrogen fertiliser in May and recommence in August. In non-irrigated plantations, you may need to stop earlier if there has been insufficient rain (less than 50 mm) since the last application. In spring when the rainfall is lower and more erratic, use nitram instead of urea.

Should I use single fertilisers or mixed fertilisers?

The advantage of single fertilisers is that they allow you to accurately apply the required amounts of each nutrient and at times when they are most appropriate. Generally unit for unit of nutrient, single fertilisers are also cheaper. The use of mixed or compound fertilisers with inappropriate nutrient compositions can lead to application of unnecessary or undesirable nutrients. There are some products with appropriate nutrient compositions for bananas on the market that are competitive in price to buying single fertilisers.

Are organic fertilisers better than inorganic ones?

As suppliers of nutrients, there is no significant difference since the compounds absorbed by the banana roots are identical regardless of the

source. The main advantages of organic fertilisers is that they generally have a slow release action, are less likely to cause root burn and improve the soil biology and soil structure. However, the nutrient content of organic fertilisers is generally low compared to chemical fertilisers and composition of nutrients can be quite variable from one batch to the next (except for registered organic fertilisers which contain guaranteed minimum amounts). Bulky manures are also difficult to handle and costly to spread, and fresh manures may damage plants.

Organic growing

Can I grow growing bananas organically?

There are problems with pest, disease and weed control and maintenance of adequate fertility. In most cases, bunch size and yield will be reduced by 30-50% and fruit appearance may not be as good, when compared to conventionally grown bananas so you will need to achieve a significant price premium to offset this reduction. There is a small but rapidly growing niche market for organically grown bananas that some growers may find profitable. There is also the advantage of reducing chemical usage minimising impact on the environment. A thorough investigation of the market is essential before proceeding. With only a little over 100 ha of organic bananas currently produced in Australia, new plantings of only 10 to 20 ha may contribute to market gluts.

The requirements of the *Plant Protection Act 1989* for producers to manage weeds, pests and diseases such that their plantation poses no risk to other properties, apply equally to organic and non-organic growing systems.

Things that go wrong

I think my bananas may have banana bunchy top virus. What should I do?

Establish that it is banana bunchy top virus (BBTV). Look closely at the last fully open leaf to see if it has a light yellow margin with a distinct upturn of the margin. Then look for the distinctive dot-dash green lines along the veins on the back of the leaf. These veins often hook downwards into the midrib of the leaf. If you believe it is bunchy top, your response depends on whether you are in Queensland or New South Wales.

In Queensland, spray or pour some kerosene or diesel down the throat of the plant to kill the aphids that spread the disease. Then destroy the plant and all its attached suckers by cutting them up into small pieces or injecting them with either glyphosate or 2,4-D herbicide. Report the outbreak within 24 hours to a DPI banana inspector. Make sure that you eradicate any re-growth from the affected plant.

In New South Wales, it is a notifiable disease. Any suspected infection should be confirmed and the affected plants destroyed by an injection of glyphosate and dimethoate. Contract inspectors carry out routine detection surveys in the BBTV quarantine areas and are a good source of guidance and assistance.

My plants are not growing as well as they should. What could be wrong?

Provided the plants have been well fertilised and are not suffering from cold damage or drought, the most likely causes are Panama disease, banana weevil borer, nematodes or severe red spider mite damage.

My fruit does not fill. What's wrong?

The most likely causes are cold, drought, too much leaf disease, poor nutrition (particularly boron deficiency) and plants that are too close together.

Why are my plants falling over?

There are many reasons. The most likely cause is nematode damage to the root system. This causes the plant to topple, breaking at the roots so that the rhizome (corm) comes out, exposing the roots. Nematodes cause dark streaks and/or bumps on the roots. Another possible cause is banana weevil borer. Severe attacks cause the corm to snap at ground level, leaving the roots in the ground. Periods of hot weather with water stress can also cause plants to kink midway along the stem. Cavendish plants with heavy bunches may topple during windy weather if they are not adequately propped.



Photos are found in the companion book, *PICTURE GUIDE: Subtropical banana problem solver*.

What is causing these marks on my fruit?

There are a number of possibilities but the most common causes are birds, flying foxes, flower thrips, rust thrips, mites, caterpillars or maturity bronzing.

Growing the crop

Why are bunches covered and how are covers applied?

Bunch covers improve fruit quality and colour and produce larger fruit with up to a 25% increase in yield. They also promote slightly faster filling of fruit and, to a large extent, reduce the damage from insects, birds and flying foxes. Bunch covers help retain protective insecticide applications. Mechanical damage is also reduced in the field and during harvesting and transport to the packing shed.



Bunch covering
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The normal method of application for Cavendish is to climb a ladder to cover the bunches. For Ladyfingers, there are two different designs of

bunch covering tools which allow you to apply the bunch covers from the ground. Bagging machines are also available.

How do I monitor and control banana weevil borer?

Choose clean ground and clean planting material, and maintain good hygiene within the plantation. This means cutting up fallen or blown down plants within a month of them falling. Split the stem lengthwise and cut up into 30 cm long pieces for rapid drying. Monitor the activity of the weevil with weevil traps to determine when treatments are best applied. The easiest way to do this is to cut the old stem through when you cut the bunch off and place a piece of the stem with the cut surface against the ground. After a week or so, turn the traps over. If you find more than four weevils on average per trap, then treatment is recommended.



Pests
Chapter 3 page 49

How should I sucker my bananas?

There are two ways of selecting following suckers. You can select the first sucker on the uphill side and allow it to continue to grow and remove all other suckers. Alternatively, remove all suckers and then select the next sucker when the parent plant is about to bunch. This gives you a longer bunching cycle in the following sucker but it can give you fruit at a better time of the year with respect to supply and therefore price.

