



Information Sheet

4.3 Flowering and pithing in sugarcane

The significance of flowering

Flowering in sugarcane can negatively affect both cane yield and quality, thereby reducing RV yield (sucrose yield in other countries) if harvesting is delayed for too long after flowering.

Initially, flowering acts as a strong natural ripening stimulus because it prevents further stalk growth without affecting sucrose production by the mature green leaves. This leads to accelerated storage of sucrose in the stalk (natural ripening). As a result, flowering improves cane quality (RV%), which will compensate for the lower cane yields (t/ha) in the short-term. Research in South Africa has shown that flowering increases RV yield (t/ha) provided harvesting occurs before the end of September. Delaying harvesting for longer may reduce RV yield because of lower cane yields and quality deterioration induced by profuse side-shooting, the occurrence of sour rot, and senescence (ageing) of the mature green leaves responsible for sucrose production.

The process of flowering

For flowering to occur the sugarcane plant must first change from a juvenile phase, not capable of flowering, into a mature vegetative phase. The duration of the juvenile phase in commercial sugarcane varieties is typically longer in plant crops than ratoon crops. The sugarcane plant enters the mature vegetative phase when two or three mature internodes have already formed at the base of the stalk. Once the sugarcane plant enters the mature vegetative phase flower initiation can occur provided the photoperiod (day length), minimum air temperature, soil moisture, and crop nutritional status are conducive (see factors affecting flowering on page 2).

Of all these factors, photoperiod (day length) is the most important. As day length gets shorter, the flower initiation period typically occurs for 3 weeks during February (SADC countries closer to the equator e.g. Malawi and Zambia) or during the last three weeks of March (South Africa). Under exceptional circumstances flower initiation might also occur during spring, but this phenomenon is poorly understood and might be related to very specific photoperiod requirements in certain sugarcane varieties.



Flower initiation is strongly promoted by minimum (night) temperatures of 18°C or higher and adequate soil moisture availability during this time period. In irrigated cane, where irrigation water supply is not limiting, the main determinant of inter-season differences in flowering intensity is night temperature. In rainfed cane inter-season differences in flowering intensity is also determined by soil moisture availability, in addition to night temperature.

Approximately 8 - 12 weeks after flower initiation, growth is terminated at the apical meristem of the stalk and the inflorescence (tassel) will begin to emerge. The inflorescence continues to mature over the next 12 weeks followed by senescence. During senescence side-shooting will also rapidly advance.

The significance of pithing



Pithing is a condition that occurs in sugarcane stalks that causes formation of cavities in the center of internodes that are without juice. Pithing is of an economic concern because it reduces RV% and can also result in reduced sucrose extraction during milling.

There is little information on pithing in sugarcane, although it has been shown to be well correlated with flowering. If flowering occurs, there is a very high chance that pithing will also occur, pithing is directly caused by flowering. Best management of flowering cane will also reduce the negative consequences associated with pithing. However, high growth rates in response to very favorable growing conditions, can also cause pithing, even in the absence of flowering.

Factors affecting flowering (and pithing linked to flowering)

Day length

- The initiation of flowering occurs when the day length is approximately 12.5 hours or shorter.
- In South Africa the flower initiation period occurs during the last 3 weeks of March.

Temperature

- Night temperatures of 18°C or higher during the flower initiation period strongly promotes flowering.
- Daytime temperatures in excess of 32°C during the flower initiation period will reduce flowering.

Soil moisture

- Adequate soil moisture, brought about by sufficient rainfall or irrigation, is prone to cause more profuse flowering.
- The presence of a water table causes more profuse flowering.

Crop nutrition

- Published evidence shows that nitrogen (N) deficiency promotes flowering. In N-deficient crops a reduction in flowering intensity occurs with an increase in N fertiliser application rates.
- There is some published evidence suggesting that application of phosphorus (P) also appears to reduce flowering.
- However, the potential reduction in flowering in response to N and P application may be negated due to the strong influences of the other factors listed above.
- These findings support the need to fertilise sugarcane according to crop demand, as determined through accurate attainable yield estimates in combination with soil and leaf nutrient analysis.

Variety

- Some varieties flower more profusely than others because the propensity of a variety to flower is genetically determined. Planting of shy-flowering varieties, in fields to be harvested from September to the end of the season, is recommended in South Africa.
- In SADC countries closer to the equator (e.g. Malawi and Zambia), most varieties will flower every year because the climatic conditions are highly favourable to induce flowering.
- Refer to the SASRI variety information sheets to obtain an indication of relative flowering propensity.

Best management of flowering sugarcane

Harvesting guidelines

- Flowering fields should be harvested before end-September if the number of flowering stalks is more than 20% per field.
- Topping height of flowering cane is important, especially where pithing is severe. In such cases a lower topping height is advisable.
- If the number of flowering stalks is less than 20% per field, the field can be carried over to the next season if absolutely necessary, but cane yield may be lower than in non-flowering carry-over fields.
- If flowering fields show signs of eldana damage [$>1.1\%$ stalk length red (%SLR)], carry-over of these fields should be avoided. Harvesting of these fields is a priority.
- Be careful not to overestimate the stalk yield of flowered cane.

Chemical guidelines

- Unfortunately, Ethephon® (and other trade names) are not registered for flowering control in South Africa.
- Profusely flowering crops (more than 20% flowering stalks per field) should not be treated with chemical ripeners because this will place an additional stress burden on these crops.

A flowering index has been developed by SASRI for predicting the severity of flowering that is likely to occur within a given season in the various regions of the industry. The flowering index may guide growers in the proactive adjustment of harvesting schedules of susceptible varieties in seasons where profuse flowering is predicted. Information from this index is included in a flowering report, which is available for individual weather stations, from the SASRI WeatherWeb. Visit the SASRI website (<https://sasri.org.za/decision-support-tools>) and click on the WeatherWeb link on this page. The Flowering Reports can be found under the Data Views & Downloads menu inside WeatherWeb.

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