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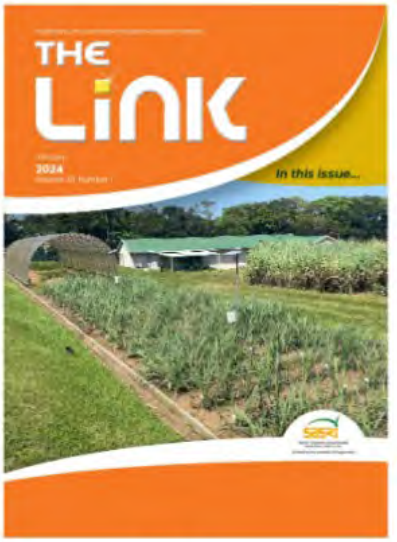

January 2024

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Director’s Message

Dr Terry Stanger

Published: 17th Jan 2024

The 2023 calendar year is now behind us, and the euphoria of winning the Rugby World Cup is a distant memory. In the context of some of the challenges that we have experienced in recent years, 2023 was a significant improvement, with a sense of some normality returning. I would like to commend SASRI staff on their continuing resilience, commitment, delivery and the progress made in various research projects during the difficult times that the industry has been experiencing.

Many climate experts are warning that this summer will be one of the hottest and driest on record, which could have a significant impact, particularly on the agriculture sector. Forecasts for the 2023/24 El Niño have been in place since the latter half of the southern hemisphere summer and northern hemisphere winter and, while uncertainties remain about the event's intensity, a substantial majority of forecast models are predicting an El Niño occurrence. SASRI will continue to provide updates to the industry as the predictions become firmer.

Engaging with and encouraging adoption of technology by small-scale growers is by no means unique to our industry. SASRI has been actively addressing this. During the second half of 2023, under the guidance of a consultant social scientist, empowering participatory research methodologies have been customised for engaging with small-scale sugarcane grower communities. The goal of the interactions is to provide growers with a safe space to express their views on their farming practices and preferences so that SASRI can better tailor technologies to the needs expressed directly by small-scale growers. A further important objective of the participatory research is to facilitate social learning and confidence building amongst peer farmers within the same community.

The final four of the first round of community engagements were recently completed (Pongola, Makhathini, Malelane, and Komatipoort), bringing the total number of engagements to eleven. The qualitative data collected during the eleven engagements are currently being analysed using a thematic analysis technique frequently used in social science research. The first of the eleven planned feedback sessions commenced in the Midlands during September 2023 and the consultant social scientist will continue to guide SASRI in devising the best approach for these knowledge exchange events with the small-scale grower communities.

Longhorn beetle.

Unfortunately, longhorn beetle larvae were discovered on one of the previously infested farms in Entumeni in August 2023. This occurred following a two-year period with no sightings of adult beetles, larvae, or any signs of damage to sugarcane within the containment area. Subsequent to the identification of longhorn beetle larvae in the fields, an extensive survey was conducted, covering 385 hectares on this and neighbouring farms. The survey revealed a total of four infested fields spanning an area of 12.5 hectares, all located on the same farm, and representing new fields not previously infested in 2016. As a result, eradication orders have

been issued in adherence to the regulations governing the control of longhorn beetle. More recently, the pest has also been found on farms in the Melmoth region, an area some considerable distance from Entumeni.

