January 2025

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Director’s Message

Dr Shadrack Moephuli *(Director)*

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Director’s Message

Greetings to all our growers, millers and readers of this edition of *The Link* at the start of the New Year, 2025. As many of you know, our summer period coincides, in many instances, with heavy rainfall and hot temperatures. During the current season, many sugarcane growing areas of South Africa have experienced both hot, dry temperatures in November/December and very wet, warm conditions in late December to mid-January. Climate variations have both short-term and long-term implications for sugarcane farming. In the long-term, climate variations, often accompanied by shifting patterns of rainfall and heat, are likely to impact the selection of varieties suitable for growth in different areas. Such varieties need to be resilient to various stress conditions to ensure production and productivity, particularly as this influences sugar content in the crop.

'Abiotic stress' refers to various physiological stresses that subject plants to environmental conditions that limit plant growth, development, reproduction, and crop productivity. Like any plant, sugarcane is subject to abiotic stress and responds accordingly where possible. The sugarcane crop requires a relatively high water supply and moderate temperatures for productive growth. In the event of abiotic stress, growers will notice crops with lower growth and increased susceptibility to diseases, resulting in reduced sugar content. Accordingly, it's important to ensure growers utilise varieties that are efficient and effective in their interaction with the target production environment. A good understanding of the potential to respond to prevailing growth-limiting conditions is essential for commercial growers to cultivate varieties with acceptable yields under stress conditions. Crop nutrient availability, particularly soil health, mitigates abiotic stress impacts to growth.

Although there are multiple conditions for stress in sugarcane growth and productivity, in this edition we focus on diseases and heat. Diseases such as ratoon stunt (RSD) present limitations to growth and productivity of sugarcane under various environmental conditions. Growers are encouraged to obtain insights presented by SASRI researchers on RSD, and adopt effective control measures to improve the productivity of their crops.

As indicated earlier, climate impacts experienced through heat elicit plant growth adaptation responses. Often, high temperature conditions are linked with water-deficit environments. Thus, an understanding of the soil-plant-atmosphere-continuum is essential to understand adaptation to heat stress. Growers need to cultivate varieties that are most suitable for growing optimally under heat stress to mitigate productivity losses. In this edition, researchers at SASRI present insights on the impact of heat stress on sugarcane growth and productivity.

100 years of growing sugarcane and research

This year marks a period of 100 years of research and development on sugarcane at SASRI. The establishment of the sugar experiment station a century ago was crucial for the growth and development of the sugar industry. This year, 2025, SASRI celebrates the development of innovations, technologies and other scientific solutions that have sustained the growth and competitiveness of the sugar industry since it was established.

During this period, growers were provided with varieties that enabled the resilience of the sugarcane crop under various conditions such as disease infestation, pests, heat-stress, drought, frost and floods, among others. In many instances solutions were the result of investments and active scientific inquiry, through research collaboration conducted by the SASRI. For example, many sugarcane varieties that sustain our growers were released for cultivation under targeted growing conditions for optimal productivity. Technologies such as DNA fingerprinting, soil analysis, sugar content analysis, plant breeding by genotyping, genomics, phenomics, crop ripening, digital (smart) agriculture and use of drones were introduced in the South African sugarcane growing areas. Throughout the century, growers were provided with the technologies, data, information and various decision support tools to enable optimal and sustainable sugarcane farming.

We have declared 2025 the centenary year of the South African Sugarcane Research Institute. Through this declaration we recognise the achievements, challenges and contributions of research and development in sugarcane over the years and into the future. We therefore invite all interested stakeholders to celebrate with the SASRI in various ways.

The Link is a short newsletter that provides advice on key aspects for sustainable sugarcane production and productivity. We hope you will gain insights from these articles, gather additional information, especially from the experts at SASRI, and apply such knowledge in your farming practices. We hope you enjoy reading these articles.

