

Guide for sugarcane planting

Planting is the most expensive operation in the sugarcane production system – costing around \$800 per hectare depending on region.

Money is wasted if the crop is poorly established. To ensure the best crop establishment it is recommended that highest quality planting billets are placed in soil conditions that promote germination and establishment. There is no magic formula for a good plant strike, but correctly doing a set of basic actions will tip the odds of success in your favor.

What should I do?

Remember good planting is the essential first step to a good crop. A poorly planted crop will never match the yield of a well planted crop. So when planting always:

- Start with good seed cane and high quality planting billets.
- Treat the seed and billets with care and the appropriate fungicide and insecticide sprays.
- Put billets into a good seedbed, cover with the correct amount of soil and firm the soil after planting.

What type of material should I plant?

Grow sugarcane specifically for planting material. You must deliberately produce sugarcane that is suitable for plants rather than for maximum production.

If you start with unsuitable or diseased planting material, you will have little chance of getting a good strike. Make sure that all planting material is confirmed as disease-free prior to use.

Planning is essential to ensure high quality cane is available at planting time. High quality planting material is produced by:

- Growing cane in a disease-free and well-drained environment.
- Growing cane in a weed-free and sugarcane volunteer-free environment.
- Avoiding lodging by planting or ratooning later in the season, withholding fertiliser and/or water, or planting on less fertile soil.

- Satisfying the plant's nutritional requirements but aiming to produce a moderate yielding crop - application of nitrogen 1-2 months before cutting plants may improve germination.
- Satisfying the crop's water requirements to produce billets with 2-3 internodes per billet (internode spacing of about 100 to 150 mm).
- Growing cane under uniform soil conditions to ensure a uniform crop of even maturity.
- Obtaining the original material from an approved seed source and increasing it to commercial quantities in on-farm nursery plots. As a rule of thumb, rely on a 20 to 1 multiplication per year when using a whole-stalk planter (1 kg will produce 400 kg in 2 years). This amount will be about halved if a billet planter is used.

If you are unsure of the disease status of your sugarcane plants, contact your local productivity services group to find out more about RSD testing prior to planting.

The 'ideal' billet for a mechanised billet planter is:

- is 250-300 mm long
- has a minimum of 2 nodes per billet with sound eyes.
- has both ends cleanly cut (no squashing of ends).
- has minimum damage to rind from the harvester rollers.
- is free from piping (hollow centres).
- is actively growing.
- is free of pests and disease.
- contains little trash.

Erect cane is essential for plant material. Most growers know that lodged, bent cane is unsuitable for whole-stalk planters. However, research has shown that bent cane also produces billets of poor quality, even when cut with best-practice, modified, plant-cutting harvesters.

Crop lodging is managed by crop husbandry. Nutrients, in particular nitrogen, must be limited and rates applied will depend on previous field history. Do not use more than 100 kg N/ha. Planting after large, well-grown legume crops may result in excessive N levels. Crop growth can also be controlled by restricting irrigation, or late planting.

Where should I propagate plants?

Growing cane for plants does not require the same inputs as a commercial crop. The best soils on the farm should not be used to propagate plants, but don't use the worst ones either. Soils should be well drained and ideally have little or no slope. The site should be readily accessible by machinery and weed free.

Limited natural rainfall and readily available irrigation is ideal, as you can 'control' plant growth.

Plant for propagation only in clean (free from volunteer sugarcane plants), fallowed blocks. Never plant into ploughed-out replant blocks.

Pests, such as weevil borers, should be avoided if possible. Cane should be inspected for these pests and, if they are heavily infested, use plants from somewhere else.

Machinery issues

Which harvester should I use?

Sugarcane must be harvested with the appropriate machinery to produce the highest quality planting billets. Billet-planting systems require a modified harvester to supply billets, as commercial machinery is often too aggressive and will cause excessively high levels of billet damage.

SRA field tests have shown that a combination of erect, high-quality cane and the use of machinery specifically modified for the production of planting billets can produce planting billets of equivalent quality to those from a whole-stalk planter. It is important that the harvester operator is aware of all the factors that contribute to the production of quality planting billets and takes due care when operating the harvester.

The harvester to cut planting billets should be modified with:

- feed train rollers speed optimised (ratio of roller speed to chopper speed is critical to ensure clean cut of the billet)
- rubber-coated feed rollers to minimise rind damage
- reduced cane knockdown angle to prevent splitting of the cane stalk.