Important off-season operations

Rowan Stranack ***(Extension and Biorisk Manager)***

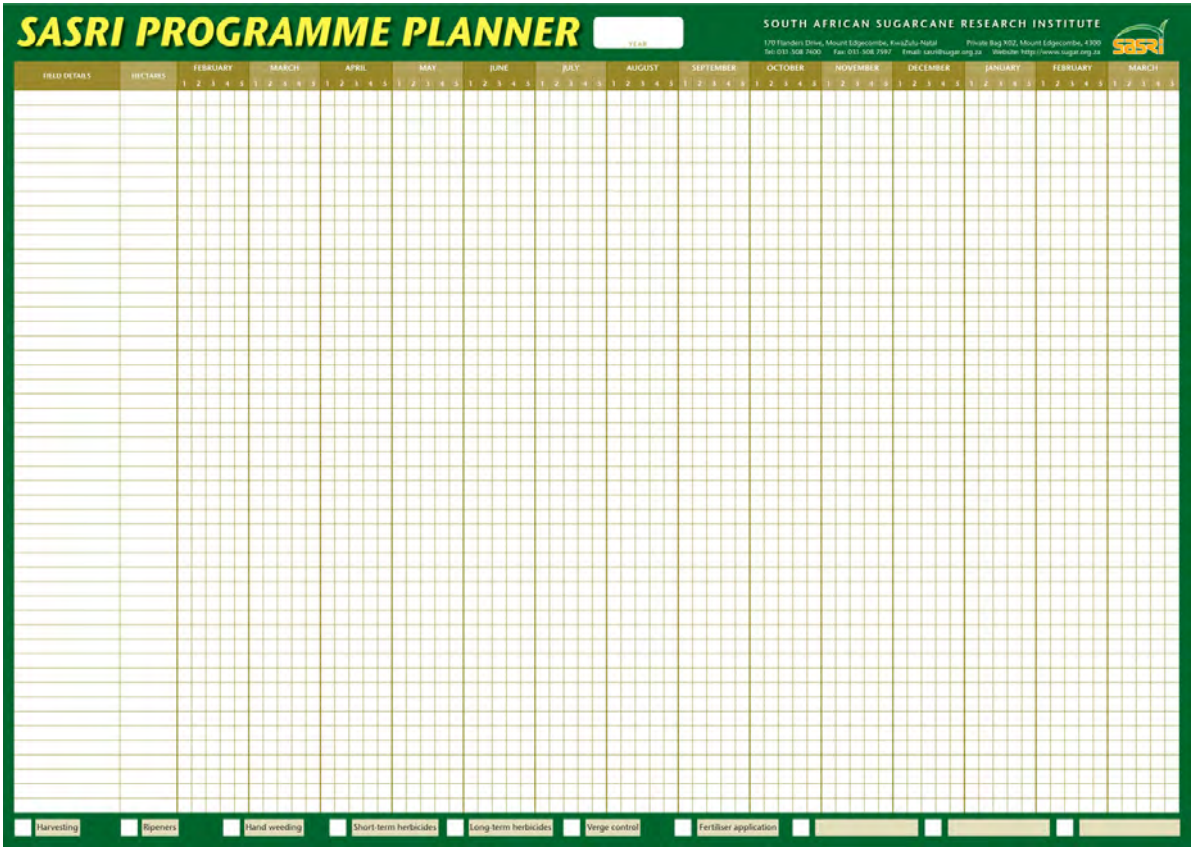
Published: 17th Jan 2024

Although regarded as the so-called ‘quiet time’ of the season, January – March is a period of maximum growth; it is therefore the time when maximum income is being generated. Growers with irrigation should be on full alert to ensure that the impact of loadshedding is minimised by attending to factors within your control (such as effective irrigation scheduling, weed control and regular equipment maintenance).

Planning your ripening, harvesting and replant programmes for the coming season should be finalised by now. However, if further information is required, visit the SASRI website to access the various yield benchmarking, crop estimating and weather-related decision support tools available. Or speak to your SASRI Extension Specialist.

If the RV price remains at current levels, it will profit growers greatly to attend to all issues of crop management such as irrigation scheduling, soil health, crop nutrition, weed control, seedcane, variety choice and pest and disease control. Also, make sure the right choices are made and that operations are carried out at the right time. Attention is necessary to all these aspects if top yields are to be achieved. Research has shown that yield benefits are compounded by systematically attending to and effectively managing each of the factors under your control.

Drawing up a programme plan of operations for all fields on the farm, is the next step once a harvesting and replant plan has been drawn up. When doing this, it is essential to visit each field and note all the necessary operations required to ensure that the field will produce maximum yield. SASRI has programme planning charts available at local extension offices which growers can use to plan all operations.



Regarding the ripening of cane, the PurEst® app has been put to extensive and good use since its introduction. Should rainfall be below long term mean in summer and autumn, the use of PurEst® is even more important for ripening decisions and choices around the relative maturity of fields. Consult your Extension Specialist for help with the use of PurEst®.

Consult your Biosecurity Officer and SASRI Extension Specialist to plan an optimum variety disposition for your farm. Match soils to varieties whilst considering the various agronomic factors and pest and disease risks.

The off-season is an opportunity to train staff without much disruption to important operations. Some courses that could be appropriate at this time are: disease, pest and variety identification, planting, Junior or Senior Supervisor, tractor care, basic workshop skills and welding. Cane cutter courses could also be scheduled for the start of the season. Contact the Shukela Training Centre on 031 – 508 7700 or your local SASRI extension office.

