



Information Sheet

15. CANE QUALITY

15.1 Components of cane quality

Introduction

The objective of the Recoverable Value (RV) cane payment system (see Information Sheet 11.8) is for growers to improve their cane quality by more accurately rewarding them for quality based on actual extraction of sugar by the mill.

The processing of sugarcane for the extraction of sugar really begins in the field. The variety of cane, the soil in which it is grown, cultural practices, climate, and degree of maturity all interact (Figure 1) to determine the quality of the harvested product.

Raw juice from sugarcane comprises mainly sugars and non-sugars in molecular, colloidal and suspended forms. The relative proportion of sugars and non-sugars present indicates the quality of the juice in sugarcane.

The miller

The miller monitors the amount of sugar that can be recovered from each ton of cane crushed. The less cane he has to crush per ton of sugar produced, and the lower the level of impurities, the easier it is to crystallise the sugar from the juice.

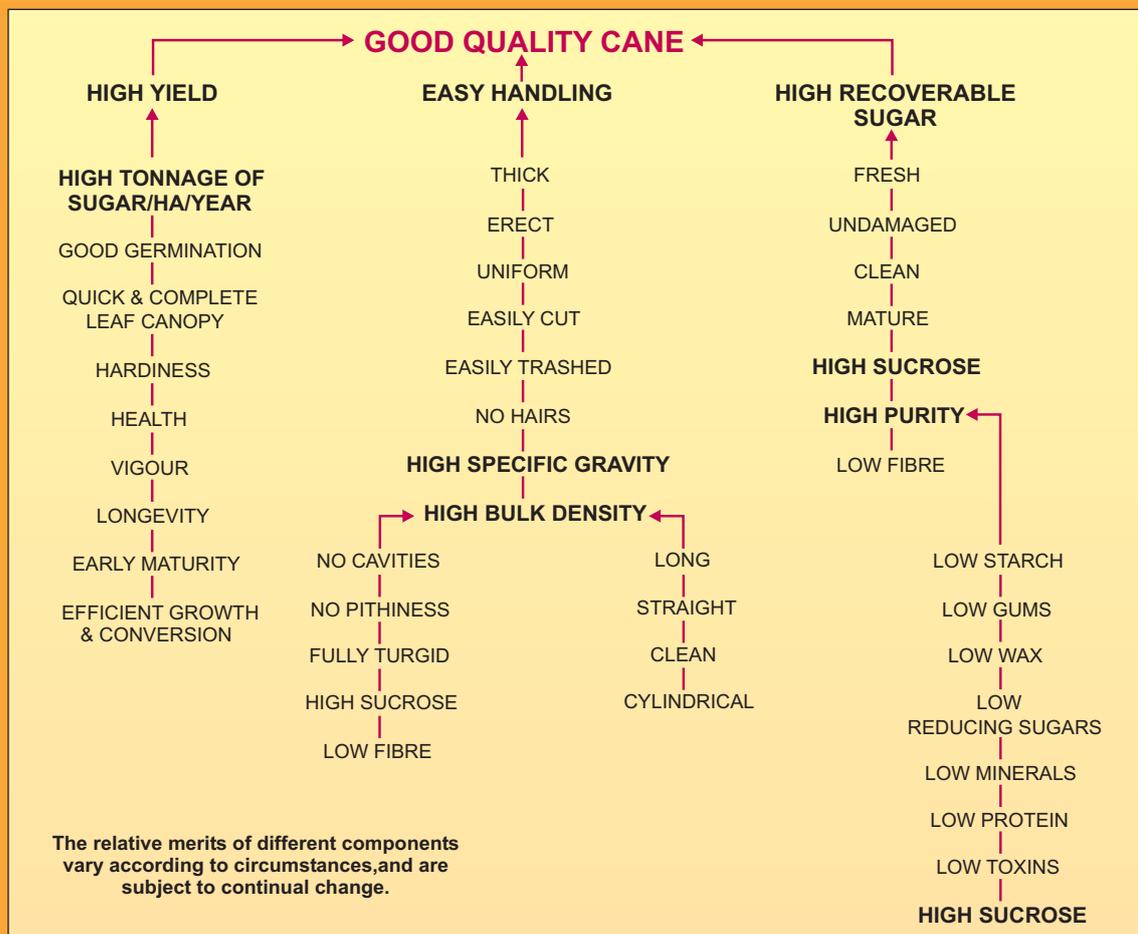


Figure 1. The component characteristics of quality cane.