*More information is available in the **Billets Quality** information sheet which is available on the SRA website www.sugarresearch.com.au/page/growing_cane/harvesting/information_sheet*

An underslung basecutter box is best for cutting plants, but these are not commonly used in the industry. When using the leg-type basecutter box, remove all feed paddles or aids from the leg shaft to minimise rind damage. Irrespective of the type of basecutter used, keep the harvesting pour rate even and moderate. Harvester pour rates of 55 to 75 tonnes/hour are recommended. During operation, various machine components should be regularly maintained to ensure that high-quality billet are produced.

Basecutter blades require regular maintenance:

- Keep blades extended to the maximum length possible.
- Use thin blades as these produce the best quality cut
- Replace blades when the cutting edge becomes dull and rounded.

Chopper blades should be sharpened regularly and replaced if damaged or when worn excessively. As a guide, blades should be resharpened after cutting each 20 tonnes of billets, but more often in abrasive soils or where rocks are present. Portable, battery-powered grinders and impact wrenches make these jobs easy.

What about handling and transport?

Research shows that standard billet handling systems are not detrimental to billet quality, but excessive handling of billets should be avoided. Maintain and operate all handling and planting machinery to ensure that billets remain in good condition. Check billets regularly during planting and identify and rectify any changes in billet quality. Always empty and clean haulouts and planters of all billets when changing varieties and farms.

Soil conditions for planting

What soil tilth is needed?

Because soils vary greatly, there is no recipe for land preparation. If you use a conventional planter, whole-stalk or billet, you must obtain a suitable soil tilth before planting. Most soils require only limited tillage to produce a satisfactory seedbed for sugarcane. Excessive tillage using aggressive implements, such as a rotary hoe, will lower organic matter, producing a poorly structured soil that will reduce crop establishment. Poorer soils will degrade quicker than better soils.

The idea that a well-tilled, fine soil is essential for sugarcane germination and establishment is incorrect if improved planting machinery is used. Many growers have significantly

reduced the number of times they till fields and are seeing the benefits of minimum- and no-tillage planting. Good soil structure and moisture conservation associated with minimum tillage provide ideal conditions for germination. With improved planting equipment such as double-disk planters and modified planters with narrow planting chutes, you won't need as much, if any, tillage for seedbed preparation. Be aware of the needs of your planting equipment and use only enough land preparation to prepare a suitable seedbed.

Is soil temperature important?

Soil temperature is a critical variable for sugarcane germination and emergence. Time to sprout differs between varieties, but relies on accumulating temperature-day units. Establishing cane using fewer days at higher soil temperature will reduce loss through disease and insect damage. Cane should not be planted when soil temperatures at the sett are below 18°C.

Planting the crop

How much soil cover?

Sugarcane plants can emerge from a range of soil depths, but, as the cover of soil over the sett increases, plant emergence is slowed and fewer plants will emerge and establish. The best soil cover will depend on soil type, time of year and local conditions. Usually 40-65 mm is acceptable.

Disk-type soil coverers are best on conventional planters, as these coverers are easily adjusted and suit a wider range of soil types than fixed tines. Stop regularly during planting and dig in the furrow to check the amount of soil covering the sett. This is particularly important if the soil type changes.

Is soil firming required?

Effective press wheels are essential components of both whole-stalk and billet planters. Those with high soil-firming pressures significantly improve both the rate and the percentage of crop establishment. Rollers are not recommended as they generally have lower pressing forces and will firm an excessive area. Tractors must NOT be used to press the soil after planting as the planted billets can be damaged.

Using an effective press wheel on the planter ensures that:

- only soil covering the sett is pressed - why press other parts of the field and make it easier for weeds to germinate?
- an extra field operation for soil firming is not required, as the furrow is opened, sett placed, furrow closed and soil

firmed, all in one machine pass

- the depth of soil cover on the sett is more uniform.

How should fungicide be applied?

Fungicides will protect billets against soil-borne diseases, particularly Pineapple sett rot disease. However, they are only effective at protecting sound billets with two or more nodes and no pipes.

You have a choice of fungicides that are registered for use on sugarcane, but all must be used as per the label instructions. Mercury-based fungicides also stimulate germination however the future availability of this product is limited.

Most planters use a billet-dip system, a spray system, or a combination of both. There is no advantage of one system over the others, although systems that recirculate the fungicide solution are prone to soil contamination.

