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Reducing the spread of RSD

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Nutrition and cane quality
Growers are encouraged to adopt crop nutrition and soil health management practices that optimise sucrose yield. ***(page 8).***

Controlling weed spread
An integrated weed management strategy detailed on ***page 20*** will allow growers to minimise the spread of giant *Panicum maximum.*

Reducing salinisation
Guidelines for improved diagnosis and management of salinity in the irrigated regions of the sugar industry. ***(page 14).***

SASRI
SOUTH AFRICAN SUGARCANE RESEARCH INSTITUTE
Unlocking the potential of sugarcane

A SASRI trial has confirmed that RSD is transmitted by mechanical harvesters. Decontaminating harvesting machines can be elaborate and time-consuming. These procedures will reduce but not eliminate the spread of RSD from one field to another. Full Afrikaans article on ***page 16*** as well as English version on ***page 18.***

DIRECTOR'S Message

Dr Terry Stanger *(SASRI Director)*

In the midst of the third wave of the COVID-19 pandemic, SASRI continues to ensure continuity of its operations whilst maintaining a safe workplace for its employees. Unfortunately, the looting and unrest that hit KwaZulu-Natal in July resulted in a most unfortunate incident wherein the SASRI biosecurity office in Eshowe was looted and burnt to the ground with the adjacent Coastal Hardware shop being the main target. Fortunately, there were no security breaches at Mount Edgecombe, but many other areas of the industry suffered significant losses.

On a more positive note, following the Sugarcane Research and Sustainable Agriculture (SRASA) Committee directives, SASRI through a series of engagements with members of the SRASA Working Group, finalised an agreed five-year strategic plan that was approved by The South African Sugar Association (SASA) Council for adoption at its June meeting. The strategic plan includes six key critical success factors, namely:

- Sustainable Sugarcane Production
- Small-scale Grower Sustainability
- Enhancing and Enabling Adoption
- Biosecurity
- Commercial Opportunities, and
- Smart Agriculture

These critical success factors provide clear direction to SASRI, with each one being underpinned by several focused objectives, which will guide future research projects. In a significant shift, seven of the thirteen new draft project proposals being considered include an element of smart agriculture. Given the dynamic nature of the sugar industry at present, and in view of potential directives that might emanate from the Sugar Industry Master Plan, this five-year strategic plan will likely require some flexibility with respect to some of the stated goals.

Several research projects have just been closed out and there has been some exciting progress in the development of decision-support tools for our Extension Specialists to use in guiding their growers.

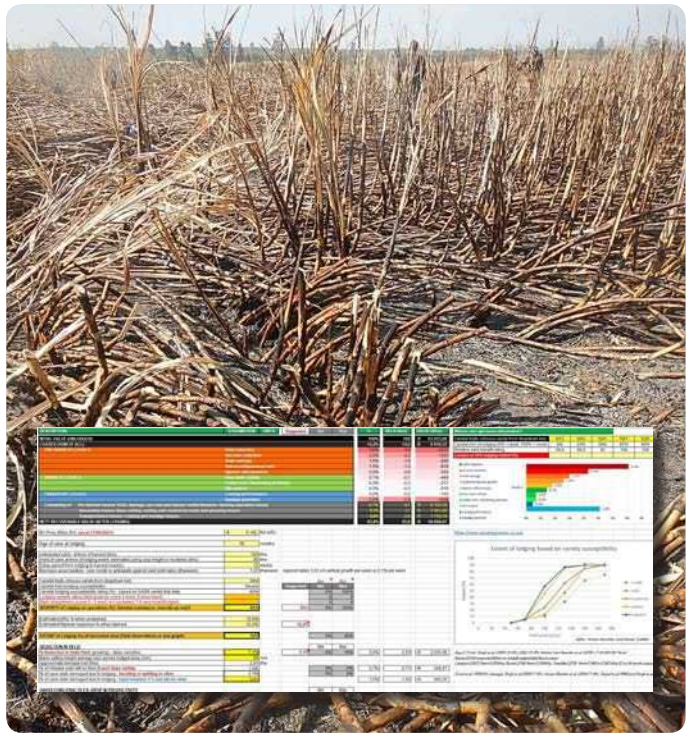
The SASRI WeatherWeb site which was designed over a decade ago has become very popular. The increased use of the SASRI WeatherWeb, while advantageous, created higher end-user expectations and exposed limitations of the site. The SASRI WeatherWeb online tool has now been modernised and an application to enable use of the site on smartphones will be released during 2021/2022.

