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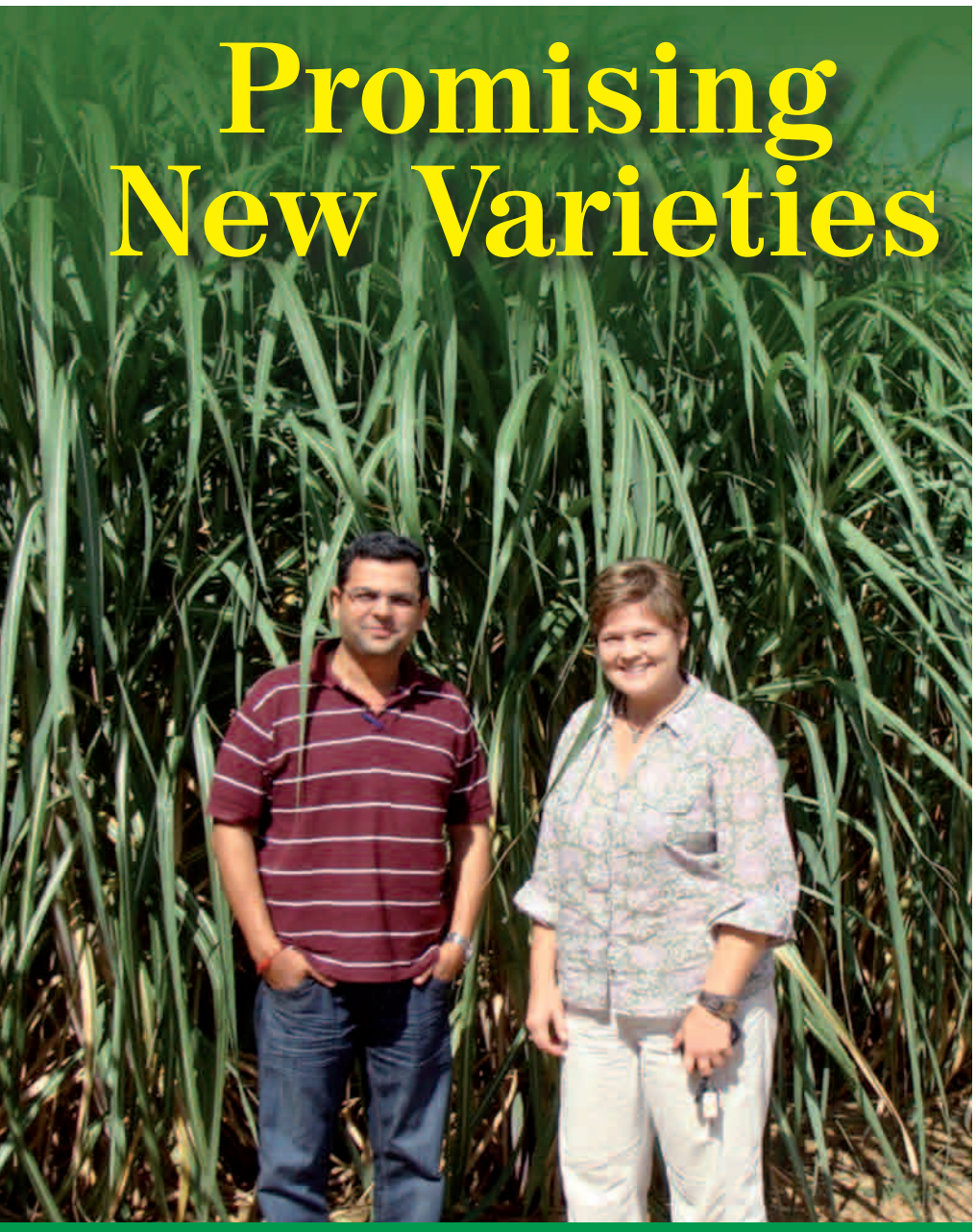
Promising New Varieties



Page 12: *This year has seen the release of four new varieties which hold much promise for the industry: N54 for the midlands, N55 and N56 for the coastal and hinterland areas and N57 for the northern irrigated areas. See pages 12 and 13 for brief overview of each variety. Seen here in a field of N57 are SASRI Senior Plant Breeder, Shailesh Joshi (Left) and Lowveld Pest, Disease and Variety Control Officer, Karlien Trumpelmann .*

Also in this issue...

Page 2: Quality Seedcane. The first step in ensuring a sound foundation for your crop is to acquire the best seedcane possible.

Page 16: Ripenin. Considerable benefit can be derived from ripening 24-month cycle N12 and N31 crops provided favourable climatic conditions are present.

Page 22: Spray on Profits. New chemicals being used against crop pests and diseases offer several additional benefits.

SASRI
Unlocking the potential of sugarcane

From the DIRECTOR

Dr Carolyn Baker

Quality Seedcane

The old adage – you reap what you sow – applies to sugarcane. The importance of the quality of seedcane cannot be over-emphasised. Given that the investment made at this crucial stage of crop establishment is designed to last for 10 years, it really is a 'no brainer' to acquire the very best seedcane possible to ensure a sound foundation for the crop. For this reason there is a strong focus on developing certified seedcane schemes in the industry to supply local growers with the best possible product. Unfortunately the attraction of acquiring a cheaper source of seed elsewhere is strong, particularly when grower margins are slashed. However, the risks that accompany this temptation are immense – and all too often our extension specialists and pest and disease teams discover that crops planted up with uncertified seed are infected with one or more diseases. The consequent impact of reduced yields and the possibility of having to face eradication orders if the incidence of the pathogen is high, is not pleasant.

It is undoubted that with all the best intentions, there are several reasons why certified or approved seedcane cannot always be sourced, resulting in growers having to consider acquiring material from alternative suppliers as a last resort. In these cases it is imperative that P&D regulations are followed and that the material is at least healthy, has been harvested with due care to transmission of diseases such as RSD and checked for varietal purity. Ensuring that seedcane is true-to-type is particularly problematic when harvesting seedcane from commercial fields in view of the possible incidence of volunteers in the field, as well as the likelihood of mixing bundles following harvest.

Closely associated with the seedcane debate is the discussion regarding whether or not using seedcane sourced from NovaCane® would be the most desirable route to follow. As a source for seedcane beds it is unquestionably the answer

SASRI's Variety Improvement Manager, Sandy Snyman (right) showing Carolyn Baker (SASRI Director) a NovaCane® seedling destined for the Plant Breeding Programme at SASRI.

to ensuring that the material is disease-free and true-to-type, yet it must be recognised that once the plants are in the ground they are as susceptible as any other sugarcane to prevailing pests and diseases. Nevertheless the assurance that the parent material is of the highest quality at the outset provides a significant reason for considering its use as a seedcane source. Further, through the use of NovaCane® the ability to produce larger volumes of seedcane more rapidly remains a very attractive proposition. It is for this reason that SASRI is committed to the use of NovaCane® in the final stages of development of new varieties in our plant breeding programme. Through NovaCane® we are able to not only propagate higher volumes of seedcane of newly released varieties, we are also able to transfer varieties from one region of the industry to another that would have been previously precluded in view of concerns regarding disease transmission.

The contribution that good seedcane makes to the long term sustainability of the industry barely requires debate: it is the practices associated with achieving this that require commitment.

Topical Tips

September - December 2013

Nutrition

- Fertiliser application programmes should have started in August in anticipation of spring rains, and should be well progressed, especially in the coastal areas. Remember to follow up with a leaf sampling programme for the appropriate summer months to audit fertiliser applications.

Pests and Diseases

- Focus on roguing your smut and mosaic susceptible varieties. Do not forget the **no plant period** from 1 November to 1 February in the high mosaic risk areas.
- Now is the time to consider in-furrow applications of insecticide to reduce damage by thrips later in summer.
- Carry out final eldana inspections in carry over cane during October. Where eldana numbers are of concern, consult your P&D Officer to explore control options.