Innovative assessment of GM sugarcane for eldana resistance

Robyn Jacob

(Molecular Biologist)

Published: 17th Jan 2024

SASRI is pioneering a promising solution to tackle one of the industry's most persistent pest problems – the dreaded stalk borer, eldana. This solution involves genetically modified (GM) sugarcane engineered with CRY proteins, nature's own insecticides produced by soil-borne bacteria. This solution forms one arm of an integrated pest management approach.

Traditionally, SASRI has evaluated the resistance of these GM sugarcane varieties to eldana through pot trials, a process that demands mature stalks and extensive time. Unfortunately, this method proved impractical for assessing and comparing the resistance of engineered cane during the early stages of their development in the GM programme.

Enter the In Vitro Plantlet Bioassay (IVPB), a cutting-edge innovation developed by SASRI. This revolutionary approach allows the assessment of GM sugarcane resistance to eldana larvae without the lengthy wait.

Eldana larvae are carefully weighed and placed into sterile glass vials containing GM tissue culture (in vitro) plantlets.

After five days, larvae on resistant GM cane are either deceased, or have not gained in weight and the plantlets show little evidence of feeding.

Susceptible sugarcane is extensively damaged and the larvae thrive!

The five-day bioassay has resulted in the development of an eldana resistance rating scale that allows the ranking of GM cane according to their resistance to the pest. The assay considers plant damage as well as larval weight and mortality.

The result?

The IVPB is more than just a time-saver; it's a game-changer for SASRI's GM programme. Instead of the traditional two-year timeline for pot trial assessment, this new method cuts the time required down to less than six months.

This not only expedites the GM programme but also enables the early identification of superior GM plantlets, contributing to greater efficiency and improved resource utilisation.

Keeping your crop and soils healthy

Rowan Stranack ***(Extension and Biorisk Manager)***

Published: 17th Jan 2024

It is not too late to take leaf samples, provided the crop has not undergone any stress during the last two months and the cane is the correct age for sampling. The results from leaf samples can indicate changes which maybe necessary in the coming season's fertiliser programme.

Plan to sample soils as early as possible, so that lime application and the planting of green manure crops can be done timeously. Green manures for winter fallows also need to be planned. Although not a legume, oats are popular, and this crop can be especially useful in fields where creeping grasses are a problem.

High levels of soil acidity in the midlands and coastal hinterland regions, and the build-up of salinity/sodicity in the northern regions, can have a significant effect on cane yields if not properly addressed. If either of these problems is suspected, the only reliable way to confirm their presence is by taking both top and subsoil samples and sending these to SASRI's Fertiliser Advisory Service (FAS). Speak to your SASRI Extension Specialist.

The protection of wetlands and watercourses in the industry is now firmly under the spotlight. Well-protected watercourses and wetlands are essential to prevent excessive soil loss and to maximise water retention on your farm. Should signs of erosion appear in these areas ask your SASRI Extension Specialist for advice. Much work has been done in the past on ways to protect the banks of streams and how to encourage the rehabilitation of wetlands; there is therefore a wealth of information available. There are opportunities currently, with less pressure to expand area under cane, to withdraw cane from sensitive areas adjacent to wetlands and watercourses, thereby improving their stability.

The Sustainable Sugarcane Farm Management System (SUSFARMS®) is an excellent practical tool which can be used to gauge the level to which environmental better management practices have been implemented on your farm. Speak to your SASRI Extension Specialist for more details.

Longhorn Beetle Alert!

Published: 17th Jan 2024

After a two-year period with no sightings of Longhorn beetle within the containment area, larvae were unfortunately discovered in August 2023 on one of the previously infested farms in Entumeni.

Subsequently, the pest has also been found on farms in the Melmoth region. The latest findings have been in an area some considerable distance from Entumeni, and therefore all areas once again need to be extra vigilant, particularly those areas where cane is grown on a long cutting cycle and where cane is planted adjacent to or near timber plantations. The major threat would therefore be in the high-altitude areas.

Farm employees should be alerted to the pest. Cane cutters are best placed to find traces of the pest in the form of borings in the stools. Any strange or unusual damage or stress evident in the cane should be investigated and our Biosecurity Officers and Technicians called out to confirm the cause.

Adult male beetle.

Larvae in sugarcane stalk.

Larva in the base of a sugarcane stalk.

Managing Pests and Diseases

Rowan Stranack ***(Extension and Biorisk Manager)***

Published: 17th Jan 2024

Preserve your varieties: control Smut!

