



Information Sheet

4. HUSBANDRY

4.5 Management of cane affected by drought

Prevention is better than cure

Droughts are a regular occurrence in the South African sugar industry. Severe droughts occur with an approximate frequency of one or two years out of every nine, and dry spells are also quite common. Dry spells may not last for more than three months at a time, but can be damaging if they occur during the critical growing months. It is best to be prepared by paying attention to all aspects of soil and water conservation and basic crop husbandry. When drought strikes, the decision tree shown below can help growers in managing stressed cane.

Healthy soil with adequate nutrients will produce a healthy crop that is better placed to survive drought. Soil is the reservoir from which the crop obtains the water and nutrients it needs. It is essential to conserve this reservoir by implementing practices such as strip cropping, minimum tillage, scattered tops and crop residue retention (mulching). Preserving wetlands will keep valuable water on the farm for longer, and mulching also contributes significantly to water conservation

in the soil. Compaction from heavy infield machinery restricts the rooting depth of the soil, thereby limiting the amount of soil water available to the cane plant. Taking care when operating machinery on soils prone to compaction will limit the negative effects.

It has been shown that plant cane and young ratoons survive drought better than older ratoons, so it makes sense to maintain an adequate replanting programme that will ensure that ratoon age remains within reasonable limits.

There are varieties that withstand drought better than others. These need to be planted in fields that are most prone to stress. Having adequate disease control measures in place is also important. For example, the effects of ratoon stunting disease (RSD) are far greater in times of drought, and smut tends to be more common during dry seasons.

These are just some of the more important basic practices that need to be in place in order to be prepared for drought. Failure to pay attention to these will place the crop under unnecessary stress, and could result in financial hardship.

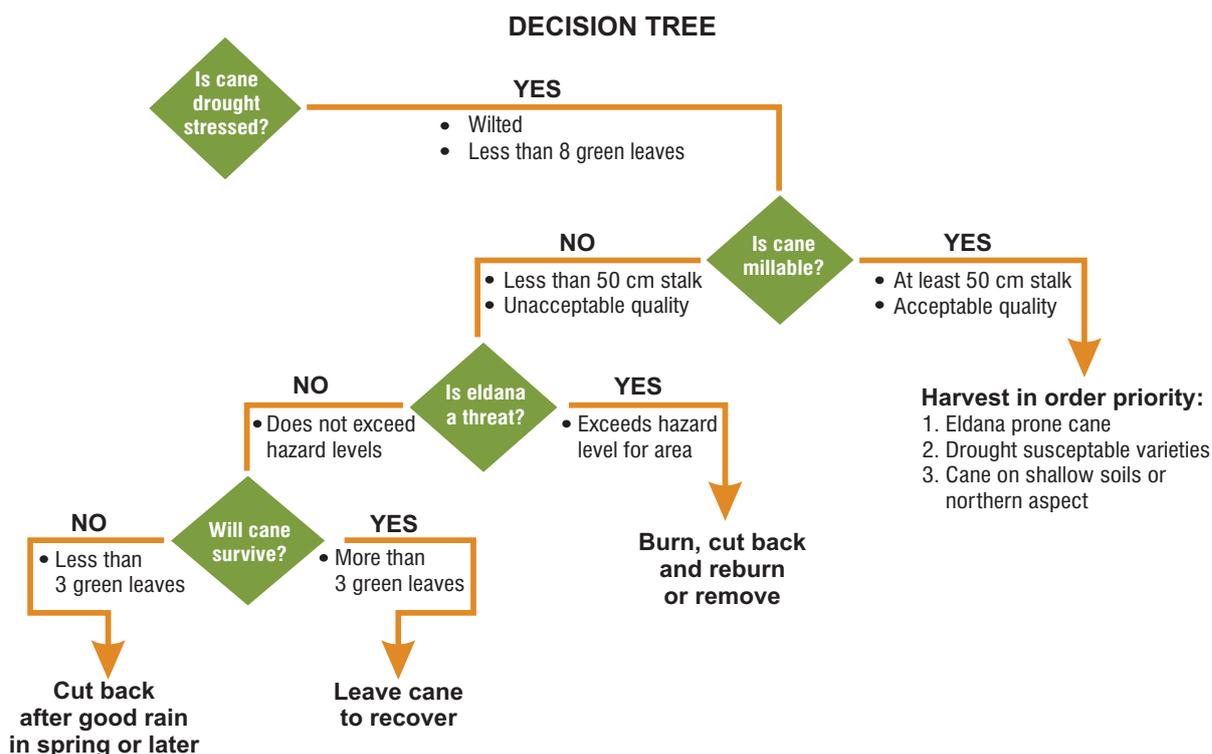


Figure 1. Decision tree for stressed cane affected by drought.