Management

- It is time to start your long fallow programme of crop eradication and green manures for commercial fields or nurseries to be replanted in late autumn or spring the following year.
- Are you considering minimum tillage or chemical stool eradication? Check that all cane tillers have emerged on these fields before spraying and keep an eye on the effectiveness of your spraying.
- As the rainy season develops, expect rapid growth of vegetation in your verges and breaks. Implement a programme to mow them.

The SASRI Extension Team

THRIPS
control in sugarcane

Weed control

- With the advent of the spring rains, weeds can become a problem so you should be considering applying long-term herbicides.
- Keep a check on the effectiveness of herbicide application and identify fields with problem weeds and begin follow-up treatments.
- In the Midlands areas, keep an eye out for any winter weeds in last season's cane.
- It would be wise to ensure all your harvested fields have received the necessary herbicide treatment before your staff go on their annual December/January leave.

Planting

- Begin your spring planting programme especially if you have had good rains.

With the increased planting that usually occurs at this time of year, a reminder of SASRI's current recommendations for thrips control is appropriate. This article provides a summary of our recommendations; for general information on the pest, please see articles in previous editions of The Link, especially February 2009, May 2010 and September 2012. These are available on the SASRI Info Pack discs sent out last year, or may be requested from the SASRI Library Tel 031 5087514.

Planting date

Avoid planting more susceptible varieties* (N21, N22, N27, N28, N31, N32, N41, N43, N45 and N48) over the September-December period as such crops will be young and vulnerable during December / January when thrips numbers peak.

Variety choice

Where possible, select varieties that are less severely damaged by thrips* (N12, N14, N16, N33, N35, N37, N39, N40 and N44).
** based on thrips numbers found in each variety.*

Insecticide use

Two chemicals are currently registered for use against thrips:

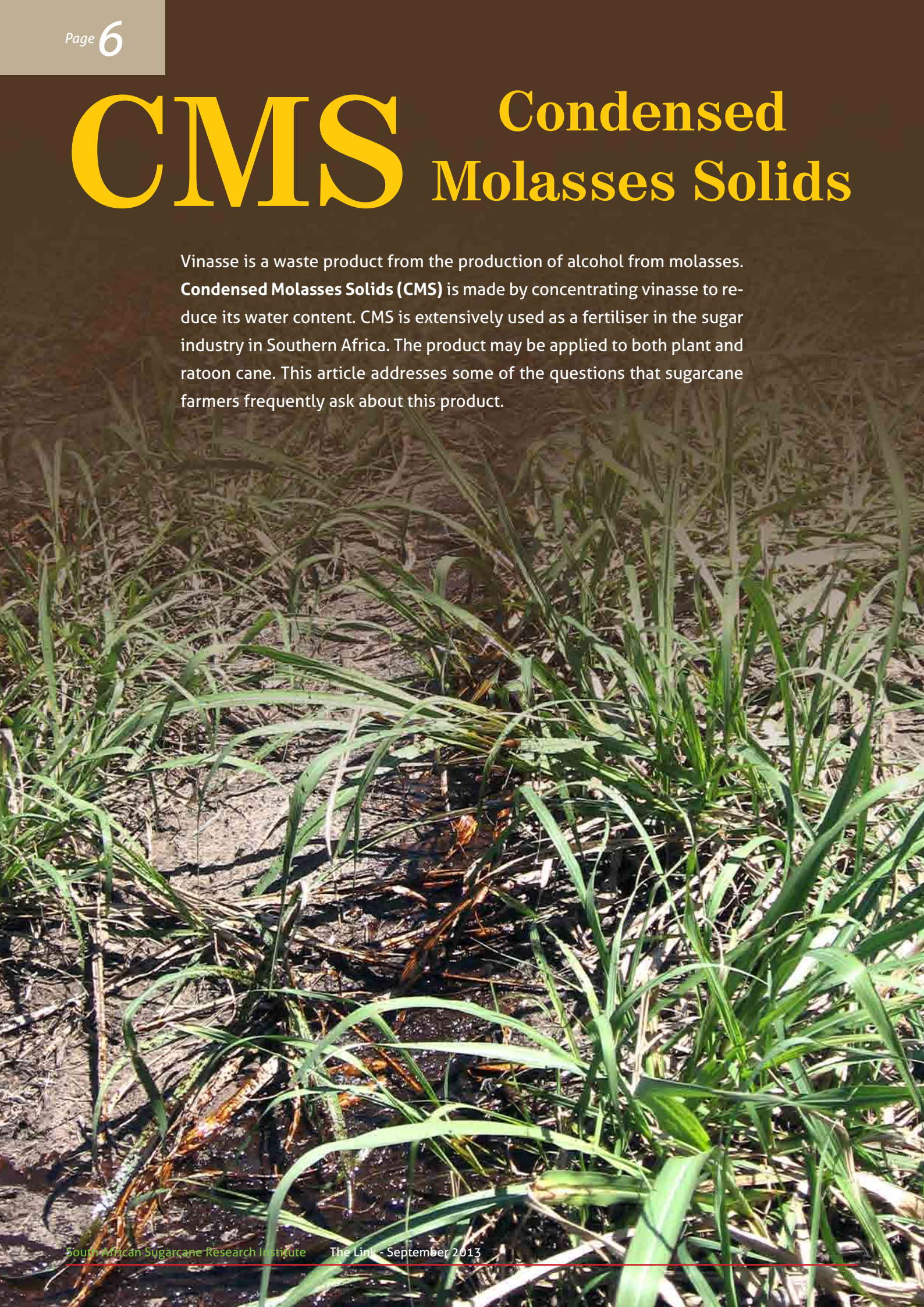
- The insecticide Bandit 350 SC (imidacloprid) is most effective when applied in the furrow at planting at a rate of 1 - 2 L product/ha. Arysta, the owners of Bandit and Allice, have revised the Bandit label and removed the recommendation for foliar application of this product. Bandit is now only registered for furrow application at the rate noted above. Note that the product is registered for ground application only.
- Another insecticide, Allice 20SP (acetamiprid), has recently been registered as a foliar spray for protection against thrips. Apply to ratoon crops as soon as the pest is noticed, at a rate of 1.5kg/ha after 6-8 green leaves have developed. Allice can also be aerially applied.

For more detailed information on the use of these products, please read the product labels.

Graeme Leslie *(Principal Entomologist)*

CMS Condensed Molasses Solids

Vinasse is a waste product from the production of alcohol from molasses. **Condensed Molasses Solids (CMS)** is made by concentrating vinasse to reduce its water content. CMS is extensively used as a fertiliser in the sugar industry in Southern Africa. The product may be applied to both plant and ratoon cane. This article addresses some of the questions that sugarcane farmers frequently ask about this product.



Frequently asked questions

Rian van Antwerpen & Neil Miles *(Senior Soil Scientists)*

How suitable is CMS as an N carrier?

Because CMS is a thick concentrated product, it is very difficult to dissolve any substance in it. The integration of additives into CMS is best left to professional commercial companies who have the proper equipment and the necessary skills. Growers are therefore strongly advised against on–farm integration of additives into CMS (in the hope of reducing costs), as this could possibly result in an uneven application of the additive. If growers are serious about making CMS tank mixes by themselves, they are advised to invest in a proper corrosion resistant continuous agitation system.

How stable is N in fortified CMS?

SASRI conducted a basic test on CMS enriched with N by a professional commercial company. After being stored for a 12-month period, samples were taken from two depths in the tank, and analysed for N, P and K. Distribution of all three elements remained even over the sampling depths, indicating that the N was totally dissolved in the CMS and that the enriched product was stable.

What effects does soil texture (clay%) have on CMS efficiency?

CMS will infiltrate faster into soils with larger pores (sandy soils) compared to those with smaller pores (clayey soils) due to its high viscosity (or thickness). Thus, when applied to clayey soils, the CMS will remain on the surface for longer. Additionally, as with any other N carrier, the longer the carrier is exposed to the elements (left on the surface) the higher is the possibility of N loss due to volatilisation. CMS should therefore be treated as any other N carrier with the objectives of minimising N losses due to volatilisation.

What are the recommended CMS application rates?