Topical Tips

Ruth Rhodes (Extension Specialist, Zululand South) and Jan Erasmus (Extension Specialist, Malelane)

Topical Tips

Welcome back to a busy new year! No doubt, weeds and disease roguing are foremost on many growers' minds. With a large portion of the industry having received lower-than-average rainfall in November, and extended periods of high temperatures in December, heat stress may also be a concern for some. Below are a few things to remember during January and February.

Planning for the year ahead

- Programme planning is essential for efficient farming. Start planning now well before the new season begins. Prepare your harvesting and replant programmes.
- Ask your Extension Specialist for a blank programme planner, where you can fill in your annual field programme and have this displayed on your office wall.
- Keep your re-establishment programme in mind. Confirm that your seedcane requirements can be met and fields are being fallowed already, to ensure a clean replant field.
- Be sure to take full advantage of the courses offered by the Shukela Training Centre. Trained staff are more effective and efficient.

Heat stress

- Hot, dry weather raises concerns about heat stress.
- Avoid planting on excessively hot days, or applying herbicides when chemicals may be vapourised.
- Read the artilce "*Heat stess in sugarcane*" in this edition to find out more.

Pests & Diseases: Scouting and Roguing

- Although P&D teams will be inspecting your farms regularly, you don't need to wait for them. Do your own pest or disease surveys. The best time is when your cane is at shoulder height. Your local P&D officer or technician will be able to provide guidance on how to conduct various surveys.
- **Yellow sugarcane aphid (YSA).** There was an explosion in the levels of YSA in some areas along the coast, and in irrigated areas in February 2024.
- There has been a lot of smut around. When staff are doing follow-up hand weeding, remember to rogue out any smut-infected stools that may have been missed the first time around. Smut whips first need to be cut off and then burnt or buried to prevent further spread of spores. Consider chemical roguing to save time and labour requirements.
- **Eldana** In February, start inspecting your carryover fields to see which are worst affected, and should therefore be harvested first at the start of the season.

Crop nutrition

- Soil samples can be taken at any time of year. Sample plough-out fields early so that fertiliser, lime and gypsum can be ordered in good time.
- Leaf samples are particularly useful to diagnose problems, for example if you have uneven growth or poor patches in your field. Take leaf samples at 4-7 months of age if growing conditions have been favourable. See Information sheet 7.15 in the Soils & Nutrition series for further info on leaf sampling.

Weed control

- In dryland areas in particular, January is one of the best months for crop growth. Make sure that the advantages are not lost due to weed competition.
- Spray field edges and verges to control creeping grass infiltration.

Ripening

- Consider chemical ripeners for fields to be harvested first in the season. Contact your

Heat stress in sugarcane

Jan Erasmus (Extension Specialist, Malelane), Ruth Rhodes (Extension Specialist, Zululand South) and Riekert Van Heerden (Research Manager)

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Heat stress in sugarcane

This summer, several areas in the industry have reported periods of hotter than normal conditions. Growers may be wondering whether heat waves can cause irreversible damage to sugarcane.

Summary

• As a perennial tropical grass, it is unlikely that high temperatures alone will cause irreparable harm to the sugarcane plant.

• Often, the danger is where high temperatures coincide with limited water availability. The resultant stress can increase eldana numbers and trigger other pests and diseases.

• Heat stress can cause reduced growth and dry matter production resulting in shorter plants, higher fibre and lower sucrose.

Sugarcane's response to heat

The base temperatures for optimal sugarcane growth are regarded as 30-35ºC. During prolonged hot and dry conditions, leaves wilt and curl in, and the drying out of the soil can be seen, but what else is happening inside the plant during these abrupt and severe temperature events?

Sugarcane is well-adapted to warm climates, but like any crop, it has its limits. When temperatures exceed the upper limit of heat tolerance in a variety during prolonged heatwaves (temperatures beyond 40ºC), the plant's physiological processes begin to falter.

