

# Sweet corn information kit

Reprint – information current in 2005



## REPRINT INFORMATION – PLEASE READ!

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

This publication has been reprinted as a digital book without any changes to the content published in 2005. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research:

- Chemical recommendations—check with an agronomist or Infopest [www.infopest.qld.gov.au](http://www.infopest.qld.gov.au)
- Financial information—costs and returns listed in this publication are out of date. Please contact an adviser or industry body to assist with identifying more current figures.
- Varieties—new varieties are likely to be available and some older varieties may no longer be recommended. Check with an agronomist, call the Business Information Centre on 13 25 23, visit our website [www.deedi.qld.gov.au](http://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 2005. 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 sweet corn production. This information is not to be used or relied upon by users for any purpose which may expose the user or any other person to loss or damage. Users should conduct their own inquiries and rely on their own independent professional advice.

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



Queensland Government

Chapter 2



# Common QUESTIONS

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

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## Varieties

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### What is the difference between normal (standard) and supersweet sweet corn?

Supersweet sweet corn contains a shrunken ( $sh_2$ ) gene that produces about twice the amount of sugar as normal or standard varieties that contain the sugary ( $su$ ) gene. It also reduces the rate of conversion of sugar to starch, so supersweets start with a higher sugar content and lose their sugar more slowly. The fresh market now demands supersweet varieties, and although many processing varieties are the normal types the quantity of  $sh_2$  sweet corn grown for processing is increasing.

more info



Postharvest treatment  
This chapter page 22

### What varieties of sweet corn should I plant?

Variety selection is an important decision as there is no one variety that performs best across all planting seasons and production techniques. Factors to consider include particular market requirements, yield, disease resistance and the climatic stresses during the production period.

The supersweet varieties completely dominate the fresh market. Goldensweet is the main variety grown but will most likely be replaced with Golden Sweet Improved which has better disease resistance and husk cover. Other varieties grown include Gladiator, Lancaster, Kahuna, Matador, Krispy King, Hybrix 5 and Sovereign.

Krispy King and Rising Sun are early maturing varieties. Sovereign, Gladiator, Kahuna, Lancaster, Golden Sweet Improved and Goldensweet are mid maturing varieties. Matador is mid to late maturing and Hybrix 5 is a late tropical variety best suited to the warmer conditions.

Processing varieties are determined by the processors.

### What is bi-colour sweet corn?

Bi-colour sweet corn has a mixture of gold and white kernels. Whilst most sweet corn sold in Australia is gold, there is a small but increasing fresh market for bi-colour and white sweet corn. In the US white or silver sweet corn is also sold.

### What are the production times in Australia?

Table 1 in Chapter 1, *Before you start* shows the planting and harvest times for sweet corn in Australia.

## Planting

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### Can I plant sweet corn near maize or other corn crops?

It is important to ensure that there are no plantings of maize or sweet corn other than supersweet types within 200 m of a sweet corn crop. If

a key issue



Varieties  
Chapter 4 page 135

other maize or sweet corn is grown within this distance, ensure that it won't be shedding pollen within two to three weeks of your sweet corn crop being in the silking stage.

Pollination of supersweet varieties by maize or non-supersweet varieties will result in very undesirable starchy grains on the cob.

### What sowing rate should I use?

For fresh market sweet corn, aim for a population of around 50 000 plants per hectare. Assuming 10% of the seed will not emerge, you need to plant 55 600 seeds per hectare. In NSW the aim is to have 60 000 plants per hectare for processing crops. Sweet corn seed is usually sold on a seed count so it is best to work out how much seed you need by number, rather than the weight of seed per hectare.

more info



Decide how many seeds you need  
Chapter 3 page 30

### What is the pink powder on my seed?

It is a fungicide and is sometimes mixed with an insecticide. The seed is coated with this mixture to protect it from diseases and pests during germination and emergence.

### What causes poor crop establishment?

Poor germination and emergence can be caused by a number of problems. For example:

- poor seed quality which can occur if the seed is old or hasn't been dried or handled properly after harvest;
- seed rots (*Pythium* and *Rhizoctonia* fungi);
- planting into cool, wet soil, planting too deep and soil crusting. Supersweet corn has lower vigour than normal sweet corn and requires warmer soil and generally has poorer germination capacity than normal sweet corn.
- uneven plant stands can also be caused by soil crusting and insects, mainly cutworms and wireworms;
- nematodes, particularly root lesion nematodes, are often associated with poor crop establishment and growth.