A new high-resolution spatial framework termed the Sugarcane Quinary Catchment (SQC) framework has been developed for crop simulation modelling and other studies that require point-to-region upscaling.

The SQC has a spatial resolution approximately ten times that of the current system of Homogeneous Climate Zones (HCZs). The development will lead to improved accuracy of the monthly crop forecast issued by the Canesim Crop Forecasting System, as well as the other decision-support tools, including the My Canesim real-time irrigation scheduling tool and the StalkGro growth increments tool.

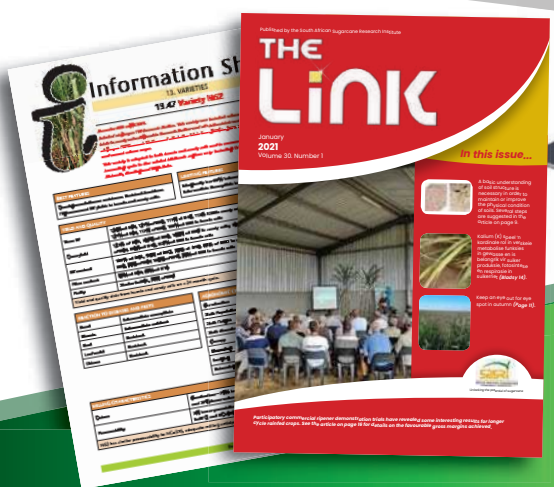
Besides the known negative impacts on crop productivity and yield, the phenomenon of lodging affects the efficiency of harvest and transport, as well as other management activities, including decisions to ripen or remove irrigation systems from lodged fields. SASRI has developed a customisable Excel-based tool to enable Extension Specialists to advise growers on the effects of various lodging scenarios on their revenue. The spreadsheet is also fully customisable by region and crop cycle length, or to the fields of individual growers based on current field performance estimates.

The development of these decision-support tools will significantly enhance the ability of SASRI's Extension Specialist to provide support and guidance to their growers.



▲ Assessing the increased costs in harvesting, loading and transporting of lodged cane using an Excel-based revenue loss calculator.

The SASRI eLibrary has it all!



Our eLibrary on the SASRI website (www.sasri.org.za) is your one-stop site for sugarcane farming information. This interactive platform allows you to conduct keyword searches, and to download The Link, Ingede, Information Sheets, Videos, Illustrative Guides and various SASRI farming manuals, books and reports. Everything you need is simply a click away!

Topical Tips

Rowan Stranack
(Extension and Biorisk Manager)

Yellow sugarcane aphid (YSA)

This elusive and potentially damaging pest began to manifest itself over winter and is now showing clear signs of an increase. Outbreaks in the Lowveld, Midlands and parts of the coastal belt are warning signs that the pest could reach damaging proportions soon if not checked. Regular scouting is important to warn of potential problems. Yield losses can be serious if outbreaks are not treated immediately, and some varieties such as N57 and N23 in the Lowveld appear to be particularly affected. Consult your SASRI Extension Specialist or Biosecurity Officer for advice.

Seedcane

Seedcane is sometimes deemed unsuitable for planting due to excessive levels of eldana damage. Seedcane, especially certified seedcane, is very costly and time-consuming to produce, and to be unable to use or sell it due to eldana being above the hazard level is a waste. To avoid this problem, apply two diamide insecticide applications to all seedcane during its growth cycle, timed to coincide with the recognised moth peaks; (March to May and September to November). This should provide adequate protection to the seedcane. In some areas, it is mandatory to take such precautions. Consult your Biosecurity Officer or SASRI Extension Specialist for more information.