Smut continues to be problematic in some areas. In the irrigated north, the variety N41 remains under significant threat and there is a moratorium on planting this variety in the Pongola area. Less smut-susceptible varieties, such as N36 which is widely planted in the North, could come under threat if growers do not carry out regular roguing across all varieties and do not plant only Certified or Approved seedcane.

In the rainfed areas, some varieties are also under threat. Smut levels in N54 and N59 are becoming disturbingly high, and these varieties need special monitoring and roguing to make sure smut is controlled. These are both excellent varieties which are proving very popular. Do your utmost to help preserve them by regular roguing and limiting plantings (of any variety) to less than 20% of the area under cane on your farm.

When roguing diseased plants, make sure the entire stool is removed, including the roots, to prevent regrowth. Chemical roguing of smut, although requiring some training, is a better option. Speak to your SASRI Extension Specialist or your Biosecurity Officer.

Scout regularly for YSA

If the predicted dry summer materialises, outbreaks of yellow sugarcane aphid (YSA) are likely to occur in summer and autumn. Regular scouting will provide early warning of an outbreak and trigger treatment, if necessary. Spraying is proving successful where growers actively implement this approach. Often the pest reappears in the same spot each year and these areas should be checked

carefully. Spraying of

insecticides should be carefully considered, as the pest can be elusive and natural enemies are also often present to provide a measure of control. Ask your SASRI Extension Specialist or Biosecurity Officer for advice.

Prioritise eldana-infested fields for harvest

Whilst the previous season's large areas of unplanned carry-over cane have been alleviated somewhat in several mill areas, the threat of eldana remains, and growers should carry out scouting in the off-season to prioritise fields for harvest once the mills open. With heavily infested fields, a stool drench directly after harvest is an option to consider. This will help reduce the residual population present in the cane stools and buy time to implement an effective follow-up spray programme in those fields.

Control creeping grasses

Work hard at controlling creeping grasses. Repeated under-canopy applications of glyphosate, and verge control with imazypr (Arsenal) are essential to keep these grasses under control. It is a good idea to use flags in problem spots within fields to keep track of these areas as the cane matures. Large areas where grasses have taken over will require re-establishment. It is important to target the source of creeping grass problems. Verges and small patches of grass inside fields MUST be

treated with herbicide. Hand-hoeing is not recommended as it is not effective and could encourage the spread of these grasses. Loaders can also spread creeping grasses. Make operators aware of this and take extra care in fields where grasses are a problem.

Rapid adaptation to climate change through mutation breeding

Dr Stuart Rutherford

(Principal Scientist: Integrated Pest Management)

Dr Sandy Snyman

(Principal Scientist: Biotechnology)

Published: 17th Jan 2024

SASRI scientists are preparing for a hotter and drier world by using specialised breeding techniques in the laboratory to create sugarcane that will respond differently to environmental stresses, such as drought and heat, as well as tolerance to aluminium and salt.

The technique, called mutation breeding, uses physical or chemical agents to purposefully create changes in the DNA of plants without introducing foreign genes. Mutation breeding is not new: more than 3 200 mutant cultivars – including numerous crops, ornamentals, and trees – have officially been released for commercial use in more than 210 plant species from over 70 countries.

Ionising radiation is the most common agent used, whilst other chemical agents such as Ethyl methanesulfonate (EMS) have also been successfully used. SASRI's herbicide tolerant N12 Zapyr sugarcane variety was produced using EMS.

By using various agents, scientists can either create changes in gene DNA sequences that can be beneficial, or create changes in the way genes are expressed (without changing the DNA sequence). Both forms of mutation result in altering the way plants respond to environmental stresses, such as drought and heat.

Some of the benefits of using mutation breeding for crop improvement include refining the resilience of plants without introducing foreign genes; reducing the time and cost of developing new cultivars compared with conventional breeding or genetic engineering; and improving an otherwise elite cultivar for a desired trait.

Application of this technique at SASRI

In the laboratory, sugarcane cells are exposed to both a chemical mutagen and heat and water stress to generate mutant plant lines. These are then hardened off in the glasshouse and further rounds of selections are carried out.

Plantlets that performed well during glasshouse testing are currently being evaluated under more natural conditions in an outdoor rain-shelter trial. As a final

step, the best performing plantlets will be taken to the field to establish equivalence with the parent variety.