With K requirements being generally higher on clayey soils than sands, for the same yield targets greater amounts of CMS are required on clayey soils, as illustrated in the table below. Due to the variability in the composition of CMS, it is advisable to have it analysed at a reputable laboratory (such as SASRI's Fertiliser Advisory Service) in order to apply the correct amount. CMS to be applied at a rate of 3 tons per hectare would typically supply 120 to 160 kg of K per hectare.

Can CMS be applied on alluvial soils?

We strongly advise against applying CMS to soils that are poorly drained (i.e. some alluvial soils with distinct differential textural layers, valley bottom soils, and soils with a high water table), as it might lead to the development of anaerobic conditions and a build-up of salts in subsurface layers. Thus, CMS may be applied to well-drained alluvial soils with no sign of an occasional water table. CMS has a high oxygen demand which means that it will consume significant portions of oxygen in water should it end up there, and this may lead to the suffocation of most aquatic life. Care should therefore be taken to avoid spillage of large quantities into rivers, streams and dams.

CMS application rates.

Sandier soils (<30% Clay)	Clayey soils (>30% Clay)
K < 70 mg/L , apply CMS at 3 t/ha	K < 100 mg/L , apply CMS at 3 t/ha
K 70 to 90 mg/L, apply CMS at 2 t/ha	K 100 to 120 mg/L apply CMS at 2t/ha
K 90 to 125 mg/L, apply CMS at 1 t/ha	K 120 to 150 mg/L apply CMS at 1 t/ha
K > 125 mg/L, do not apply CMS	K > 150 mg/L, do not apply CMS

Fertigation

As fertiliser prices increase, farmers are on the lookout for more cost-effective and improved fertiliser management strategies. For irrigators, fertigation (the application of soluble fertilisers via the irrigation system) could help to increase fertiliser use efficiency and lower application costs at the same time.

Fertigation allows for more accurate and flexible fertiliser application in particular with drip irrigation systems. Specific fertilisers have also been used in microjet, overhead sprinklers, centre-pivot and linear moving systems for a range of crops. However, the accuracy of fertiliser application is dependent on the accuracy of water distribution from the irrigation system.

Nitrogen savings

Nitrogen (N) forms the biggest part of the fertiliser costs: about 80% of the total costs are spent on N. However about 50% of the applied N gets lost. This is mainly due to a lack of synchronisation between N-supply and N-demand of the crop. Timing of conventional solid N-application is often dictated by farm management constraints. Heavy rains one or two days after the N-application have often washed the nitrogen away. With fertigation, the plants are 'spoon-fed': N can be supplied exactly at the time when the plant requires it. This, and the better accuracy of fertiliser placement, leads to higher efficiency compared to conventional solid fertiliser application. Results from various field trials in South Africa, India, Mauritius and Australia show increases in nitrogen fertiliser use efficiency of up to 50% in sugarcane. According to these studies, N application rates for sugarcane can be reduced by 20 – 30 percent compared to rates in conventional management systems. It is worth noting that fertigation is not a tool to increase yields with elevated N-rates: sugarcane yield response curves tend to be flat at N application rates above the optimum.

Application

Questions from sugarcane farmers often relate to the splitting and timing of application: What is the most efficient strategy in terms of uptake? How many split applications? When should the last application before harvest occur?

The main criteria for scheduling of N-application is the season of the cropping cycle: the period of N demand for a winter cycle crop is much longer (due to lower temperatures inducing slower growth) than for a summer cycle crop. Research has shown that after four months' growth in a winter cycle crop, only 12-15% of applied N was taken up, compared to over 60% for a summer cycle crop. After experiments which tested various application schemes, the following recommendations are provided:

Summer cycle crop (summer harvest)
Splitting of the nitrogen evenly over the first five months of crop development (4to 5 splits within the first 5 month starting one month after planting) is most efficient for a summer cycle crop. N-status of the crop should be checked by leaf sampling after month 6 and only if the leaf sample shows additional demand, another application should be considered.
Winter cycle crop (winter harvest)
Splitting application up to 10 times during the season works better for winter cycle crops, where the crop demand stretches over a longer period. Application in month 9 and 10 is still possible, but not afterwards so that ripening and cane quality are not adversely affected.

Other Fertilisers

The fertiliser products which can be used are limited to those that are readily soluble. Most solid forms of nitrogen such as ammonium sulphate, urea and ammonium nitrate are soluble enough to make concentrated stock solutions for injection. For phosphorus and potassium, the costs of fertilisers suitable for fertigation (i.e. those which will not clog the system) are higher, and efficiency increases from more directed fertiliser applications would sometimes not outweigh these high costs. In these cases, the economic advantage will come from savings in application costs. Additional considerations when deciding to use certain fertiliser products are as follows:

Phosphorus

MAP and DAP tend to react with calcium in the irrigation water to form a precipitate which clogs the filters. However, using phosphoric acid or acidifying the stock solution, either by mixing with sulphuric acid or injecting sulphuric acid immediately after fertiliser injection can prevent this.

Potassium

Potassium nitrate is the recommended source of K because of its solubility – however it is the most expensive K fertiliser, Potassium chloride and Potassium sulphate are less soluble.

Calcium, Sulphur, Magnesium

Routine application of these nutrients is not normally necessary. In case of deficiency, both Magnesium sulphate and Calcium nitrate are good soluble fertilisers.

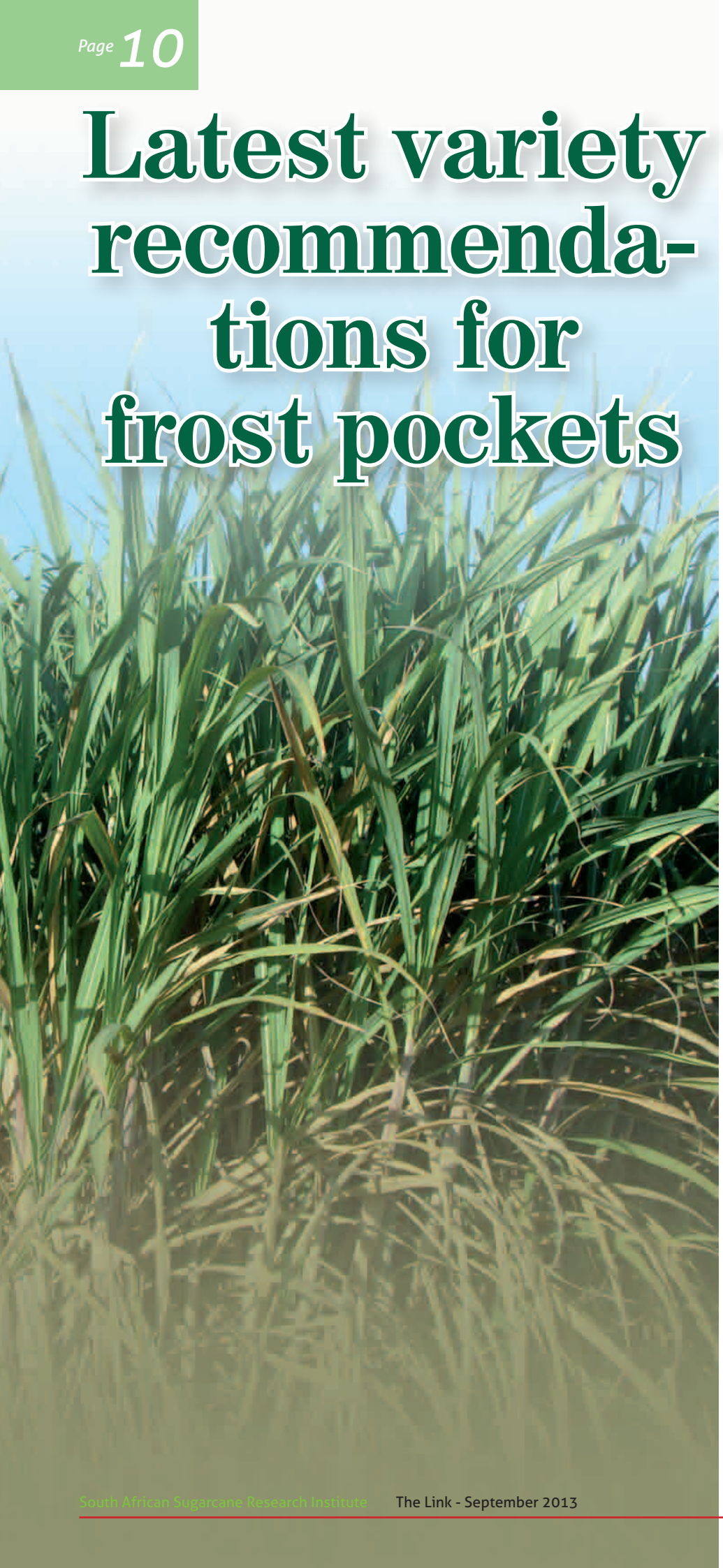
The plant's requirements of elements such as iron, zinc, copper and manganese are generally low. Usually they are applied as foliar spray but the application via fertigation system is possible, but should be pre-dissolved before being added to the tank.