When drought strikes

Apart from the long-term considerations already mentioned, a number of short-term factors need attention during a drought event:

- Harvesting fields strategically to prevent runaway fires.
- Deciding between millable and unmillable stressed cane.
- The order of harvesting stressed cane.
- If and when to cut back unmillable cane.
- The area of carry-over cane.
- The drought tolerance of the varieties in the fields.
- The eldana hazard.
- Whether to burn or retain crop residues.
- Deciding on a relevant crop nutrition policy.
- How much irrigation to apply when water is restricted.
- Ways of handling short cane.

Millable cane

This is cane of sufficient length and quality to be handled and transported to the mill with minimum wastage, and which is acceptable at the mill. About 50 cm of stalk (or a yield of 15-25 tons/ha) should cover the direct costs of cutting, transporting to the mill, and a proportion of subsequent ratoon management costs. However, dry cane of very poor quality is unlikely to be economical and should be treated as unmillable.

All stressed, but millable cane should be harvested during the season. Preferably, cane should not be burnt at harvest unless eldana is a threat, or is present in the cane at high levels. Where fields with high levels of eldana are being harvested, extra attention must be given to base cutting, and all harvested stalks must be removed from the field even if they are not fit to be sent to the mill. The stalks could harbour eldana that will re-infest the emerging crop.

Cutting of the most stressed and eldana-prone cane should have priority. Shallow, north-facing slopes should be cut before hillsides or valley bottoms.

Unmillable cane

If the cane is too short to cut and eldana is below the local hazard level, it should be left as it is. Cutting back will stimulate the crop to break dormancy and regrow, using all the moisture and nutrients it has stored. Under severe conditions, this may increase stool mortality. However, if, after good spring rains, most of the new growth is from side-shoots rather than elongation of the stalks; it would at this point be preferable to cut the cane back as soon as possible. Cane that has only three green leaves, or less, is unlikely to recover properly and should be cut back.

It should be noted that decisions to carry-over severely droughted cane can have dire economic ramifications. Figure 2 illustrates the type of cane that should not be carried over to the following season. Side shooting and eldana infestation results in extremely poor yield and cane quality. This is contrasted with a decision to cut and ratoon the affected field which, if followed by good seasonal rains, could result in yield potential being achieved and with normal cane quality.



Figure 2. In September 2010, a grower decided to carry-over cane that was affected by drought conditions (above). Due to the severity of plant stress, the crop became infested with eldana. In addition, there was die-back of the growth point which led to severe side-shooting in the same crop in February 2011 (below). The result was a poor yield and shocking cane quality.

Note: If cane is left standing, extra hand weeding may be necessary.

If eldana exceeds the hazard levels for the area, the cane should be burnt, cut back and the remaining material reburnt or removed from the field to prevent the new ratoon being infested. Experience from the 1992/93 drought showed that eldana-infested unmillable cane must be cut back, and must not be carried over.

Note: Where cane needs to be cut back, do it by hand. Do NOT use a tractor-mounted mower. In the past, it was found that where cane had been slashed mechanically the stools were often damaged, thereby increasing the risk of spreading RSD in this manner.

Note: If some stool mortality has occurred, consider gapping young ratoon fields, but older ratoons should be left until normal replanting is scheduled.

Varieties

A carefully planned variety policy is one of the most effective ways to minimise the damaging effects of drought. A variety such as N12, is fairly tolerant of drought and is not as susceptible to stool mortality as some other varieties. However, recovery after rain can be slow. By contrast, N39 and N41 recover fairly quickly after the onset of good rains. Although N21 is known to be the most tolerant of eldana infestation, it does not fare well if cut before the onset of a particularly dry winter and will suffer from severe stool mortality. N31 and N36 are also known to suffer from severe stool mortality if harvested immediately prior to the onset of a very dry winter. One should programme to harvest these varieties during spring when they have a greater probability of survival. If cane is severely stressed or eldana is present, varieties NCo376, N16, N19, N27, N35, N36, and N37 should not be carried over.

Fertilising droughted cane

Millable cane

Where millable cane has been harvested, the normal fertiliser top-dressing programme should be followed at the start of the spring rains. Depending on local conditions, a reduced application of nitrogen (N) fertiliser may be given without significantly affecting the yield of the following crop. This is possible after a prolonged drought, as many soils will mineralise above average amounts of N with the onset of the rains. The extent of the reduction in N will depend on the amount of residual N and the N mineralising potential of the soil. Typical reductions for soils in the various N categories are as follows:

Category	Mineralisation potential	Nitrogen (kg N/ha)
Category I	Low	20
Category II	Medium	30
Category III	High	40
Category IV	Very high	50

Note: For the P and K nutrients, growers are advised to send soil samples for analysis from selected ratoons during the winter.