When buying or selling seedcane, your Local Pest Disease & Variety Control Committee must approve all such transactions and movement of seedcane. Only certified or approved seedcane should be used for planting and seedcane buyers must ensure that the seedcane for sale has met the necessary criteria and has the required certificates of approval. Contact your local Biosecurity Officer or Technician in this regard before any transaction is undertaken.

There is often confusion regarding what qualifies as certified or approved seedcane. There are very clear criteria for both, and these are available from your SASRI Biosecurity Officer or Technician. Should you wish to produce either certified or approved seedcane for sale or for your own use, contact your local Biosecurity Officer or technician who will guide you through the process.

Smut

In the irrigated northern areas, smut roguing of commercial fields should be well under way by now. Getting in early and detecting smut when still in the incipient stage is critical to prevent the accumulation and spread of smut spores. Roguing can either be manual or chemical (See The Link September 2018 p 14-15) and should be on-going throughout the summer. Request help from your Biosecurity Officer for training for your staff in identifying smut.

Eldana and carryover cane

In the southern rainfed regions, there will be a significant area of unplanned additional carryover cane this year due to pressure on milling capacity. This could potentially place farms and areas at risk from excessive damage caused by eldana as populations build-up in older cane. Planning which fields to carry over and their spray programmes should be well advanced by now, but in the event of decisions still needing to be made, avoid carrying over susceptible varieties and fields prone to stress and those which have flowered excessively.

Your farm scouting team should be regularly going through fields to check eldana levels and damage. Remember that low eldana numbers do not necessarily mean the pest is under control. Check the number of damaged stalks and the extent of the damage. If those are high, it will mean the pest is still present but probably in the moth or egg phase and therefore not easily detectable. Check the size of the larvae recovered as well. Small larvae indicate a recent emergence that could increase. Larger larvae will indicate that they will soon pupate, and a new generation will emerge. Consult your Extension Specialist or advisor to decide when it would be appropriate to apply an insecticide. Last season, some growers were caught out by not completing their spray programmes during the late moth peak and paid the price for this in badly damaged cane and poor cane quality at the start of the season.

In a situation of forced carry over, choosing fields which will deteriorate the least as a result of ageing is important. Variety often makes a significant difference in this regard. By way of example, N12 is known to be one of the most suitable varieties to carry over in the Midlands and other inland areas. It is best to try and avoid bottomland fields to carry over, or some of the newer varieties which are prone to lodging and which are growing on high potential soils where they will inevitably lodge. Cane quality can be severely impacted by lodging for extended periods.

With the severe frosts experienced in the Midlands regions, it is important to note that frost damaged cane, which was not harvested, will produce side-shoots. This cane will therefore be under stress and this tends to attract eldana, so it should be surveyed and sprayed if it is to be carried over. Unmillable (less than 40 to 50 cm stick), severely frost damaged cane should have been harvested and thrown away by now. Unfortunately, these fields never develop a good crop unless cut back, thus allowing a new crop to develop without the hindrance of side-shoots, dead sticks etc.

Irrigation

Currently, water supplies are still good in the irrigated areas and maximum advantage should be taken of the coming summer peak growing season to obtain optimum yields. For this to be possible, irrigation systems should be fully functional. A quick checklist follows to ensure this is the case:

- Check the system and all pipes for leakages.
- Check the length of all draglines.
- Check pressure and flow rates at the pump, before and after filters and at field level (and compare with the design specifications).
- Check, clean and/or service filters, filter sand depth and condition (replace sand), air valves, pressure control valves, hydraulic valves, backwash valves and electronic connections.
- Check sprinklers for wear and replace nozzles if wear exceeds 5%, replace worn springs, washers, and nozzles.
- Flush mainlines, laterals and driplines.
- Chemically treat/clean dripper lines.
- Check the filter flushing cycle and reset if necessary.
- Check pivot motors, tower panel, main control cabinet and all switches.
- Plan and evaluate the irrigation scheduling programme.
- Clean all infield drainage pipes.

Late-season ripening

In the irrigated areas, late-season ripener application should be planned. Make sure there are 8 or more healthy green leaves in cane to be ripened and take refractometer readings and use these together with the **Pur***Est* app to assess suitability of the cane for ripening and product recommendations.