The most important factors contributing to high recovery of sugar are:

- High sucrose
- High purity
- Low fibre
- Low non-sugars.

The level and nature of non-sugars impacts on the cost of processing and refining of sugar. Polysaccharides, which include gums, starch and dextrans, can have a deleterious effect on raw sugar manufacture, and may cause further problems in refining. Other parameters which can affect the quality of raw sugar are ash, colour, filterability, crystal shape and reducing sugar levels.

The grower

The grower is primarily interested in yield of sucrose per hectare per unit of time. In addition, the cane's health, vigour, hardiness, longevity, ease of propagation and its ability to canopy quickly and mature early are factors which help to reduce costs of production.

Ease of handling also reduces harvesting and transport costs, as tall, erect, thick stalks of uniform length which are easy to cut, easy to trash and free from irritating hairs improve harvesting efficiency, and are therefore characteristics of quality cane (see Figure 1).

Field factors that affect cane quality:

- Correct selection of varieties
- Topping height
- Harvesting practices
- Fertiliser management practices
- Deterioration due to harvest to crush delays
- Use of chemical ripeners
- Disease and pest infestation.

The above factors and various climatic factors affecting quality will be considered in subsequent information sheets in this series on cane quality.

Quality components of sugarcane

The measure used by the South African Sugarcane Research Institute (SASRI) to estimate the amount of sucrose

in cane is estimated recoverable crystal (ERC % cane), whereas in the South African sugar industry recoverable value (RV% cane) is used. The RV formula is similar to that of ERC.

Other components such as water and fibre (which includes extraneous matter such as tops, trash and sand) and some non-sucrose soluble solids (e.g. reducing sugars, proteins and gums), all affect the sucrose per cent. For a clean stalk of cane, see Figure 2.

There are three quality components that, when added together, help explain why there are differences in sucrose %:

$$\text{DM \% cane} = \text{Sucrose \%} + \text{Fibre \%} + \text{Non-sucrose \%}$$

$$\text{Brix \% DM} = \frac{(\text{Sucrose \%} + \text{Non-sucrose \%})}{\text{DM\%}} \times 100$$

$$\text{Purity \%} = \frac{\text{Sucrose \%}}{\text{Sucrose \%} + \text{Non-sucrose \%}} \times 100$$

Therefore, when evaluating the factors that affect cane quality, it is important to remember that:

Sucrose is the valuable component of sugarcane.

Fibre reduces extraction of sucrose from the cane, so **keep F/S ratio as low as possible.**

Non-sucrose reduces recovery of sucrose from the juice, so **keep N/S ratio as low as possible.**

Conclusion

Profitability for both miller and grower is related to producing clean cane of good quality. This implies high juice purity and sucrose % cane, with low fibre and non-sucrose.

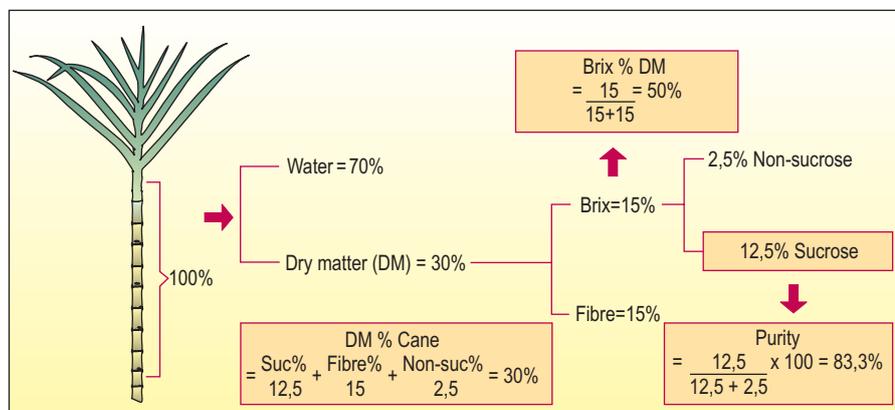


Figure 2. Diagram of a clean stalk of cane, its quality components and their relationships.