## Pests, diseases and disorders

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### What is the most important stage to control insects?

The critical period of insect pressure is from tasselling onwards; the major insect pest is the heliothis grub or corn earworm, *Helicoverpa armigera*. Eggs are laid around the flag leaves and on the silks when silks start to emerge. If insecticides are used, they must be directed to cover this area.

An Integrated Pest Management (IPM) system is essential to manage pests and diseases in sweet corn.

more info



Chemical handy guide provides a list of registered pesticides

### How do I adopt an IPM approach to pest management?

IPM requires the use of a number of components of pest management including pest monitoring by professional consultants, protecting beneficials, using biological insecticides, improving spray application equipment and making spray decisions based on pest and crop monitoring.

a key issue



IPM  
Chapter 4 page 167

### What causes stunting and deformed leaves in young plants?

The disorder, wallaby ear is the most likely cause of this problem. Wallaby ear is caused by maize leafhoppers that transmit a toxin into the plant. The higher the population of the leafhoppers the more toxin there is and the worse the stunting and distortion will be. Fifteen or more leafhoppers per plant on plants up to knee height will cause this disorder. Once the insect is brought under control new leaves that emerge will grow normally.

### What causes striping on leaves?

Several things will cause leaf striping, for example a genetic breakdown, Johnson grass mosaic virus and maize stripe virus. Some nutrient deficiencies also cause striping; zinc and manganese deficiencies are the most common.

### What causes powdery brown spots on the leaves?

A fungus known as rust. There are several rusts that affect sweet corn but the most usual one is common rust, *Puccinia sorghi*.

In moist weather brownish spots can also occur due to the partial germination of pollen.

### What causes long grey narrow spots on the leaves?

The fungus turcicum leaf blight, *Exserohilum turcicum*. This disease is also known as northern leaf blight (NLB), and is referred to in USA literature as northern corn leaf blight (NCLB), often using its former name *Helminthosporium turcicum*. There are fungicides registered for use against it but they are protectants and will not have a curative effect. It is not generally economic to spray unless suitable weather conditions make a severe outbreak likely. If possible, plant resistant varieties. It is most prevalent in hot, wet weather and will not be a problem in dry conditions.

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Photos and what to do about the problem can be found in the companion book available from DPI&F

offices—

PICTURE GUIDE:  
*Sweet corn problem solver & beneficial identifier*

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### Do nematodes affect sweet corn?

Yes, particularly root lesion nematodes (*Pratylenchus zae*). In north Queensland, lesion nematodes have been associated with poor growth and stunting in the field. Damage by lesion nematodes can often be diagnosed by the presence of small blackish lesions on the root surface.

Lesion nematodes are most active at soil temperatures around 30°C. Secondary infections of damaged roots by fungi and bacteria often make it difficult to estimate the losses caused by lesion nematodes.

Continuous cropping with sweet corn can contribute to a build-up of lesion nematodes in the soil. Sugar cane will also increase the numbers of *Pratylenchus zae* resulting in damage if sweet corn is grown in the same soil immediately after sugar cane. Crop rotation with non-host crops is the best long term management strategy for nematode control in sweet corn.

## Using chemicals

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### What is the best spray equipment to use?

There is no one best type; buy spray equipment that suits your situation and budget. In some districts, large areas of sweet corn are often sprayed by aircraft. Boom sprays with and without droppers are the most commonly used ground equipment. Select equipment based on its ability to give good coverage of the target area.

The silks are the most important target to spray, but are also the most difficult.

### How do I calibrate my spray equipment?

To work efficiently, equipment needs to be calibrated. Document the results of this calibration as part of your quality management system, and keep it with your spray diary. One method of calibration is shown in Chapter 4.

### What is an MRL?

MRL stands for Maximum Residue Limit, which is the maximum level of a chemical permitted to be present in a food. It is expressed as milligrams of active ingredient per kilogram (mg/kg) of the food.

Produce at the markets is randomly tested for chemical residue. Farmers have been prosecuted when chemical residues were above the MRL, or residues of non-registered chemicals were found.



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Spray application  
Chapter 4 page 216

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### What is a withholding period (WHP)?

The withholding period is the number of days that must pass between the last chemical application and harvest for human consumption, grazing by livestock and cutting for stock feed. For postharvest treatments it is the number of days from the postharvest treatment to consumption. The WHP will be on the pesticide label.