Desuckering is the practice of removing unwanted suckers from the mother plant and leaving the sucker that you wish to become the next cropping plant. There are three main methods used to desucker bananas: a suckering bar—basically a long handled shovel, which removes suckers from the base of the parent plant; a sharp knife to cut off unwanted suckers that are then injected with kerosene or diesel; direct injection of suckers.

Timing the selection of the following sucker so that it produces fruit that can be harvested when prices are high is advantageous. A bunch will be produced for harvest approximately twelve months after the sucker has been selected.



Desuckering
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Is it necessary to spray for leaf diseases?

Ladyfingers have some resistance to leaf diseases and generally require spraying only in very wet years. Deleafing, where diseased leaves are removed from the plant routinely at four to six week intervals, is highly recommended. Cavendish requires spraying every three weeks from December to May if infection rates are high. Use an appropriate chemical from the *Chemical Handy Guide*. Follow label directions. Keep in mind that there are two types of chemicals for leaf diseases—the protectants, which form the basis of the regular spray program; and the systemics, which are used when the disease is serious or the spray schedule gets



Leaf disease control
Chapter 3 page 51

interrupted by wet weather. However, **de-leafing is essential prior to spraying** with the systemics as these are ineffective on visible lesions.

Can I use trickle irrigation?

Choice of an irrigation system will depend on the soil type and each method (overhead solid set sprinklers, travelling irrigators, under-tree mini-sprinklers or trickle) has its own merits. What is preferred or best on your farm will also depend on your crop management and economics. Trickle is less suited to soil types with a very narrow wetted pattern (for example sandy soils)—two or three trickle lines may be required in these soils.

Should I spray for mites?

Spraying is usually not necessary as naturally occurring predatory beetles and mites generally keep the problem under control. Indiscriminate use of insecticides can kill many of these beneficial insects and cause the mite population to flare up again. Wet weather tends to decrease the mite population.



Pests
Chapter 3 page 49

Monitoring for mite populations at least once a fortnight during hot and dry weather is recommended. Cold and/or wet conditions are less favourable to mites and the monitoring interval can be extended to three weeks. The only situation where spraying might be needed is when severe leaf bronzing and fruit damage occurs and no predatory beetles or mites are present.

Is there a good shade-tolerant ground cover?

Trials of ground covers indicate sweet smother grass and Pinto's peanut to be the most promising. They establish reasonably permanently, are low growing, shade-tolerant, dense enough to smother most weeds and have a degree of tolerance to some herbicides. However Pinto's peanut compete with bananas (especially for water) and reduce yields unless they are appropriately managed. Keep the ground cover under control with regular slashing and away from the banana plant by using herbicides and mulches.

Will ground covers reduce my banana yields?

As they are competing for some of the same nutrients and water as the banana plants, there is the potential for a slight reduction. However, this is minimal if an appropriate ground cover is managed properly. The advantages of reduced soil erosion, more favourable root temperatures and the nitrogen contribution from the nitrogen-fixing bacteria in legumes will be likely to offset any potential yield reduction from this ground cover in the longer term.



Nematode control
Chapter 3 page 51

Should I treat for nematodes?

Treatment is recommended only where a severe nematode problem exists. An obvious indication of a significant problem is toppling (plants falling over) in the absence of strong winds. A level of 5% of plants toppling is considered the point at which treatment may be warranted. Don't confuse nematode toppling with banana weevil borer damage where affected plants snap at the base leaving some rhizome (corm) in the ground. Weevil borer tunnels are also quite obvious.

Monitoring for burrowing nematode will give an estimate of the nematode status of the crop. The disease index rating for lesions caused by burrowing nematode will help you make decisions on nematode management. In most cases, it is unlikely that nematicides will be economically effective in improving bunch yields. Burrowing nematodes and lesion nematodes can be a major problem in southern Queensland. Root-knot nematode and spiral nematodes are not regarded as damaging nematodes in most situations.

Harvesting

How do I know when to harvest my bananas?

This knowledge comes with experience. Bananas need to be harvested in a mature green condition, as you don't want them ripening on the plant or during transport to the market. Make sure the fruit is reasonably well filled and that the sharp angles in immature fruit have almost disappeared. The fullness of the fingers is only a guide to harvest maturity as the rate of bunch filling is influenced by moisture stress, leaf spot damage or cooler weather. A combination of fruit age and fullness can be used. Measure fruit diameter and bunch age to provide another guide to harvest maturity.

Inspect your fruit at different intervals to gain experience in recognising maturity. Many growers use different coloured bunch covers or coloured tape or paint as a code to indicate when the bunch was thrown and consequently when it may be ready for harvest.

Do I need to dip my fruit?

Usually there is no requirement for any dip treatment apart from the standard washing of the fruit in clean water to remove sap and other residues. If you have a particular problem with anthracnose or squirter disease, first clear the shed and its surrounds of any old banana refuse and dip the fruit in an appropriate chemical from the *Chemical Handy Guide*. Follow label directions.

Some restrictions apply to the movement of banana varieties other than Cavendish to Western Australia from Queensland. Dipping is required.

Contact the DPI Queensland or NSW Agriculture for more information on interstate certification.

How do I pack my fruit?

Depending upon market requirements, pack fruit in 8, 12 or 13 kg cartons either as entire hands or cut into clusters of three to seven fingers. There are different packing systems for Ladyfinger and Cavendish and also different packing systems for extra large and large to medium grades.

more info



Packing and labelling
Chapter 3 page 59