Flowering

Flowering has once again been profuse along the coastal belt from Zululand to the Lower South Coast. Heavily flowered cane should have been milled by now. It is important that cane with >20% flowered stalks is not carried over. Also, be on the lookout for delayed flowering, particularly in the variety N12, where flowers often emerge in late spring. One can check for this by slicing open the top of the cane stalk to reveal the apical meristem and see if the flower has formed. It is advisable to carry out these checks regularly and early enough so that fields for carry-over can be changed if possible.

Crop re-establishment

Chemical minimum tillage remains the safest and cheapest method of crop eradication. Wherever possible, this method must be used. Remember, minimum tillage is obligatory on erodible soils. Glyphosate seldom, if ever, gives a 100% kill, so regular follow up and removal of regrowth is essential.

Plan to incorporate an appropriate **green manure crop** if fallowing over the summer period. There are also useful mixed green manure crops available on the market these days. Consult your SASRI Extension Specialist or advisor to select and source an appropriate crop.

If not already planned, start deciding about fields to be re-established next season. Especially if these fields are likely to require lime and gypsum, plan to sample these early so the orders for product can be placed timeously, allowing incorporation of lime and gypsum to be done next winter.

Crop nutrition

Fertiliser prices have gone through the roof and, as a result, optimising every rand spent on crop nutrition should be a priority. Your fertiliser programme should be based on a comprehensive soil sampling programme together with more than just a superficial knowledge of the soils of your farm. Soil depth, colour, texture, structure, and organic matter are vital keys to unlocking the potential of your soils. Grouping soils on your farm in this way e.g. all the deep red clay soils or shallow grey sandy soils will help prioritise and manage fertiliser applications to ensure minimal losses and appropriate timing and placing of fertiliser. This together with a comprehensive soil and leaf sample history are necessary to effectively address all potential limiting factors and to obtain maximum yields. Also consider the following:

- Remember the four Rights (SASRI Information Sheet 7.1) when it comes to the planning and management of a crop nutrition programme. The RIGHT TYPE of fertiliser or other nutrient source, the RIGHT RATE of application, the RIGHT TIMING of application and the RIGHT PLACEMENT of the nutrient source. The first two Rs are established by taking a soil sample and having it analysed by SASRI's Fertiliser Advisory Service (FAS). Your SASRI Extension Specialist can help you with the timing and placement.
- Split applications of fertiliser: On sandy soils and those prone to periodic waterlogging, split applications of nitrogen fertiliser are essential. Whilst often challenging to do, considering that under average conditions less than 60% of N applied makes it into the plant, and under marginal conditions even less, this makes splitting N applications even more critical. Under irrigation, the option of fertigation should be explored to ensure effective use of applied nutrients, especially nitrogen. Applying fertiliser, again especially nitrogen, too early when cane is not growing is wasteful except under irrigated conditions where growth starts earlier and water supplies are adequate.
- Leaf samples can be taken from November onwards if growing conditions are favourable. The efficiency of nutrient uptake is best measured by leaf samples, enabling either top-up applications to be made or revised applications the following season.
- Salinity/sodicity: In the northern regions of the industry, salinity and sodicity build-up can limit growth significantly on certain soils and where water quality or drainage is poor. Tell-tale signs of a salinity/sodicity problem are salts crusting on the soil surface, patches of poor growth and areas where very little appears to grow. Sub-surface samples are required to confirm this so consult your SASRI Extension Specialist for the procedure. A sample of the irrigation water will also indicate if water quality is contributing to the problem.

Improving cane quality through balanced nutrition

Louis Titshall *(Senior Soil Scientist)* and
Riekert van Heerden *(Senior Scientist: Sugarcane Physiology)*

To ensure sustainable and profitable returns from sugarcane production, growers must adopt crop nutrition and soil health management practices that optimise sucrose yield. The effect of nutrition on cane yield and quality is, however, complex. Nutrient deficiencies, excesses and imbalances can all result in below optimum production. However, some general trends have been observed that provide useful guidance to better manage crop nutrition for optimal sucrose yields.