Equipment and Management

There is a wide range of products available for establishing fertigation systems, and capital costs will vary, depending on the level of system chosen. Simple systems involve a single fertigation tank with suction injection (venturi method), which supplies one fertiliser at a time. More sophisticated systems are designed with multiple mixing tanks and control units for automatic operation. They are suitable for large scale operations and require a pump injection (rotary, piston or diaphragm pump). Modern systems should be able to regulate the quantity applied, the duration of application and the proportion of fertiliser. For a detailed specification of such a system according to farm size and irrigation system requirements, one should consult an expert.

Annett Weigel *(Soil Scientist)*

Latest variety recommendations for frost pockets



Varieties N36, N41 and N48 are the highest RV yielding varieties in frost pockets in the midlands. This is according to the results of two variety trials that have been harvested over the last five years in frost pockets. The one trial near Eston was planted on a sandy soil (<15% clay) and harvested for five crops. Figure 1 shows the RV yields of all varieties in that trial, averaged over all crops. The results show that N48 produced the highest RV yield of 9.6 tons RV/ha/crop, followed by N36 and N41, respectively. Older varieties such as N21, N31 and N16, which were previously recommended for frost pockets, were outperformed by a range of newer varieties.

There have also been questions about the ratooning ability of the newer varieties compared to older varieties. Figure 2 shows the RV yields of the new recommended varieties (N36, N41, and N48) and the previously recommended varieties (N16, N21, and N31) for each crop harvested at Eston. The results show that N36, N41, and N48 have maintained higher RV yields than the older varieties across all five crops, showing that they have good ratooning ability.

Another trial near New Hanover was planted on a humic soil and harvested for three crops. Once again, the top three RV yielding varieties over all crops were N41, N48, and N36, respectively (see Figure 3). This shows that these three varieties may be recommended for frost pockets on good and poor soils.

What about other varieties?

Variety **N35** is often grown in frost pockets because of its very high RV% and good purity at twelve months. It is therefore a good choice where mill quality thresholds are enforced. In terms of RV yields, however, N36, N41, and N48 are still superior to N35.

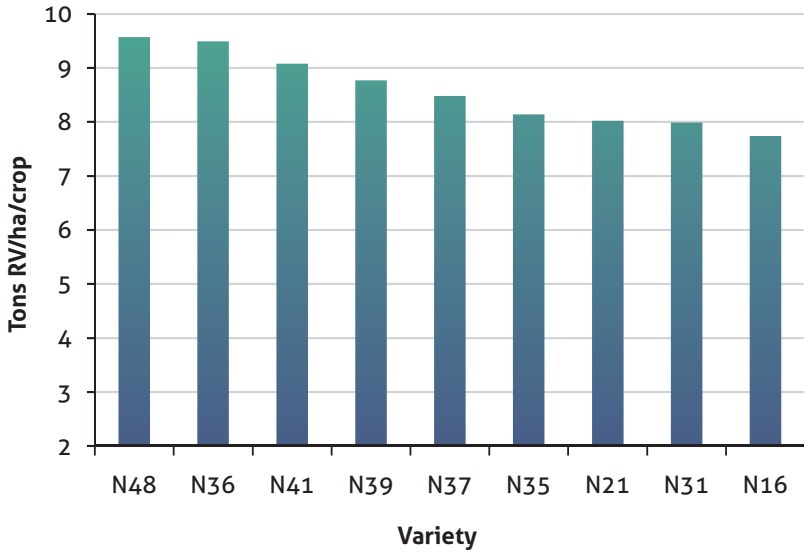


Figure 1: Average RV yields of nine varieties harvested over five crops in a frost pocket at Eston.

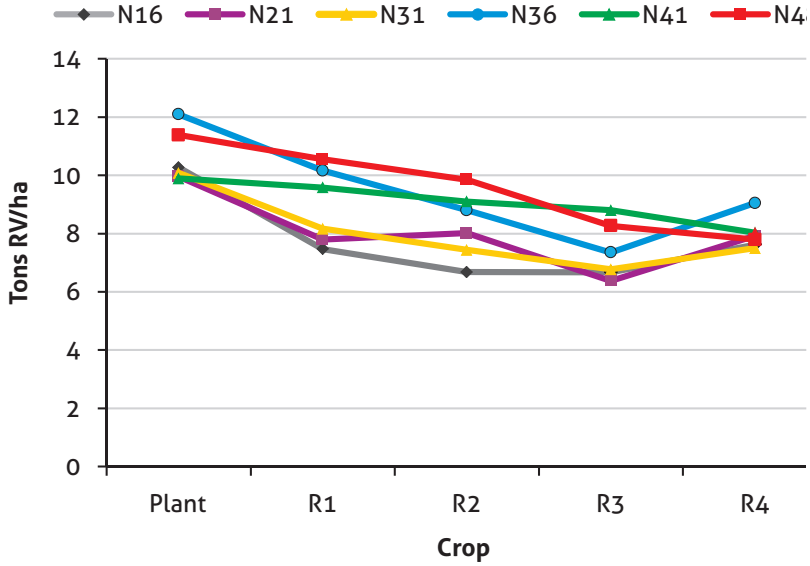


Figure 2: RV yields of six varieties in each of five crops harvested in a frost pocket at Eston.

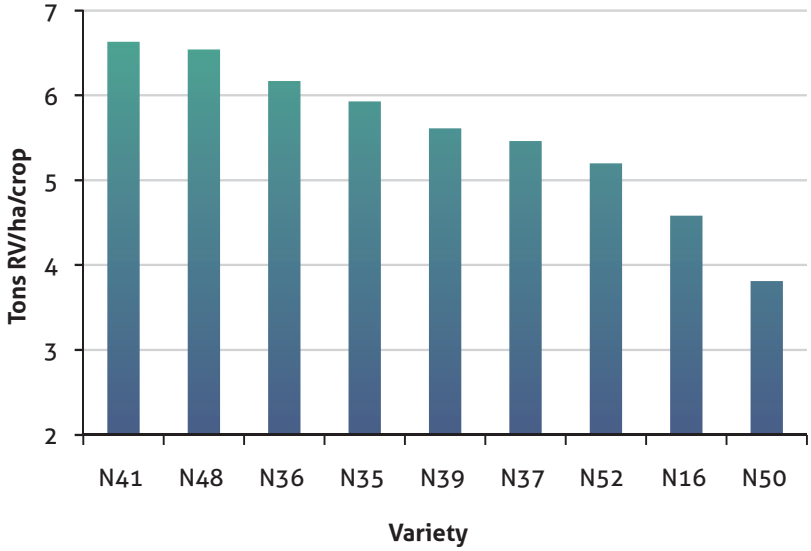


Figure 3: Average RV yields of nine varieties harvested over three crops in a frost pocket at New Hanover.

Variety **N39** has performed reasonably well in frost pockets in trials and commercially. One of the advantages of N39 is that it can be aged and carried over to give good RV yields if a major frost is not experienced. Variety N41 can also be aged and carried over in the absence of frost, however, the RV yields of N41 are lower than N39 when harvested older than 15 months of age. Variety N48 may also be carried over when no frost occurs, however, variety N36 should not be aged older than 12 months.