Some chemicals do not have withholding periods for livestock, if these chemicals are used, the crop must not be fed to livestock. The withholding period for livestock consumption may be greater than that for human consumption.

Residues should be below the MRL if the chemicals are used at the registered rate and frequency, and the withholding period is observed.

### How do I get chemical application accreditation?

You must attend a ChemCert or SMARTtrain Farm Chemical User Training course in your state. Course participants complete an open book assessment at the end of the course and successful candidates are then issued with a statement of accreditation by their state ChemCert or SMARTtrain organisation. This accreditation is valid for five years.

### Do I need training in the safe use of chemicals?

In some states you cannot buy certain pesticides unless you have a current ChemCert or SMARTtrain accreditation and in Australia, endosulfan can now only be supplied to or used by an accredited person.

ChemCert or SMARTtrain accreditation will assist the documentation of a quality assurance (QA) program. It is highly desirable for growers to be able to demonstrate safe, responsible use of chemicals. One of the best ways to demonstrate this is to obtain ChemCert or SMARTtrain accreditation. These accreditations must be renewed every five years so participants are kept up to date with changes and developments.

### How should I store my chemicals?

Chemicals need to be stored in accordance with the AS2507-1998 standard. This does not mean you will have to spend a fortune on elaborate storage facilities but you need to be aware of several safety, environmental and food safety factors when dealing with chemicals.

### Do I need to keep a diary of spraying records?

Records of chemical application are now one of the most important pieces of documentation you will need to be able to prove what you have done with chemicals. Most merchants and agents supplying the retail sector now expect you to keep spray records showing at least what was applied, how much, by whom, and when the application took place. This information is an essential part of a QA system.

more info



ChemCert or SMARTtrain  
contact details  
Chapter 5 page 241

Further information on  
correct storage of chemicals  
is found in the ChemCert  
course.

Safe storage, use and  
disposal of chemicals  
contact details:  
Chapter 5 page 241

## Environmental management

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### What is an EMS?

An Environmental Management System (EMS) is a systematic approach to managing the impacts that a business has on the environment. An EMS does not dictate levels of environmental performance, however it should enable a business to comply with legislative requirements concerning the environment. It should also build on existing activities such as industry best management practices, industry codes of practice and quality assurance schemes.

### What type of EMS do I need?

We do not know when or what type of EMS will be required in the horticulture industry in the next few years. It will depend in part on the markets you are aiming to supply. As a minimum, you should become familiar with the Growcom Farmcare Code of Practice for fruit and vegetables. It was developed by Growcom to assist growers meet their general environmental duty of care under the Environmental Protection Act 1994.

The most widely recognised auditable international EMS standard is ISO 14001. This process standard requires a business to have an implemented, documented environmental policy in place which is available to the public. It also requires the business to have a documented environmental management system in place that is capable of being audited by an accredited third party. ISO 14001 does not prescribe specific levels of environmental performance but it does require a business to be able to identify and have access to all relevant environmental legislation.

In Europe, a protocol based on good agricultural practice called EurepGAP has been operating since the late 1990's. A significant number of Australian horticultural businesses are working towards EurepGAP in order to meet compliance deadlines stipulated by UK/European retailers and importers.

### What is Enviroveg?

Enviroveg is a relatively new program from the Australian Vegetable and Potato Growers Federation (AUSVEG). Enviroveg is committed to encouraging vegetable growers throughout Australia to adopt and implement good environmental practices. It includes a self-assessment tool to help growers compare their current farming practices with the environmental best practice activities listed in the Enviroveg guidelines.

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Environmental  
management  
Chapter 4 page 110

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## Farm safety

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### What are my workplace health and safety obligations?

Australian Agriculture has one of the highest rates of workplace accidents. Your obligation as an employer and farm manager are based on three principles:

- a concern for people and their well-being including yourself and your family;
- sound business management;
- compliance with current workplace health and safety legislation.

The best way to meet your obligations is to take part in the Managing Farm Safety program developed by Farmsafe Australia. The Managing Farm Safety program is aimed at developing skills in risk management of farm safety – an approach that is consistent with the way other farm business risks are managed. The training course and resource package are based on real data about the major risks on Australian farms, including specific agricultural industries, and takes into account the requirements of current occupational health and safety legislation.



Farm safety  
Chapter 4 page 113

## Fertiliser

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### What fertilisers do I need?