Excessive heat causes the tiny pores (stomata) on the leaves to close, in order to conserve water. This limits the uptake of carbon dioxide, which is essential for photosynthesis, and this ultimately hampers growth. While stomatal closure conserves water, it also reduces the transpiration rate. Transpiration serves multiple purposes, including evaporative cooling of the leaf canopy and facilitating nutrient uptake by the roots. When transpiration is reduced, the plant's ability to cool itself diminishes, leading to increased leaf temperatures and further stress on plant tissues.

Additionally, heat stress leads to an increased respiration rate. While respiration is vital for energy production (stored energy is converted to active energy), excessive respiration under

heat stress depletes the plant's energy reserves, leaving little for growth or sucrose storage in the stalk. Other biochemical reactions in the plant cells due to oxidative stress can also damage the cells, worsening the physiological functioning of the plant.

Heat stress can significantly impair the physiological functioning of a sugarcane plant, leading to reduced growth and dry matter production. So, in short, hot temperatures can lead to shorter plants, higher fibre and lower sucrose.

As a perennial tropical grass, it is unlikely that high temperatures alone will cause irreparable harm to the sugarcane plant. The biggest danger is often when high temperatures coincide with limited water availability.

Heat and moisture stress

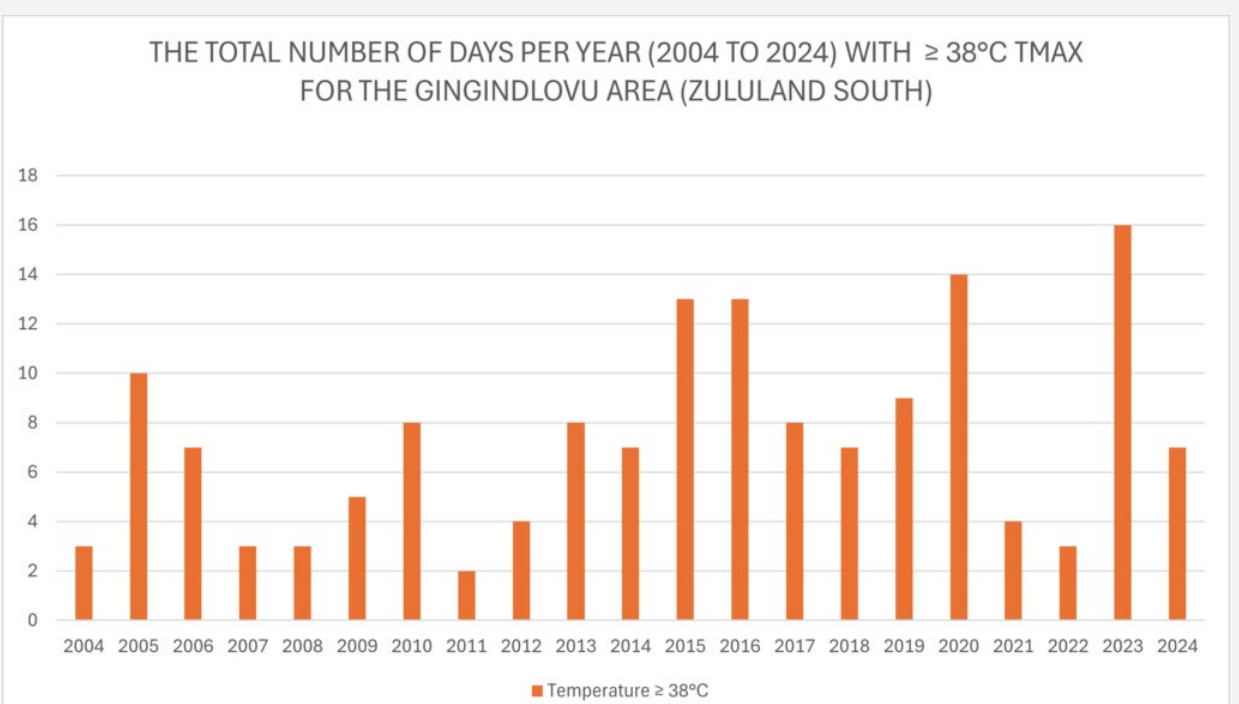
Despite the plant's reduced transpiration rate, heat stress may still lead to a net water loss, as the plant struggles to absorb enough moisture from the soil to keep up with transpiration needs. Additionally, soil moisture levels can fall below the requirements necessary for vigorous growth due to both meteorological and agricultural reasons. This is especially concerning in shallow, dry, rocky soils in rainfed regions. Even in irrigated fields, for example, a sub-surface irrigation system may only induce the plant to develop a superficial root system, which could prove insufficient to meet the plant's water balance needs under heatwave conditions. Irrigation becomes less effective under extreme heat conditions and water scarcity could be another consequence of rising average temperatures, which further aggravates the situation.