Variety **N52** has been receiving much attention due to its quick growth rate and high cane yields, and growers are questioning its possible suitability to frost pockets. It must be emphasised that this variety has a very low RV% (lower than N31) and is therefore quite immature at twelve months. Therefore, the current recommendation is that growers should not plant N52 in frost pockets.

High RV yields in frost pockets are dependent on achieving maximum growth and quick maturity within the 12 month growing period. Fast-growing, high sucrose varieties like N36, N41, and N48 are therefore suited to these conditions. Trial results have also shown that these varieties tend to show slower rates of quality deterioration after major frost events compared to previously recommended varieties. Growers are therefore advised to establish N36, N41, or N48 in frost pockets. Local Extension Specialists may be contacted for variety advice for unique production scenarios.

Sanesh Ramburan
Crop Scientist (Variety Evaluation)

Promising N

This year has seen the release of four new varieties which hold much promise for the industry: N54 for the midlands, N55 and N56 for the coastal and hinterland areas and N57 for the northern irrigated areas. This article provides a brief overview of each variety. Detailed Information Sheets are being prepared and will be distributed soon.

N54

This variety is recommended for the midlands areas for both humic and sandy soils on a 19 – 24 month harvesting cycle.

N54 produced high cane and RV yields on humic soils. It has a fairly erect growth habit with good canopy, high stalk population and good ratooning ability. It should, however, be noted that this variety is prone to lodging.

It is important to note that this variety showed resistance to mosaic and rust, both of which are prevalent in the midlands. It has, however, been found to be intermediately susceptible to smut. It has an 'intermediate' rating for eldana.

With regards to milling characteristics, colour is much lower than N31, N12 and N37. N54 has better processability than N12, N16 and NCo376.

N55

N55 has been released for the hinterland and coastal areas and is recommended for a 15 – 18 month harvesting cycle.

This variety had consistently showed higher tons RV with high cane yield and ERC percent thanN39 both in high and low yield potential soils.

It has good pest and disease resistance ratings, with a 'resistant' rating for rust and 'intermediate-resistant' rating for smut and mosaic. N55 has better resistance to eldana than N39 and N12 and is rated 'intermediate'.

N55 develops a good canopy and has good ratooning ability.

It has significantly better colour than N39, N12 and NCo376.

N55 has high fibre and is prone to lodging.

ew Varieties

N56

This variety has been released for the hinterland and coastal areas and is recommended for 15 – 18 month cutting cycle in high yield potential soils in the hinterland.

It is resistant to rust and has intermediate resistance to mosaic, smut and eldana .

N56 develops good canopy with high stalk population. It produces similar fibre content to NCo376. Its juice colour is similar to N39, and better than N12 and NCo376. Ratooning ability of N56 is low under low yield potential soils. It is prone to flowering and lodging.

N57

N57 has been released for the northern irrigated areas and is recommended for a 12 month cutting cycle in mid-late season.

The RV yield for N57 is slightly better than N25, with similar cane yield to N25. It grows vigorously and canopies early. N57 produces thick stalks and a higher stalk population than N19, N25 and N41. It has a similar ratooning ability to N25. N57 is resistant to smut, and has intermediate resistance to rust, eldana and mosaic. While N57 has similar yields to N25, it has better disease and pest resistance. N57 also responds well to ripeners and has similar juice colour to N25 and N43.

Shailesh Joshi & Marvellous Zhou *(Senior Plant Breeders)*

Grasshopper Update

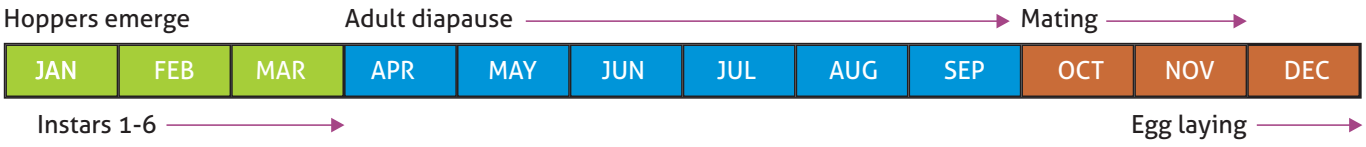

Nomadacris septemfasciata

Over the past few years grasshopper outbreaks in sugarcane have been reported from the Empangeni region. As a result, SASRI has developed a project to identify and study the grasshoppers species involved, as well as their population dynamics in sugarcane. By understanding their biology, we will be able to make better informed recommendations for their control. Reported here are the most recent findings from this project.

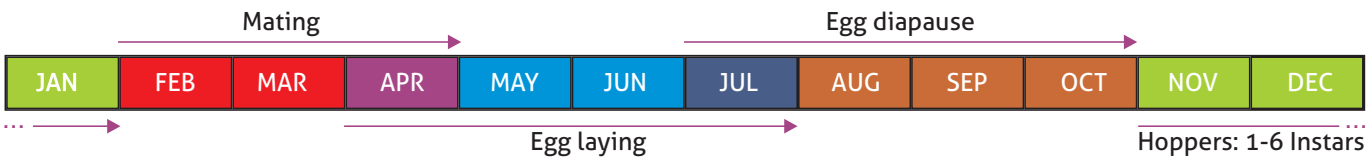
Surveys have shown that there are five species of grasshopper which are of concern. Four of the species are true grasshoppers while one is a locust: the red locust *Nomadacris septemfasciata.* (The main difference between a grasshopper and a locust is the fact that a locust will swarm and migrate over long distances whereas grasshoppers remain localised.) Of these, two species are more common and are therefore of greater concern: the red locust *N. septemfasciata* and the grasshopper *Petamella prosternalis.* The red locust is known to be an important migrant crop and pasture pest of the whole of Africa south of the equator. The current population in Empangeni is exhibiting gregarious (swarming) tendencies which may lead to their migration to other regions, so this particular species requires close monitoring. The other grasshopper species in the region do not form swarms and therefore remain pests of local importance with no immediate threat to neighbouring areas. However, the damage they can do to sugarcane crops remains a cause for concern. Surveys have revealed two other local populations of these grasshopper species, one in the Heatonville area and another on the Umfolozi flats, so illustrating their seemingly sporadic distribution and emphasises the value of continued monitoring within the industry for these pests.

Population surveys of the two most common pest species showed that they have one life cycle per year but that the timing of each is very different. The red locust breeds at the onset of winter and persists over winter in the adult stage while *Petamella* lays its eggs before winter and then dies. The eggs lie dormant in the soil for up to 6 months before hatching again at

Occurrence over time of the life stages of the Red Locust



Occurrence over time of the life stages of Petamella.



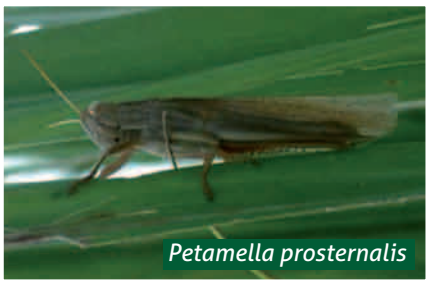
the onset of summer rains The diagrams on page 14 show the development of these two species over a year.

From the information on the seasonal abundance of hoppers, it is suggested that scouting for hatchlings, particularly in October and December, will be crucial so as to detect hopper concentrations. These can then be effectively sprayed, because unlike adults, hoppers cannot fly and so present a much better target for spraying.

Laboratory feeding trials show that *Petamella* has the potential to do more damage to sugarcane per individual than the red locust. It is hoped that such findings can be used to estimate the potential yield loss from grasshopper damage using the Canesim model. Further, these results may be linked with population density data to eventually estimate economic thresholds for these species.

Sampling has shown that hopper population densities of *N. septemfasciata* and *Petamella* are significantly lower in the veld immediately surrounding cane fields. It has also been noticed that while infield grasses/weeds seem to attract hoppers, small hoppers will nevertheless readily eat sugarcane.

