

Improving Quality Cane

Through Chemical Ripening





Several areas have reported increased RV's in the past season, with Malelane and Komatipoort recording the highest cane quality in the industry. These Mpumalanga mills have attributed the excellent quality to the rigorous implementation of ripeners and to the correct timing of harvest for each variety.

In Pongola, RV was well above the seven year average. Here also, the use of chemical ripeners was identified as the main factor. Amatikulu saw a seasonal RV average of 12.35%, which was a welcomed improvement over the last two seasons.

Growers are increasingly becoming more aware of the benefits associated with the correct use of ripeners through several grower days and study group meetings held by SASRI Extension Specialists in conjunction with SASRI's ripener specialist.

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FIGURE 1

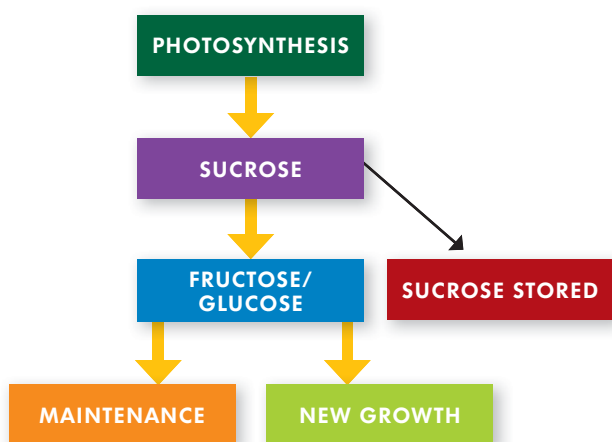
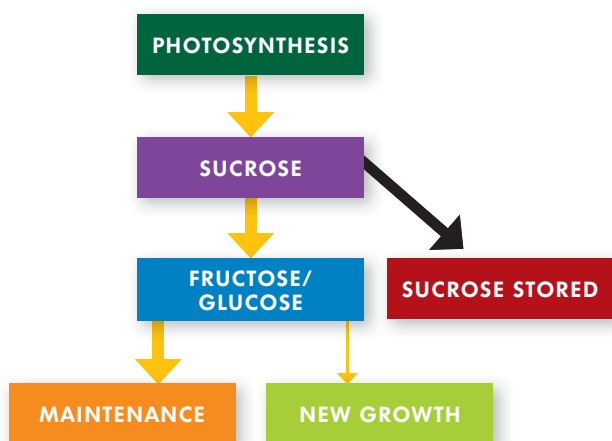


FIGURE 2



HOW DO RIPENERS WORK?

Figure 1: During photosynthesis, carbon dioxide is converted to sucrose. Not all the sucrose is available for storage in the stalk, because new plant growth and maintenance of existing biomass requires energy. For this, sucrose is broken down to its component sugars - glucose and fructose, and then used during respiration to fuel new growth and maintenance. The portion of sucrose not used for these processes is stored in the stalk. In vigorously growing sugarcane, this storage portion (thin black arrow in scheme above) is therefore relatively small causing low cane quality.

Figure 2: Chemical ripeners improve cane quality by inhibiting leaf or stalk growth, thereby decreasing the demand for sucrose by the plant (thin yellow arrow in scheme above) and increasing storage of sucrose in the stalk (thick black arrow in scheme above).

Because chemical ripeners target the growth process, they should only be applied when crop growth is vigorous.

BETTER MANAGEMENT PRACTICES

Research conducted locally and internationally over many years has shown that slight reductions in cane yield can indeed occur when ripeners are applied at registered rates to vigorously growing crops. However, improvement in cane quality by far compensates for



this loss, leading to substantially higher RV yields. The added benefit from reduced harvest and transport costs also needs to be considered in crops where cane yields are slightly reduced. Results from demonstration trials conducted on grower farms in Komatipoort and Pongola have shown that improved RV yields in ripened crops translated into profits of between R2 785 – R8 725 per hectare. However, in order to maximise profits, the decision to ripen a particular crop, and the subsequent management of that crop, requires due consideration. Years of research has shown that the following four considerations are most important:

- Only ripen healthy, vigorously growing crops. Crops suffering from drought stress because of inadequate soil moisture, or any other factor reducing growth potential (low temperature, pests, diseases, profuse flowering, severe lodging etc.), should not be ripened. Ripeners are ineffective in these crops and could also aggravate stress symptoms. Stalks with 8 or more green leaves and long upper internodes, in conjunction with juice purities below 75% (for Ethephon and generics) and 85% (for Fusilade Forte and generics), are tried-and-tested indicators of good crop vigour. For these reasons it is not economically viable to apply ripeners during winter, when crop growth slows down naturally; well-managed drying-off instead of chemical ripening remains the best practice to enhance quality for irrigated crops harvested during the months of August - October.
- Adhere to the registered application rates. Using higher rates causes more rapid and more severe symptom development without improving cane quality much further, whilst introducing a real risk of reducing cane yields to unacceptable levels. Severe browning of the green leaf canopy also hampers the ability of the plant to produce sucrose through photosynthesis for storage in the stalk.
- Good irrigation management is critical. This is not only true before applying ripeners but also afterwards. To reap the full benefits from chemical ripening it is important to maintain proper irrigation for as long as possible after ripener application. This ensures that the green leaves can continue producing sucrose for storage at the highest possible rates. Chemically-ripened crops should not be dried-off in an attempt to increase cane quality any further. Instead, irrigation should only be stopped to allow for infield harvesting operations, to prevent soil compaction and to allow for effective burning of the crop. Severe drying-off is known to reduce the benefits from chemical ripening considerably. On the other hand, commercial strip trial results from Komatipoort have shown profits in excess of R6 000 per hectare in crops where no drying-off could be practised due to persistent rainfall.
- Adhere to the recommended spray-to-harvest interval (STHI). Extending the STHI for too long beyond the recommended interval will result in greater cane yield reductions, which could erode the