Unmillable cane

Cane cut back

Where the cane has been cut back, the regenerating ratoon should receive a top-dressing of fertiliser as recommended for millable cane.

Cane left to recover

Cane that has been left to recover is unlikely to benefit from fertiliser, except on soils with a low potential to mineralise nitrogen. For this reason, cane growing on soils derived from Natal Group Sandstone (Ordinary), Dwyka tillite, Vryheid sediments, granite, sandy alluviums and grey Recent Sands should receive 50% of the normal N fertiliser top-dressing at the onset of good rains.

Following recovery of the crop, it is recommended that leaf samples be taken during November and December, when the cane is again growing vigorously, to determine whether or not additional fertiliser is required.

Irrigation during drought

The following factors should be considered and rated according to available water:

- Seedcane should be given the highest priority and irrigated without restriction.
- Young cane not fully canopied requires less water, as its evapotranspiration rate is lower, so a limited water supply can be stretched over a larger area.
- Plant cane and good young ratoons should receive preference over older ratoons, which may be ready for early plough-out.
- Stress develops quicker on shallow sandy soils, whereas deep heavy soils hold more moisture and take longer to dry out.
- Irrigation should be scheduled for optimum efficiency, applying only the water that is required according to the stage of canopy (demand increases towards full canopy).
- Leaks and other wastage should be carefully avoided.
- On deep soils, drying off can be introduced earlier than on shallow soils.
- If possible, a field should be irrigated to Total Available Water (TAW) after harvest, and then left until the spring rains, or when water again becomes available.

Managing seedcane

Nurseries must be protected from the drought to prevent a serious shortage of good quality seedcane. A shortage will be aggravated by an inevitable increase in area to be replanted.

It is important to establish additional sources of approved seedcane well before the planting season. Seedcane that has not been checked and approved should never be used for seed.

Seedcane must be free from RSD, smut and mosaic, and must be true to type. When growers have no alternative but to resort to non-nursery seedcane, they should choose a field with a history of being free from disease. Ensure that this cane is fully checked and approved by the LPD&VC Committee before it is used.

Well-grown cane found during a drought should be held back as potential seedcane later in the season, and should be tested and treated as described.

Harvesting and transporting short cane

Manual harvesting

Cut and stack

- Train labour to stack effectively by alternating the alignment of tops and butts, and overlapping stalks within the stack.
- Stack dimensions should be proportional to stalk lengths.
- Crop residue helps to bind stalks in bundles but remember the negative effect on RV% of too much tops and crop residue.
- Split or pooled harvesting systems may result in more economical stack weights.

Cut and windrow

- Cane should be placed in small bundles rather than windrows when using grab loaders.
- Increase the number of rows placed into windrows.
- Crop residue helps bind the bundles.

Infield loading and haulage

Stacked cane

- Some rear loading trailers handle short cane more easily. An example is the Evans timber trailer.
- Double cable, side loading trailers handle short cane more easily than those with a single cable.
- Cable masts may have to be moved closer together to accommodate narrower stacks.
- Additional chains per bundle may be necessary.
- Trailer loading ramps may assist loading of short cane bundles.
- Solid or meshed trailer decks will reduce cane spillage.

Windrowed cane

- Grab loaders are more efficient in handling short cane than push-pile loaders.
- Pull-piling may be more effective than push-piling when using non-slewing loaders.
- The grabs of mechanical loaders may have to be modified with extra tines or the addition of steel mesh.
- The conventional loading method where the haulage unit follows the loader along windrowed cane will cause less stool damage and soil compaction, and will result in less spillage than the shuttle system.
- Solid or meshed trailer decks will reduce cane spillage.
- Increase machinery and equipment efficiency by transporting or loading a neighbour's cane.

Loose cane system

Short cane is not a problem with this system. The problems with transloading chains and cane spillage do not apply.

Transloading

Bundle system

- Additional transloading chains may be required for each bundle.
- Transloading cranes should be equipped with spreader bars to prevent the stack from breaking.
- Loading banks will reduce cane spillage.

Loose cane system

- Attention is needed to avoid cane wastage.
- Loader grabs have to be modified.
- Loading banks will reduce spillage.

Summary of harvesting process

Handling short cane usually implies that:

- Machinery and labour productivity is adversely affected.
- Less crop residue and tops remain in the field.
- More tops and crop residue are sent to the mill, with a negative effect on RV%.
- Lower payloads are obtained.
- Increased spillage and wastage occurs.
- Better management and training are required.

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