Also from this study, simple identification keys for hoppers and adults are being developed so that growers and extension specialists will be able to quickly and easily identify which grasshopper species are present.



Petamella prosternalis

Adrian Bam
(MSc Student - Entomology)

GERMINATION OF VARIETIES AFTER HOT WATER TREATMENT

Sharon McFarlane *(Plant Pathologist)*

Ratoon stunting disease (RSD) is currently the most widespread and important bacterial disease in the South African sugar industry. Hot water treatment (HWT) of seedcane at 50°C for two hours forms part of an integrated management strategy for this disease but this practice can have a negative effect on germination. For this reason, all released varieties are tested under controlled glasshouse conditions at SASRI to determine the effect of HWT on germination.

Some varieties, including N12, N17 and N19 are known to be sensitive to HWT and may germinate slowly after treatment, particularly under cool conditions. Recent research findings have shown that fewer buds germinated after varieties N42, N47, N50 and N55 were given HWT and the rate of germination was slower in N42 and N56. It is therefore particularly important to treat setts of these varieties in a fungicide after HWT to protect against fungal diseases such as pineapple sett rot that can occur when germination is delayed (Benomyl 50% WP is currently registered for use on sugarcane in the HWT tank or as a cold dip at a rate of 50g/100L water).

Apart from applying a fungicide, double stick planting should also be considered when establishing seedbeds with these varieties. The percent germination of N31 and N54 improved after HWT and setts of N52 and N53 germinated faster than untreated setts.

Some tips when hot water treating cane:

- Buds become soft during the HWT process so it is important to handle the cane carefully after it has been removed from the tank. Where possible, leave the setts in the baskets for a few hours to cool and harden before handling.
- Loose trash should be removed, but seedcane does not need to be trashed cleanly. A little trash left around the nodes helps protect the buds from damage.
- Water temperature and timing are critical for HWT. Bud germination will be negatively affected if the water temperature is higher than 50°C and/or the setts are treated for longer than 2 hours.
- Effective bud germination will also depend on the age of the seedcane, with the optimum age of 8 – 15 months, depending on the region.

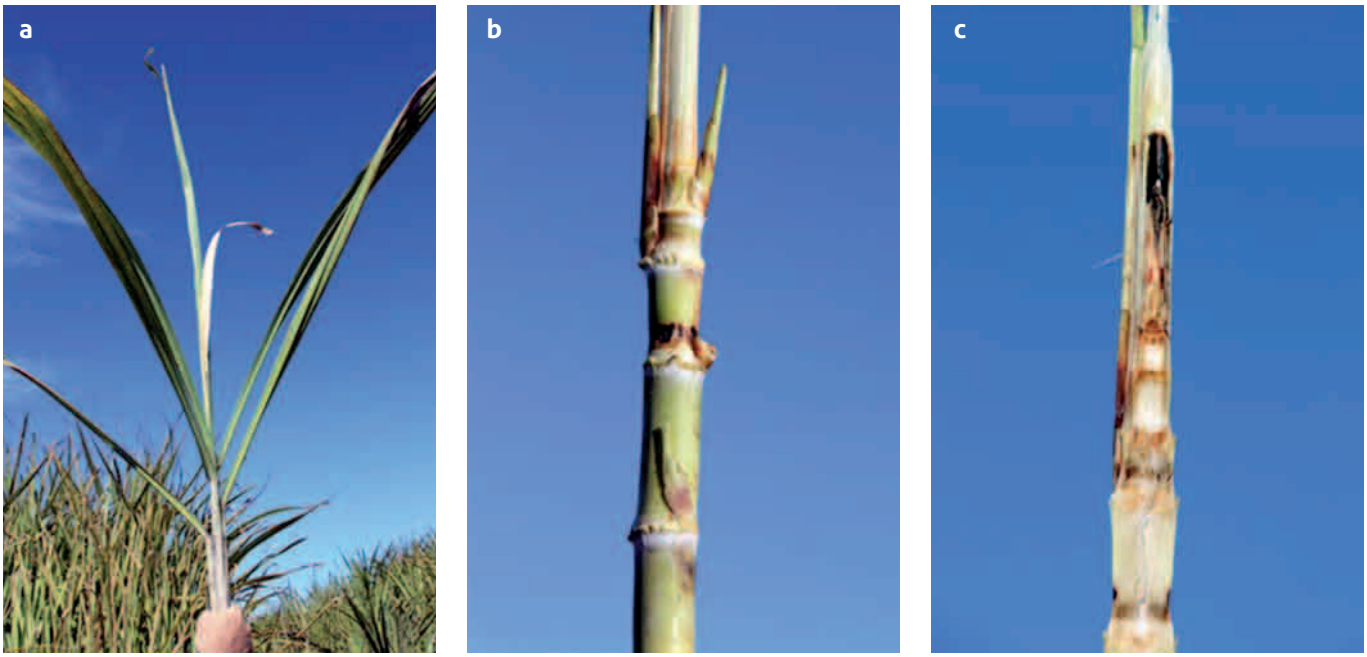
Does 24-month cycle sugarcane respond to chemical ripeners under favourable growing conditions?

Riekert van Heerden *(Sugarcane Physiologist),*
Gary Lagerwall *(Extension Specialist - Zululand South)*
& Paul Botha *(Extension Specialist - Midlands South)*

There is almost a complete lack of reliable information on the response of 24-month cycle sugarcane to chemical ripeners. Because of the extremely favourable rainfall that occurred since September 2012, even these long-cycle crops were growing vigorously during the summer of 2012/2013. It was therefore an ideal season to test the response of these long-cycle crops to early-season chemical ripening. To this end, five commercial strip trials on 24-month cycle N12 and N31 crops were conducted in collaboration with growers and extension specialists.

These trials were conducted on the farms of Victor Smith (Melmoth) and George Hyslop (Eston). 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 recommendations. In all cases the ripener was applied by helicopter. All the trials were harvested between end-April and mid-May 2013. Typical ripener symptoms such as dead spindle leaves (but with mature leaves remaining green), black ring on stalk, and side-shooting were observed in all trials. At harvest all cane consignments from the control and ripened sections were analysed by CTS to determine cane quality. The weights of all consignments were recorded and used to calculate cane and RV yields (t/ha). The main findings obtained from these trials are presented in the table.

The results showed that chemical ripening consistently increased cane quality (RV%). At the same time cane yield was reduced only marginally so that the increases in RV% translated into higher RV yields. The benefit in terms of in-



Typical ripener symptoms observed in strip trials: a) dead leaf spindle; b) black ring on stalk with side-shooting; c) dead growth point.

creased RV yields ranged from 0.51 – 2.15 t/ha. In one trial, the RV yield benefit in N31 was 3.1 t/ha. However this benefit was falsely inflated by the higher cane yield that was achieved in the ripened compared to the control treatment. This anomaly was caused by variation in growth potential within the field. If we adjust the cane yield to a more realistic value, by assuming a 5 t/ha cane yield reduction below that of the control, the RV yield benefit due to chemical ripening would still have equated to 0.72 t/ha (adjusted values indicated in brackets within table).

The results from these five trials show 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.**

Cane quality (RV%) and yield (cane and RV) responses to chemical ripening in 24-month cycle crops of N12 and N31 in Melmoth and Eston during the 2013 early-season

Location	Variety	Treatment	Cane Quality (RV%)	Cane Yield (t/ha)	RV Yield (t/ha)	Benefit (tRV/ha)
Melmoth	N12	Control	12.11	96.6	11.70	
		Ripened	13.09	95.1	12.46	0.76
Eston	N12	Control	10.57	104.7	11.07	
		Ripened	12.84	103.0	13.22	2.15
Eston	N12	Control	12.53	109.4	13.71	
		Ripened	13.37	106.3	14.22	0.51
Melmoth	N31	Control	9.25	97.2	9.0	
		Ripened	10.87	92.9	10.11	1.11
Eston	N31	Control	10.8	103.2	11.15	
		Ripened	12.09	117.8 (98.2)	14.25 (11.87)	3.1 (0.72)

SOIL HEALTH

Neil Miles
(Senior Soil Scientist)

Soil health is close to the heart of every farmer. What constitutes a healthy soil? Are my soils healthy? How can soils be improved? To answer these and other related questions, we have introduced this SOIL HEALTH page, which will be a regular feature in future editions of The Link. These articles will focus on strategies for optimising soil health and productivity.