Severe water limitations affect growth and therefore yield. Eldana numbers often increase in stressed cane, and the biochemical reactions alluded to above could also be a trigger for infection by other insect pests and diseases. Heat stress, compounded by erratic rainfall patterns, can lead to lower yields and increased production costs.

Points to consider

To combat the effects of heat stress, our industry must proactively consider:

- Research and development into heat-tolerant sugarcane varieties. It must be noted though that the plant breeding and selection process does take place under a range of climatic conditions (i.e. also heat wave episodes and limited water availability), which results in the natural selection of more heat-tolerant varieties.
- The development of irrigation systems and techniques to assist evaporative cooling of plants.
- The adoption of sustainable agroecological practices, such as mulching and intercropping, that can help maintain soil moisture and reduce surface temperatures.
- Planting dates that take severe heatwave predictions into consideration.
- Concerted efforts to reduce cut to crush delays. High ambient temperatures will hasten the post-harvest degradation of cut cane. See Information Sheet 4.5.
- Analysis of historical cane delivery and weather data to establish the economic impacts of heat stress on the sugarcane crop. A cursory look at data from SASRI WeatherWeb suggests that there has been an increase in the number of days with high temperatures (≥38ºC) over the past 20 years. See graphs for two areas in the sugar industry below.



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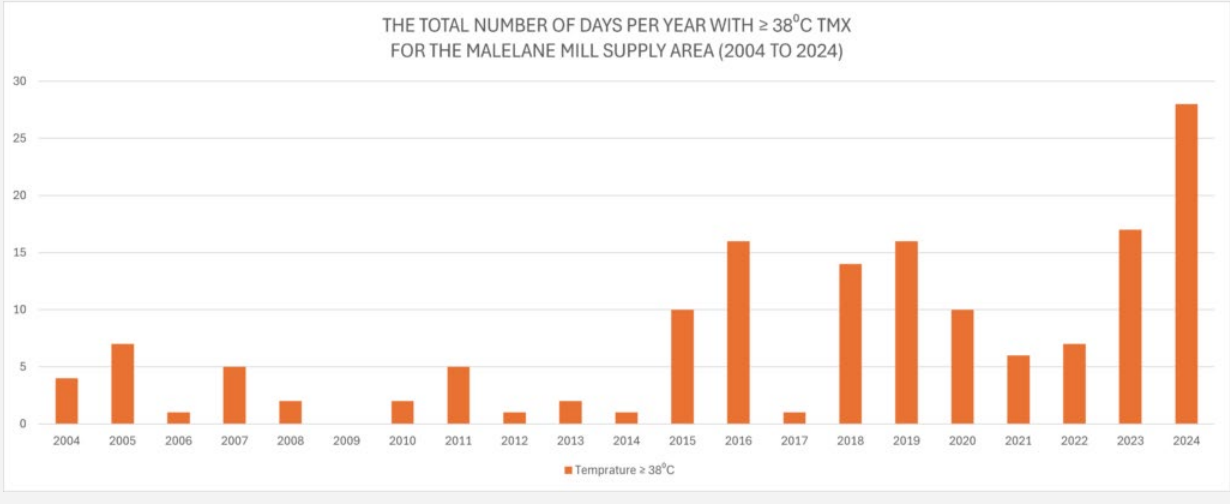
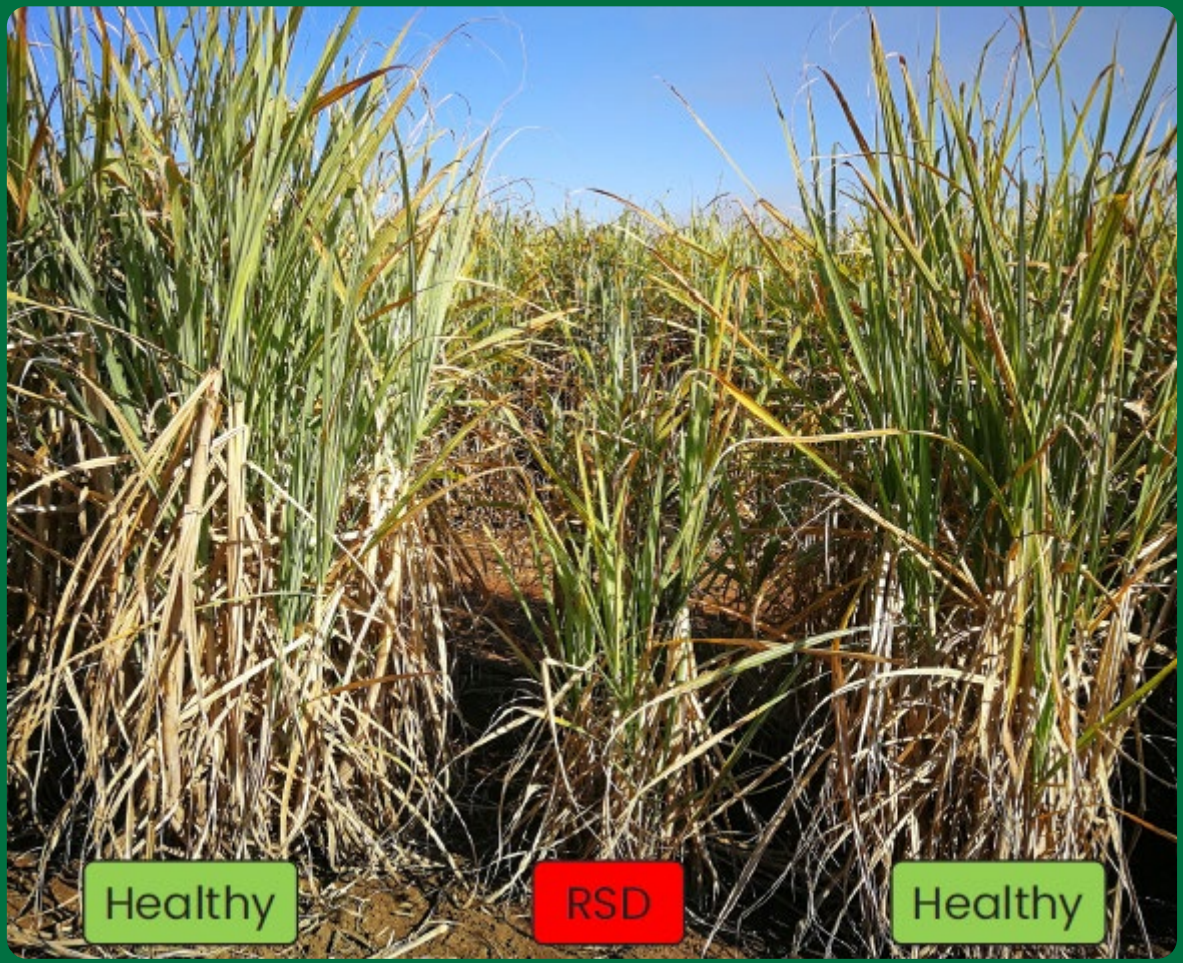

THE TOTAL NUMBER OF DAYS PER YEAR WITH ≥ 38°C TMX
FOR THE MALELANE MILL SUPPLY AREA (2004 TO 2024)
30
25
20
15
10
5
0
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
Temprature ≥ 38°C

Malelane



Managing Ratoon Stunt (RSD) in Sugarcane

Sharon McFarlane (Senior Plant Pathologist)

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Managing Ratoon Stunt (RSD) in Sugarcane

Some areas in the industry are reporting an increase in the number of fields testing positive for ratoon stunt, formerly known as ratoon stunting disease (RSD).