Adequate levels of all the major elements are required. Sweet corn needs high amounts of nitrogen, applied as a basal application plus side-dressings. All the nitrogen should be applied before tasselling.

A fertiliser application schedule should be based on the results of a complete soil analysis taken six to eight weeks before planting. Once the crop is growing, sap testing may be used to indicate how much nitrogen fertiliser should be applied.



Nutrition  
Chapter 4 page 141

Sweet corn requires careful management of nutrition to ensure high yields.

## Irrigation

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### What irrigation methods should I use?

Drip (trickle), overhead (sprinklers and travelling irrigators) and flood irrigation are all used commercially. In southern Australia, overhead and furrow irrigation systems are commonly used. The method chosen may depend on the availability and quality of water, soil type and the slope of the land.

### How much water do I need?

Sweet corn has a high demand for water, particularly from tasselling onwards. The quantity required depends on the irrigation method, time of year and the soil type; sandier soils will require more water. From 4



Irrigation  
Chapter 4 page 154

to 8 ML/ha (megalitres per hectare) for overhead watering and 6 to 10 ML/ha for furrow irrigation are commonly used. This quantity may be significantly reduced to 3.5 to 4 ML/ha if using drip irrigation. Any stress after tasselling will lower the yield.

### What quality water can I use?

Sweet corn is moderately sensitive to saline water, particularly at the seedling stage, but successful crops have been grown using water up to 2.2 deciSiemens per metre (dS/m) when using drip irrigation. Problems will occur at higher levels. It is preferable to use water with less than 1.5 dS/m when using overhead irrigation.

## Weed control

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### How should I control weeds?

Weed control is not too difficult in sweet corn. Thorough, deep land preparation followed by interrow cultivation is the most common method of weed control. Pre-emergent herbicides give early weed control and post-emergent herbicides can control broadleaf weeds during the seedling stage.

Interrow cultivation can be carried out until the crop reaches about 400 to 450 mm in height (25 to 40 day stage). After this, the crop is very actively growing and will out-compete most weeds. A common practice is to apply a lower rate of pre-emergent herbicide, followed by hilling-up to encourage prop root development which reduces lodging. A further herbicide application is needed to control weeds that would emerge in the cultivated soil. There are a number of herbicides registered for use in sweet corn.

Some herbicides leave residues in the soil for some time after harvest. Consider what crops will be grown after the sweet corn and whether these crops are susceptible to the herbicide you plan to use. Cucurbits, for example, are very susceptible to residual herbicides.

## Harvesting

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### How long does it take from planting to harvesting?

A sweet corn crop can take from 60 to 120 days from planting to harvest with most crops maturing between 80 and 95 days. It will depend on the variety and the time of year that it is planted.

Sweet corn maturity is very responsive to temperature—it matures much faster in warm weather than cold weather. Varieties have different times to maturity, so it is important to know the characteristics of the variety you are planting, its maturity period and when in the year it will mature.

more info



*Control weeds*  
Chapter 3 pages 44, 56

a key issue



*Maturing times, varieties*  
Chapter 4 page 135



Postharvest temperature management  
Chapter 4 page 235

### How can I tell when sweet corn is mature?

Note when 50% of the cobs are silking. Sweet corn is mature approximately three to four weeks after silking, so you can determine when it should be ready from the date of 50% silking. As sweet corn matures, the silks dry off and turn brown and at this stage the kernels at the tip of the cob will be approximately 75% full. The cobs will feel plump. Pull back the husks of a few cobs to check your assessment.

Another way of testing is to squeeze the kernels at the base of the cob and the milky fluid will shoot out or sometimes the embryo will pop out if the cob is mature. A more exact method of measuring maturity is by measuring the moisture content using a microwave oven. This method is used by the processors.

In cream coloured varieties, the kernels will change from white-cream to a rich cream colour when the cob is mature.

### How is sweet corn harvested?

Sweet corn can be harvested by hand or machine. Machine harvesting causes little damage to cobs and is used by larger growers because of the lower labour input. All processing crops are machine harvested. Hand harvesting is mostly done by smaller growers.

### How many times do I harvest?

Practically all large areas of sweet corn are machine harvested, a once over operation. Small areas harvested by hand may be harvested twice.

### What yields can we expect?

For fresh market, yields can vary from around 800 to 1500 x 18 L packages per hectare with a season average of around 1000 to 1200 packages per hectare. In north Queensland yields are usually lower, ranging from 600 to 1300 x 18 L packages per hectare with an average of around 950 packages per hectare. Processing crops average around 17 t/ha in Queensland and NSW.