Worn-out soils

A symptom of bad and greedy land use

When American author and conservationist Louis Bromfield took ownership of Malabar Farm in Ohio in 1948, he described the soil as "*...a mixture of cement and gravel with traces of acid*". Disturbingly, this description applies all too often to soils in the higher rainfall areas of South Africa. Acidity problems abound, compaction limits root development, surface crusting restricts the infiltration of water and air, and many soils appear to be largely sterile, with little evidence of earthworms or other beneficial organisms. These conditions inevitably result in poor yields, low returns on investments and thereby the increased economic vulnerability of farming operations.

What are healthy soils?

Important characteristics of healthy soils include the following:

- Healthy soils allow for the production of high-yielding, healthy crops.
- Healthy soils do not require excessive amounts of fertiliser for optimum yields.

- Healthy soils are not compacted, but tend to have a loose consistency and are well-aerated.
- Healthy soils permit rapid infiltration of water, and store favourable amounts of water for crop growth.
- Soil organisms (earthworms, fungi, bacteria, etc.) abound in healthy soils, resulting in a rapid 'turn-over' of organic matter and the release of nutrients.
- Healthy soils are not contaminated by high loads of chemicals (e.g. pesticides, excess nitrates or phosphates), and do not 'leak' chemicals to underground or surface waters.

Research findings

Worldwide, soil health has been the subject of much research during the past few decades, with scientists making considerable progress in measuring indicators of soil health, as well as in identifying farm management practices which are beneficial or harmful to the health of soils. This research has, for example, identified the value of crop rotations, of managing soil acidity through the judicious use of lime and gypsum, of keeping the soil surface covered with residue (trash) at all times, and of incorporating manures and other organic products wherever possible. On the other hand, it has also highlighted the harm that can be caused to soil health by in-field traffic (machine or animal - particularly when soils are wet), excessive tillage, inappropriate soil fertility management practices and the use of poor-quality irrigation water.

Organic matter management

Interestingly, any discussion on soil health inevitably returns to the huge importance of organic matter. Scientific research repeatedly concludes: *organic matter is at the heart of soil health.* Additions of organic materials such as green manures, animal manures, compost, and filtercake from sugar mills, are enormously beneficial to soils, as are management practices that conserve or build soil organic matter levels, such as no-till cropping or pasture rotations. Organic matter performs a host of beneficial functions in soils: it supplies nutrients for crop growth and acts as a source of food for soil organisms; it improves water infiltration from rainfall and irrigation, and enables soils to 'hold' greater amounts of water; it improves nutrient retention; it reduces the density of soils, allowing roots to grow and penetrate to greater depths. A focus on practices that promote good soil organic matter management is thus the very foundation for a more sustainable and thriving agriculture.

In the next edition of The Link, we will look in more detail at the biological, chemical and physical aspects of soil health.

Updated MECHANISATION REPORTS

SASRI's Mechanisation Reports are designed to assist farmers establish the total cost of operating individual machines or complete machinery systems. These reports are updated with the latest costs on an annual basis.

This year, an additional feature has been added to the reports. This takes the form of a list of up-to-date website addresses for companies that supply products commonly used in the industry (such as tractors, harvesters, cane handling equipment and implements). The list has been compiled from historic and current supplier lists, and from the list of companies that assist with costing information for the SASRI Mechanisation Reports.

The intent is for interested parties to source specific technical information regarding products, pricing and availability directly from the local suppliers. The Mechanisation Reports can be accessed from the SASRI website at www.sugar.org.za/sasri . Select "Publications" from the menu on the left.

Suppliers of products that wish to be added to the list are requested to please email SASRI's Agricultural Research Engineer, Peter Tweddle: peter.tweddle@sugar.org.za .

Getting to know your EXTENSION SPECIALISTS

SASRI Extension Specialists live and work in the region they service, and they should be your first port of call should you need to contact SASRI.

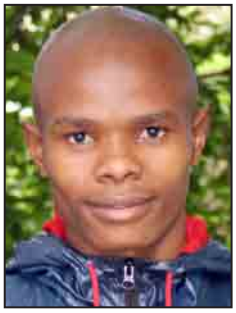
Recent Appointments in Extension

Paul Botha joined SASRI as Extension Specialist in the Midlands South area in January 2013. Paul previously worked for the Department of Agriculture, Environmental Affairs & Rural Development by where he occupied various positions since 1979, and finished there as Senior Industrial Technician. Paul has a National Agricultural Diploma from Pretoria Technikon and has extensive knowledge of the legislation impacting on agriculture and of the Midlands region.

Patrick Ngcobo joined SASRI in February 2013 as Extension Technician in the Durban North Coast Region. Patrick has a National Diploma in Agriculture from Mangosuthu University of Technology and has worked at Umhlathuze Valley Sugar Company Limited, Umfolozi Sugar Mill and Sunshine Seedling Services gaining a wide range of experience in the sugar industry.

Sifiso Hlela, took up the position of Extension Technician in Pongola in May 2013. Sifiso has a National Diploma in Horticulture from UNISA and has been in the position of Agricultural Liaison Officer at SASRI since September 2010. Prior to that, Sifiso was employed at SASRI as a Weed Specialist Technician.


Paul Botha


Patrick Ngcobo


Sifiso Hlela

Area	Extension Specialist	Admin	Telephone
Mount Edgecombe	Geoff Maher (Manager)	Shirley Brink	031 5087490
	Bongi Bhengu		
Lower South Coast	Justin Bowley	Brenda Vermaak	039 6821822
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	Joe Nkala (EG/SSG)		
Midlands South	Paul Botha	Jane Gurney	031 7812000/1
	William Gillespie (SSG)		031 3022847
Midlands North	David Wilkinson	Joleen Torlage (PVT)	033 5031818
Midlands North UCL	Bruno Eggers (PVT)		033 5011600
North Coast	Adrean Naude	Rosemary Klusener	032 9471410
	Nathi Hlongwa (EG)		
	Patrick Ngcobo (SSG)		
Zululand South	Gary Lagerwall	Helen Warren	035 3371593
Zululand North	Tom Fortmann	Michelle Pretorius	035 7725871
	Thulani Masondo (EG)		
	John Neen (SSG)		035 4745217
Umfolozi	Alexander Searle	Stacey Hartley	035 5500097
Pongola	Marius Adendorff	Elbie Venter (PVT)	034 413 2120
	Sifiso Hlela (SSG)		
Malelane / Komati TSB	Pieter Cronje (PVT)		013 7911121/7911469

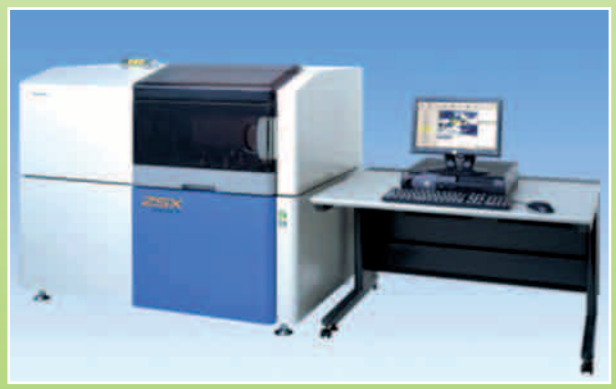
Note: EG = Emerging Grower, SSG Small Scale Grower, PVT = Private, not employed by SASRI

Leaf Analysis

Leaf analysis is of considerable value in the management of the nutrition of the sugarcane crop. It supplements soil test data, and is particularly useful for N and micronutrients: for N since a soil N test is not available, and for micronutrients since some uncertainty surrounds their soil threshold levels for crop growth. If carried out timeously, leaf analysis permits the application of supplementary fertilisers before yields are adversely affected by deficiencies or imbalances. In terms of N, there is convincing evidence that yield losses due to deficiencies of this nutrient are substantial, and using leaf analysis for optimising supplies of N for crop growth has great potential for improving profitability.