The disease, which can cause substantial yield losses, often goes unnoticed due to its lack of obvious external symptoms, leading to inadvertent spread via infected seedcane and on contaminated equipment during harvesting.

RSD is mainly spread by:

- planting infected seedcane,
- the survival of infected volunteers,
- the transmission of the RSD bacteria on contaminated equipment. This includes cane knives, mechanical harvesters and planters, and mowers and mulchers used to process droughted, frost damaged unmillable, or poor-quality cane.

Managing RSD

1. Use only certified or approved seedcane for planting. Do not use planting material from commercial fields.
2. Know the RSD status of your fields. Growers should suspect RSD in fields that do not yield as well as expected or that yield increasingly poorly as the disease spreads with each harvest operation. Ask the Biosecurity Inspectorate to take samples from these fields for testing.
3. If RSD is detected, the following steps can be taken to reduce the risk of spread to surrounding healthy fields:

- Disinfect cane knives when moving from one commercial field to another and at the end of each day. If contractors are responsible for harvesting your fields, ensure that the equipment used is disinfected when they move onto the farm. It is important to note the contact time of the disinfectant used. This affects the efficacy of the chemical. See Table below for disinfectants and contact times.
- When a field is eradicated in preparation for replant, ensure that the fallow period is sufficient to allow the effective removal of volunteers. Volunteers are an important source of RSD and newly planted fields will quickly become infected if they are not removed before planting. Commercial fields should be free of all cane regrowth for at least 3 months – this may take up to 9 months to achieve. Choose low-growing cover crops to allow for the easy identification and removal of volunteers. Tall crops, such as sunn hemp, should be avoided in previously infected fields as volunteers can be difficult to detect.
- Where possible, RSD-infected fields should be harvested after healthy fields.

Table 1: Disinfectants for use on farm implements

Disinfectant	Active ingredients	Concentration (%v/v)	Minimum contact time	Farm implements	Mechanical harvesters	Sett cutting machines
Jeyes Fluid	Carbolic acid	10	5 min	Yes	Not recommended	Yes
Quaternary ammonium compound	Benzalkonium chloride; didecyl dimethyl ammonium chloride	3	5 min	Yes	Yes	Yes
Methylated spirits	Methanol; ethanol; denaturant	75	10 secs	Yes	No	No

NovaCane®: so much more than pain-free seedcane!

Linda Mkhize ***(NovaCane® Supervisor)***

Published: 22nd January 2025

in 2005. NovaCane® are disease-free and true-to-type sugarcane plants that have been reproduced by means of tissue culture techniques in a laboratory. Tissue culture is a process whereby a whole plant can be produced from a small amount of leaf, stem or root from a parent plant on nutrient medium in a laboratory. The established protocol involves excision of small (0.5-2 mm) shoot tips and provides for the rapid multiplication of virus-free shoots. The shoot multiplication, followed by rooting can take 7-9 months. The plants are then transferred to seedling trays for 3-4 months of hardening-off. Various quality control techniques are used during the entire process e.g. DNA fingerprinting to confirm variety identity – see figure below.

The SASRI NovaCane® laboratory has limited production capacity, and the primary focus is on propagating newly gazetted N varieties to go to co-operators for field bulking. To address grower requests for NovaCane® plants for their own farms, SASRI has shared the technology with several commercial tissue culture laboratories. We supply certified starting material, perform fingerprinting and conduct regular audit-visits. Growers wanting to plant NovaCane® plantlets of released N varieties can contact their Extension Specialist for the details of the nearest commercial lab. Orders must be placed 12 months before the planting date. Please also refer to SASRI Information sheet 1.4.