Fungicide application systems can be tested by adding a marker dye to the tank. After application, cut ends of the billets MUST be completely covered by the fungicide solution. Make sure that you clean fungicide-dip tanks regularly, as they can become polluted with soil and weed seeds. In many areas, dip tanks are becoming less popular as billet planting is adopted. Spray systems must use low pressure (maximum 70 kPa 10 psi) and large orifice nozzles to produce large droplets that give effective billet cover and minimal spray drift.

Is insecticide needed at planting?

In some areas an insecticide may be required to control wireworms and other pests that attack the germinating buds. Insecticides used to control these pests should only be used as specified on the label instructions. They are usually sprayed from a gravity-fed tank directly over the billet as it is placed in the furrow.

How do I apply fertiliser at planting?

Planting fertiliser is usually placed beside the billets during planting, usually on the sides of the furrow. Take care to prevent contact between the fertiliser and the billet, as the fertiliser can burn the young shoots. Minimum- and no-tillage plantings often require fertiliser and sets to be placed in the same soil slot. In these cases, use reduced rates of low salt index fertilisers (DAP and sulphate of potash type fertilisers) to minimise toxicity to the emerging plants. Additional fertiliser can be applied after the crop has established using a disk coulter rig. Allowable fertiliser rates will depend on fertiliser type, soil type and planter opener so discuss reduced tillage fertiliser options with your advisor.

What about the billet metering system?

The metering system of a billet planter should supply high quality seed billets at a uniform rate, with acceptable levels (very low) of 'misses' or 'multiples' within the planted row.

Whole-stalk or whole stick planters, when supplied with high quality cane, are the most uniform and precise planters available. The use of a ground-wheel drive system and positive feeding of the sugarcane stalk ensures uniform plant spacing over a range of ground speeds. The high labour requirements of whole -stalk planters means that they are becoming less popular. These machines should be used to plant all nursery plots to maximise the area planted by a given quantity of seed cane.

All current billet planters use mass-flow billet-metering systems that typically have poor singulation of billets and need high planting rates. At lower planting rates, they commonly deliver clumps of billets and then gaps with no billets which leads to poor plant spacing. To reduce the number of gaps along the planted row the planting rate of billet planters is often at least double that of whole-stalk planters.

You can, however, make changes to billet planters to improve performance. Maintaining a uniform 'head' or depth of cane over the elevating conveyor will improve uniformity of billet metering. Planting rate increases with excessive depth of billets or 'cover' of the elevating system and reduces as depth of billets is reduced. Planting clean billets free from trash will allow an even flow of billets within the planter hopper and assist in maintaining an even head of cane billets. Excessive planting speeds should avoided, with 8 to 10km/hr being the limit for most planter types.

The uncontrolled drop of billets from the top of the elevating slats of billet planters makes the gap and clump distribution of this meter worse. Some early billet planters have used the elevator slats to lower billets to maintain billet spacing integrity.

How do I ensure planting hygiene?

Ratoon stunting disease (RSD) and leaf scald are caused by bacteria that can be spread by cutting implements and contact with the cut ends of billets. These diseases cause severe losses, and you should make sure that they are not brought onto your farms by contaminated planting equipment or in

diseased planting material. The bacteria are highly contagious, and a contaminated harvester or whole-stalk planter can spread them very efficiently. Planting machinery should be disinfected before changing plant sources, varieties or farms. Machinery can also carry weed seeds between farms or districts and good hygiene will prevent the spread of weeds.

An implement can be disinfected by:

- Removing all soil and plant material using high-pressure water and detergent.
- Spraying cutting surfaces and parts that contact cut surfaces with a registered product containing 0.1 per cent benzalkonium chloride. The disinfectant should be left in contact with the implement for five minutes before further use. The disinfectant is degraded by exposure to sun, soil and organic matter.
- Disinfecting the basecutter, chopper box, extractor fans, feed chain, boot and elevator slats of harvesters when cutting cane for planting billets.
- Disinfecting planters and haulouts.
- Flushing the recirculating fungicide spray-system with disinfectant, as they can carry RSD bacteria and spread disease.
- Regularly removing soil, cane billets and trash from the machines and cleaning all machinery before leaving a site. Billets should never be carried over from one job to the next. Planting billets should always be freshly cut. It is cheaper to discard day-old billets rather than to use these as planting material and then suffer a sub-optimal crop establishment.

Things to do

Plan your planting well in advance and ensure you:

- Start with cane grown for planting.
- Produce high quality, sound billets.
- Treat billets carefully and use the appropriate fungicides and insecticides.
- Place the billets into a good seedbed, cover with the correct amount of soil and firm the soil with a press wheel.