## Postharvest treatment

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### Should I cool my sweet corn after harvest?

Yes, as soon as possible after harvesting and packing. Sweet corn has a very high respiration rate and with the high sugar content of supersweet varieties, the drop-off in sugar can be very rapid. The higher the temperature the faster sugar is converted to starch.

The supersweet varieties have a higher sugar content giving them a longer shelf life than other types. To improve the shelf life and maintain

sugar levels, it is essential that the corn be cooled to close to zero as quickly as possible.

### How do I cool sweet corn?

Hydro-cooling and vacuum cooling are the most efficient methods, though some smaller growers use forced air cooling.

## Marketing

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### How is fresh market sweet corn normally marketed?

Sweet corn is marketed as whole cobs, 24 to 30 in an 18 L polystyrene package or as pre-packs packed in the same package size. Almost half the sweet corn produced in some areas is sold in pre-packs.

### What is a pre-pack?

Cobs (usually about three) are placed on individual trays and covered with transparent plastic wrap. A large part of the husk covering is removed to show the kernels. Pre-packing can be done to increase marketable yield when heliothis grubs have damaged the tips of the cobs. The damaged area is removed during the pre-packing operation. Small cobs are also marketed this way.

### What sort of packages should I use?

Styrofoam 18 L packages are the most commonly used containers. They allow hydro-cooling and top icing and are resistant to water.

### Are there restrictions on sending sweet corn interstate?

Yes, Western Australia and Tasmania have restrictions. Talk to a plant health inspector to find out the current requirements.

### What are the requirements for exporting overseas?

Generally no restrictions exist on export of sweet corn overseas, provided phytosanitary requirements for the specific country are met. Currently most fresh sweet corn exports are from Victoria. The main overseas markets are Japan, New Zealand, Malaysia and Singapore.

Talk to import agents from the destination country, export agents and an Australian Quarantine and Inspection Service (AQIS) inspector to find out the current requirements.

### What level of quality assurance (QA) do I need?

You will need different levels of quality assurance (QA) depending on who you supply. If you supply direct to a retailer, in some instances you may need a full quality management system which is accredited by a third party, for example Freshcare or HACCP plans. If you supply to a processor you will need to meet their requirements.

more info



Quarantine  
Chapter 5 page 248

more info



AQIS offices  
Chapter 5 page 247

a key issue



Quality assurance  
Chapter 4 page 103

## General

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### Are bees important for pollination?

No, sweet corn is wind pollinated and pollen moves from the male flower (tassel) to the female flower (silk). However bees can often be seen around the tassels as they are attracted by the very rich pollen. It is better to plant small blocks in several short rows rather than one or two long rows as this improves pollination.

If bees are working in crops near the sweet corn during the tasselling and silking period, apply pesticides to the sweet corn late in the afternoon. This will protect the bees as they are least active in the evening.

### Why are there kernels missing from my cobs?

Missing kernels are often referred to as blanks and are the result of poor pollination. Missing kernels at the tip are often referred to as 'blind ends'. Each kernel is the result of pollen entering a single silk. There will be a 'blank' on the cob if the silk is damaged, the pollen not viable or the silk is not pollinated. This often occurs at the tip but can occur on any part of the cob.

Some varieties are more prone to tip blanking than others. Hot, dry, windy or wet weather can cause blanking, as can severe zinc and boron deficiencies.

### What causes dimpling in the kernels?

Dimpling indicates the cob is too old for harvesting and consumption or has been kept too long under non-ideal storage conditions. Short periods of low humidity and high temperatures can also result in dimpling of kernels.

### What is baby corn?

Baby corn is corn harvested at the stage when the tips of the silks are just visible. The husk is removed and the immature, unfertilised cob is packaged to prevent desiccation and cooled immediately. It is essential to harvest baby corn before pollination of any kernels has occurred. A technique sometimes used to ensure this is to de-tassel the crop before pollen is shed from the tassels. Usually popcorn varieties are used because they produce multiple cobs per plant. Because of the high labour content, much of the baby corn in our markets is imported from countries with lower labour costs, for example Thailand.

### Why do plants tiller (sucker) and should I remove the tillers?

Some varieties tiller (sucker) prolifically. Research is inconclusive about the effect of tillers on yield. In commercially grown crops, tillers are not removed.