Weather

Phillemon Sithole

(Agrometeorologist)

Published: 17th Jan 2024

Review

Industry average rainfall for the review period (August to December 2023) was above normal despite heightened fears of a dry summer due to the existing El Niño conditions as reported in the September 2023 issue of *The Link*. While below average rainfall was recorded for August, September and November in the rainfed areas of KwaZulu-Natal (Fig 1), well above normal rainfall in October and December ensured that overall crop status remained good. In the northern irrigated areas, rainfall was also generally good and irrigation water supplies adequate. As reported previously, load shedding remains a threat in the irrigated areas.

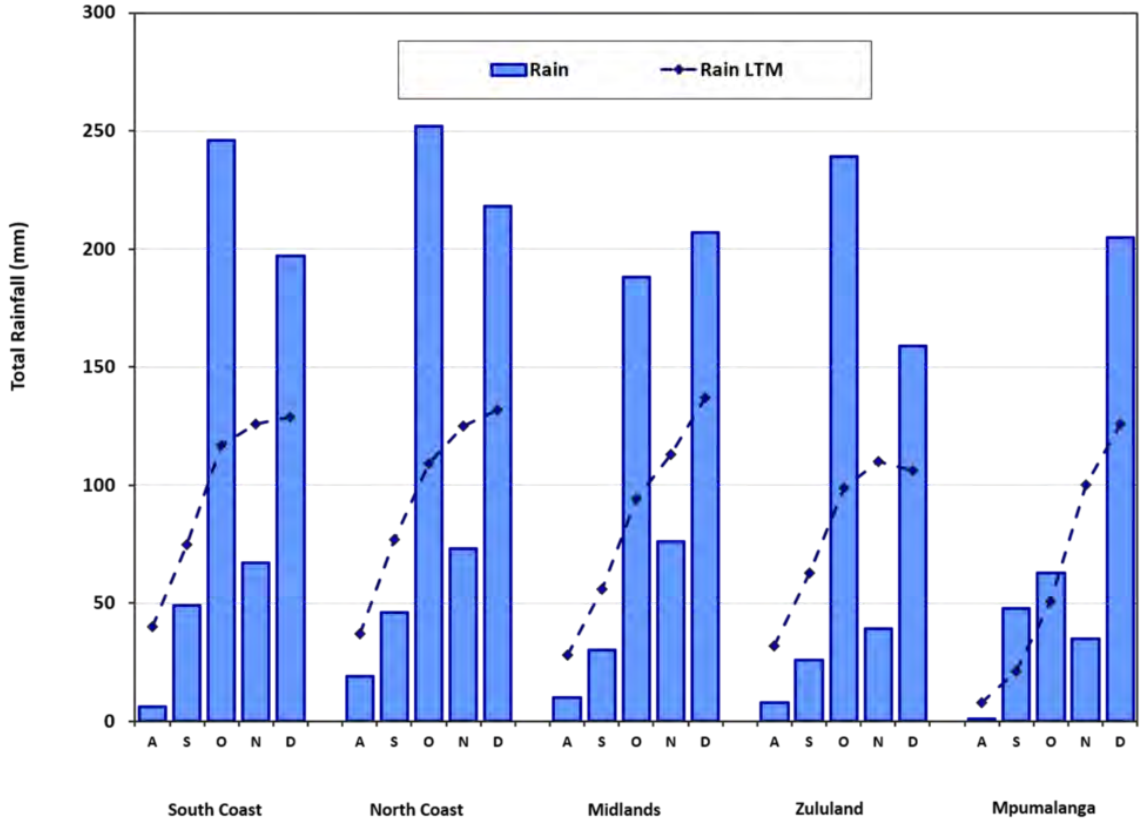


Figure 1: Regional average monthly total rainfall for August to December 2023 compared to the monthly long-term means (LTM).

Outlook

The El Niño-Southern Oscillation (ENSO) conditions remain in a strong El Niño state, which is expected to persist through the remainder of the 2023/24 summer and autumn 2024. There is uncertainty over the impact of this on the typically anticipated drier conditions over the eastern parts of the country covering the sugarcane growing regions. Due to this uncertainty, strategies that promote soil water conservation continue to be advised.

The *South African Weather Service* and the *International Research Institute for Climate and Society* predict near to above-normal rainfall for the late summer to early autumn months (February to April 2024) for most of the industry, while and the *European Centre for Medium-Range Weather Forecast* predicts slightly below normal rainfall. Above average minimum and maximum temperatures are expected.

Please visit the SASRI WeatherWeb *for the latest industry weather reports and links to up-to-date seasonal climate forecasts.*