Advantages of NovaCane® technology

- It enables large-scale production of NovaCane® plants for the release of new N varieties to the industry.
- Faster production of certified seedcane.
- It is used in the SASRI Quarantine facility to meet increasing import, and export requests and allows for safe movement of germplasm.
- It enables storage and conservation of N and imported varieties.
- Key for the multiplication of genetically modified (GM) varieties in the future.

The NovaCane® lab at SASRI which propagates newly released N varieties and provides variety starting material and support to several commercial tissue culture laboratories. The facility has produced close to 1.5 million plantlets since it was established in 2016.

Improving small-scale grower sustainability through soil management

Dr Thandile Mdlambuzi ***(Soil Scientist)***

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Improving small-scale grower sustainability through soil management

Small-Scale Grower (SSG) sustainability is essential to the sugar industry's success. To help SSGs produce high-quality sugarcane and achieve better yields, they need both skills and sound advice from Extension Specialists. However, a lack of soil information in SSG regions hinders effective decision-making and negatively affects productivity. To address this, SASRI has launched a project led by soil scientist Dr Thandile Mdlambuzi. The project focuses on using soil information to determine regional production potential and developing a starter soil database for long-term use.

To date, the project has covered many regions including Midlands North, Midlands South, Felixton, Pongola, and the North Coast. Various soil types have been identified, such as Sweetwater, Kranskop, and Nomanci in the Midlands, and Glenrosa, Oakleaf, and Hutton in other regions. While many of these soils have high potential, yields remain below capacity due to several challenges. These include the following:

- Bypassing important practices such as soil sampling and analysis, which leads to improper or missed fertiliser application.
- Many growers rely on older sugarcane varieties such as N12, N37, N55, which limits productivity compared to newer, high-yielding options.
- In some areas, nutrient deficiencies (particularly phosphorus) and issues like high acid saturation were found to be limiting factors for higher sugarcane yields.
- Growers also tend to prioritise herbicide use over fertilisers, further exacerbating soil fertility problems.
- There is limited access to seedcane of newer varieties.
- Stronger extension support is needed to bridge knowledge gaps.

To address these issues, several interventions have been implemented or recommended:

- Lime is being provided by the KwaZulu Natal Department of Agriculture in regions such as Midlands South to combat soil acidity.
- The promotion of newer, high-yielding sugarcane varieties to improve productivity has been recommended to SSGs for most of the regions already surveyed.
- Training and capacity-building initiatives for SSGs were highlighted as essential, particularly

focusing on the importance of soil sampling and analysis, soil management, and fertiliser use.

- SASRI projects are pivotal in supporting SSGs and extension specialists by improving soil and crop management practices, ultimately driving better yields and sustainable SSG sugarcane production.

The project is yet to cover the South Coast, Amatikulu and Mfolozi in KwaZulu Natal, and SSG areas in Malelane and Komatipoort (Mpumalanga).

Weather

Phillemon Sithole ***(Agrometeorologist)***

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Weather

Review

The onset of the summer rainfall season resulted in most parts of the industry receiving

significant rainfall from October to December 2024. The rainfed areas in KwaZulu-Natal recorded near normal rainfall in October and November while December rainfall was below normal except for Zululand where December rainfall was normal (Figure 1). The irrigated Mpumalanga region recorded below normal rainfall over the review period.

All the main irrigation water sources remained stable.