RV yield benefit. This is particularly the case where extension of the STHI coincides with drying-off or too high ripener application rates. Recent commercial strip trial results in Pongola on a 60 cm-deep soil have shown that under good irrigation management (irrigation only stopped two weeks before harvest) positive ripener responses in terms of RV yields were maintained for four weeks after the recommended harvest date has lapsed. However, where possible, fields approaching the recommended STHI should always hold priority in harvest schedules.

SOME IMPORTANT POINTS:

- Ripeners improve cane quality without significantly lowering sucrose production by the leaves.
- Growth suppression, either through chemical ripening or drying-off, makes more sucrose available for storage, but at the same time, could reduce cane yields.
- For the grower to make a profit from either chemical ripening or drying-off, the improvement in cane quality must exceed any negative effects on cane yield.
- Excessive chemical ripener dosages or excessive drying off must therefore be prevented at all costs.

RIPENING ON THE COAST

In a SASRI long-term ripener evaluation trial at Mount Edgecombe, varietal responses to ripeners of N42, N47 and N51 were evaluated over three seasons under coastal production conditions.

Results from these field trial results led to the recommendations provided in Table 1.

TABLE 1: CHEMICAL RIPENER RECOMMENDATIONS FOR VARIETIES N42, N47 AND N51.

Variety	Ethephon	Fusilade Forte	Combination treatment
N42	No*	Yes	Yes**
N47	Yes	Yes	No*
N51	No*	Yes	Yes

*Only a mediocre response (not statistically significant);
 **Responds particularly well to combination treatment

For variety N42 Fusilade Forte (or generics), and in particular the combination treatment, is recommended. Ethephon (or generics), when used on its own, results in only a mediocre ripening response. The same holds true for variety N51. This variety does respond well to the combination treatment, but not as pronounced as variety N42. Variety N47 responds well to Ethephon or Fusilade Forte (or generics), but achieves very little additional benefit from the combination treatment. Cost recovery of the second ripener application thus becomes questionable, especially under commercial cultivation conditions.

IMPORTANT CONSIDERATIONS:

- When used under favorable growing conditions ripeners increase RV yield in these three varieties. The reductions in cane yield that may sometimes occur, leads to further benefit in the form of harvest and transport cost savings.
- Three years of research on these varieties have shown that none of the treatments resulted in any negative effects on ratooning.



recommendations. The benefit in terms of increased RV yields ranged from 0.51 – 2.15 t/ha when comparing the untreated control results to the chemically ripened remainder of the field.

The results from these five trials demonstrated that considerable benefit can be derived from ripening 24-month cycle N12 and N31 crops provided favourable climatic conditions, conducive to vigorous crop growth before and after chemical ripener application, are present.

Outcomes of on-farm strip trials have been communicated at several grower days and through SASRI's grower newsletter, The Link. Because of the proven economic benefits associated with the responsible use of chemical ripeners, research on this topic remains an important aspect of the SASRI programme of work.



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c) In crops grown on a 15 – 18 month cycle, the naturally more mature state of the crop makes the use of Ethephon (or generics) questionable. Juice purity testing before application is strongly advised before the use of Ethephon (or generics) is considered. Ethephon (or generics) is only effective if the juice purity is below 75% at the time of application. In most cases Fusilade Forte (or generics) will be the ripener of choice in these more mature crops.

ON-FARM STRIP TRIALS: EFFECTIVE VEHICLES FOR BOTH RESEARCH AND KNOWLEDGE EXCHANGE

It is beyond SASRI's capacity to conduct formal ripener evaluation trials on each released variety across all production areas, soil types and cutting cycles. However, on-farm strip trials conducted by growers in partnership with the regional Extension Specialist and SASRI's ripener scientist have proven to be very effective to confirm and fine-tune recommendations for specific production scenarios.

Two such examples were commercial strip trials conducted during 2013 on Victor Smith's (Melmoth) and George Hyslop's (Eston) farm, which investigated the response of long-cycle crops (24-month) to early-season chemical ripening.

Five commercial strip trials on long-cycle N12 and N31 crops were conducted in collaboration with these two growers and the regional Extension Specialists. In each field a section (1 – 2 ha) was left unsprayed as a control while the remainder of the field (1.5 – 6 ha) was treated with Fusilade Forte or Volley according to standard SASRI

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