State-of-the-art instrumentation for FAS

For leaf analyses to be of value to growers, it is clearly important that analyses are undertaken speedily, and that analytical results include as many of the nutrients essential for crop growth as possible. To achieve these goals, FAS has long made use of X-ray fluorescence spectroscopy. A particular advantage of this instrumentation is that it enables the simultaneous measurement of silicon and micronutrients along with macronutrients such as P, K and S. The current X-ray instrument in FAS now quite 15 years old and will shortly be replaced with a modern Rigaku X-ray spectrometer at a cost of about R2 million. The new instrument, to be delivered and commissioned in October, will enable the analysis of a greater range of nutrients in leaf samples, with minimal turn-around time. Growers are encouraged to make use of this development by submitting leaf samples on a field-by-field basis during the coming summer months.



by **Keith Collings** *(Resource Manager: Diagnostic and Analytical Resource Unit)* & **Neil Miles** *(Senior Soil Scientist)*

Spray on PROFITS

> Research in several major crop plants is showing that some of the new chemicals being used against pests and diseases bring several other benefits in addition to being successful against their intended targets.

Strobilurin fungicides

Strobilurin fungicides are derived from a natural antifungal substance, and are apparently not only successful in controlling harmful fungi, but also increase resistance to stress. Crops treated with strobilurins yielded considerably more than untreated ones, especially when there was a shortage of water.

Treated crops have been shown to be able to utilise nitrogen especially well, even when there are reduced levels in the soil. The increased nitrogen assimilation leads to an inhibition of any 'emergency' ripening during stress, thereby allowing the plant to accelerate recovery growth when the stress level is reduced. It also allows for improved root growth which further increases the capture of nitrogen from the soil, as well as improving access to soil moisture.

New pesticides

Neonicotinoids, which are the newest of the three major classes of insecticides, are among the most effective insecticides for the control of sucking insect pests such as aphids, leaf- and planthoppers and thrips. Like strobilurin fungicides, they have been reported to enhance plant vigour and stress tolerance, independent of their insecticidal function. They do this by stimulating a plant hormone known for its role in plant defence against pathogens such as rust and smut; and which can also modulate abiotic stress responses especially to heat, which commonly accompanies drought.

Combined modes of action

Strobilurins are typically combined with another class of fungicide, the triazoles, which have a different mode of fungicidal activity. However, triazole-based fungicides also induce changes in the hormonal balance in plants, elevating resistance to insects and drought, which could act synergistically with the changes induced by strobilurins and neonic-

otinoids, allowing plants to tolerate a broad range of environmental stresses.

Triazole fungicides have been shown to inhibit the detoxification of insecticides by pests, thereby increasing insecticidal efficacy. Similarly in the case of pathogens, the direct effects of strobilurins and triazoles probably synergise with the indirect effects of strobilurins and neonicotinoids, in priming the plant for enhanced pathogen resistance when attacked.

Benefits observed in sugarcane

While these beneficial effects have been seen on other crops, most notably, wheat, maize and cotton, incidental observations suggest that they also occur in sugarcane. In a trial testing imidacloprid (neonicotinoid) for thrips control, a significant reduction in rust infection was observed. In another trial, which combined imidacloprid with a strobilurin/triazole, both thrips numbers and rust infection were reduced to levels below those of insecticide and fungicide treatments alone.

The results suggest that the neonicotinoid and strobilurin/triazole chemistries currently registered for use in sugarcane could be highly beneficial, especially if the crop becomes stressed.

It is not yet known whether varietal differences in response occur in sugarcane. Nevertheless, varieties that may particularly benefit from a combined treatment include N27, N31 and N41, since these are of intermediate resistance to brown rust and have been noted to harbour higher than average thrips numbers during summer. Other rust intermediate varieties could also benefit (N16, N35, N37, N39, N50 and N51).

The way forward

Whilst there is no substitute for the scientifically rigorous trials that SASRI conducts in investigating variety and treatment combinations across stress environments, the potential for increasing profits through the use of these registered chemistries already exists. On-farm observation trials planned with the assistance of your Extension Specialist and with the input of SASRI specialists can go a long way towards demonstrating the profitability of any new practice under local conditions.

Stuart Rutherford
(Crop Proctection Programme Manager)

Results from trials conducted under varying levels of drought stress.

Drought stress level observed	Chemistry applied	Untreated yield tc/ha	Treated yield tc/ha	% yield increase	Value of increased tonnage (R/ha)[a]	Cost of product + application (R/ha)[b]	Additional Profit (R/ha)
severe	strobilurin/triazole [c]	10	20	100	3816	1348	2468
very high	neonicotinoid [d]	27	35	30	3026	430	2596
high	neonicotinoid	39	43	11	1526	430	1096
low	strobilurin/triazole	94	102	9	2549	1348	1201

[a] Based on the 2013/14 Canegrowers estimate of R3180 per ton RV which at 12% RV would amount to R381.60 per ton cane. [b] Knapsack; 1 man-day/ha @ R150/day plus cost of product. [c]Fungicide 1.6L/ha, 2 applications to canopy, 28 days apart, product cost = R1048/ha. [d]Insecticide 2L/ha, one application, product cost = R280.

Weather

Phillemon Sithole *(Agrometeorologist)* & **Abraham Singels** *(Principal Agronomist)*

Review

The industry had good rainfall in April and May with the exception of the Zululand region where rainfall was considerably below average over the entire review period. June and July rainfall was mostly below average, except in the North Coast and Midlands regions where June rainfall was above average (Fig. 1). Despite the erratic rainfall (especially June to July), crop status generally remained good across the industry due to the low atmospheric evaporative demand over this period. High cane yields and reasonable quality are therefore still anticipated in most areas.

Winter temperatures were generally mild, with July recording considerably above average minimum temperature across the industry. However, June minimum temperature was below average for Mpumalanga.

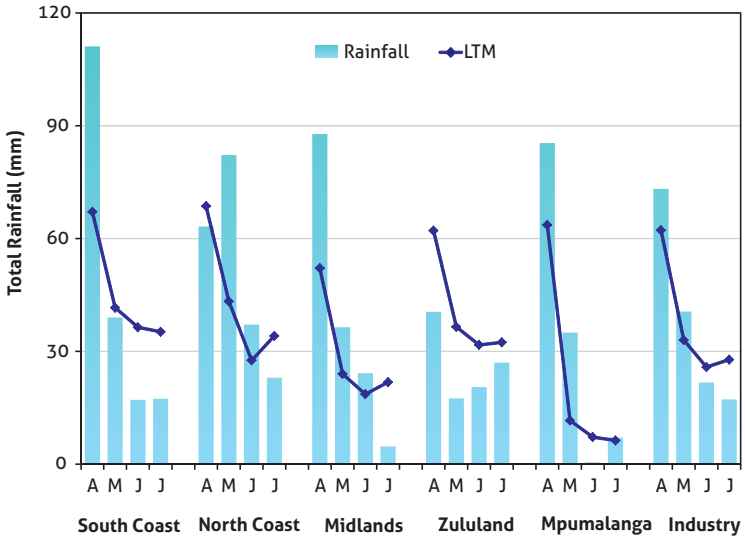


Figure 1: Regional and industry average monthly total rainfall and the monthly long term means (LTM) for April to July, 2013.

Outlook

The ENSO phenomenon is currently in the neutral phase and is projected to stay in this phase throughout the 2013/14 summer season. The South African Weather Service (SAWS) predicts average to below average spring rainfall (September to November) for most of Kwazulu-Natal (KZN) and average to above average for northern KZN and Mpumalanga. There are indications from SAWS that mid-summer rainfall could be above-average. The European Center for Medium-Range Weather Forecasts and the International Research Institute for Climate Society both predict near normal rainfall for this period across the industry. Temperatures are expected to be above average.

Please visit the SASRI weather web http://portal.sasa.org.za/weatherweb/ for links to up-to- date seasonal climate forecasts and also for the latest rainfall and other weather data.

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