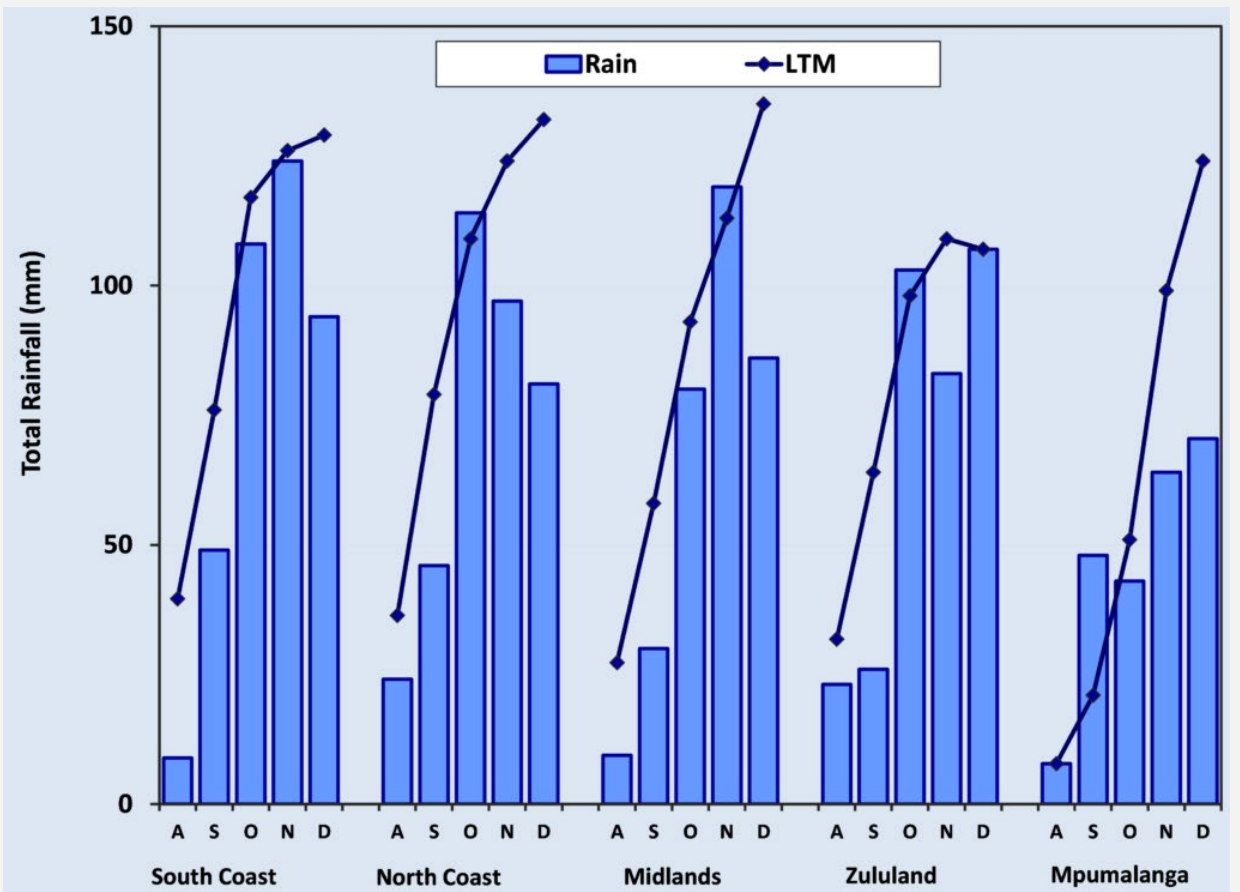

Figure 1: Regional average monthly total rainfall for August to December 2024 compared to the corresponding long-term means (LTM).

Outlook

The current weak La Niña conditions of the El Niño-Southern Oscillation are expected to continue through to the end of the 2024/25 summer season, with a likely transition to neutral conditions during autumn 2025.

The *South African Weather Services*, the *International Research Institute for Climate* and the *European Centre for Medium-Range Weather Forecasts* all predict normal rainfall in the eastern parts of the country for the remainder of the 2024/25 summer season.

Please visit the SASRI WeatherWeb for the latest industry weather reports and links to up-to-

date seasonal climate forecasts.