Nitrogen

Nitrogen (N) is mainly responsible for vegetative growth and thus biomass accumulation in the sugarcane crop. When N is deficient, growth is reduced, leading to lower cane yield and sucrose production, resulting in poorer sucrose yield. It has also been found that N is important for efficient uptake and use of other nutrients, thus suboptimal levels can lead to poor utilisation of the other nutrients, lowering nutrient use efficiency and further compromising yield and quality.

Nitrogen deficiency in sugarcane. ▶

However, where N is oversupplied (and with adequate moisture), sugarcane will luxuriously consume N. Excess N uptake leads to rapid growth, increased stalk moisture and non-sucrose content which can then lower sucrose yield. While rapid growth is generally desirable during crop establishment and the grand growth stages, excessive vegetative growth during crop maturation phases will lower cane quality. Excess N has also been linked to increased occurrence of pest and disease and lodging of cane, this due to the development of "soft" plants. As such, N application late in the crop cycle should be avoided (at least 3 to 5 months from harvest) to promote maturation and increases in sucrose content.

Potassium

Potassium (K) is important for plant water relations and the storage of sucrose in the stem. Sugarcane takes up large amounts of K and the juice ash can contain up to 50% K. It has been found that optimal K is effective to lower starch and fibre content, mitigating pest and disease occurrence and improving tolerance to water and salt stress. However, sugarcane is a strong luxury consumer of K. As with N, where soil K supply is very high, sugarcane will take up K in amounts well in excess of its needs for optimal yield and quality. This excess uptake does not seem to lead to serious negative effects on cane yield or quality. Consequently, the apparent benefits and lack of clear disadvantages of high K have led to the belief by some that over-supplying K is needed for optimal crop production.

However, excess K in the soil and crop can lead to several problems and indirectly impact cane yield and quality. High K in the soil can interfere with the uptake of calcium (Ca) and magnesium (Mg), resulting in yield and quality decline and has also been associated with crop lodging. High K levels in the cane juice also reduces the ability to extract sucrose crystals from molasses, as well as negatively affecting the colour and ash content of raw sucrose, thus lowering returns on sucrose processing.

Severe potassium deficiency and excess phosphorus in sugarcane. ▶

Phosphorus

Phosphorus (P), while not taken up by the crop at the high rates as for N and K, is often a limiting nutrient in sugarcane production. It plays an important role in photosynthesis, root development and tillering. The main benefit of P is most noticeable in deficient soils, where increases in sucrose yield are due to improvements in cane yield. While excess P in soil and crop uptake is generally a less common issue, this has been linked to a lowering of sucrose content. This may be due to P interfering with the uptake of other elements due to the formation of non-plant available compounds with P in the soil. In some regions, the repeated application of high rates of P-rich organic amendments has led to very high levels of soil P that may eventually adversely impact crop quality.

▲ Phosphorus deficiency can result in a poorly established crop (field on right) and thus lower cane yield.

Other nutrients

Other nutrients commonly measured in sugarcane production include secondary macronutrients (calcium, magnesium, silicon and sulphur) and micronutrients (mainly boron, copper, iron manganese and zinc). The specific impacts of these nutrients have not received as much attention as N, P and K, though there is sufficient evidence that deficiencies (and occasionally toxicity) can influence both cane yield and quality, thus lowering sucrose yield. In some instances, nutrients have been linked to increased stress tolerance and resistance to attack by pests, the most notable being silicon. This provides indirect benefits for cane yield and quality.

Managing crop nutrition effectively

Soil testing remains the preferred approach to establish nutrient requirements and to guide nutrient applications while also allowing the detection of several soil health problems (e.g. acidity, salts) that could adversely affect crop nutrition. Leaf testing is a valuable additional tool that can be used to assess crop response to nutrient and management practices and thus guide future adjustments to existing practices. The recommendations given by SASRI's Fertiliser Advisory Service (FAS) have been developed based on crop responses that are aimed at optimal sucrose yield. As such, these recommendations should form the basis of any nutrient management plan, with adjustments being made for site-specific and situational conditions. This requires continual evaluation and refinement due to the ever-changing nature of the environment.

Kwantifisering van die impak van omvalriet op produsente se inkomste

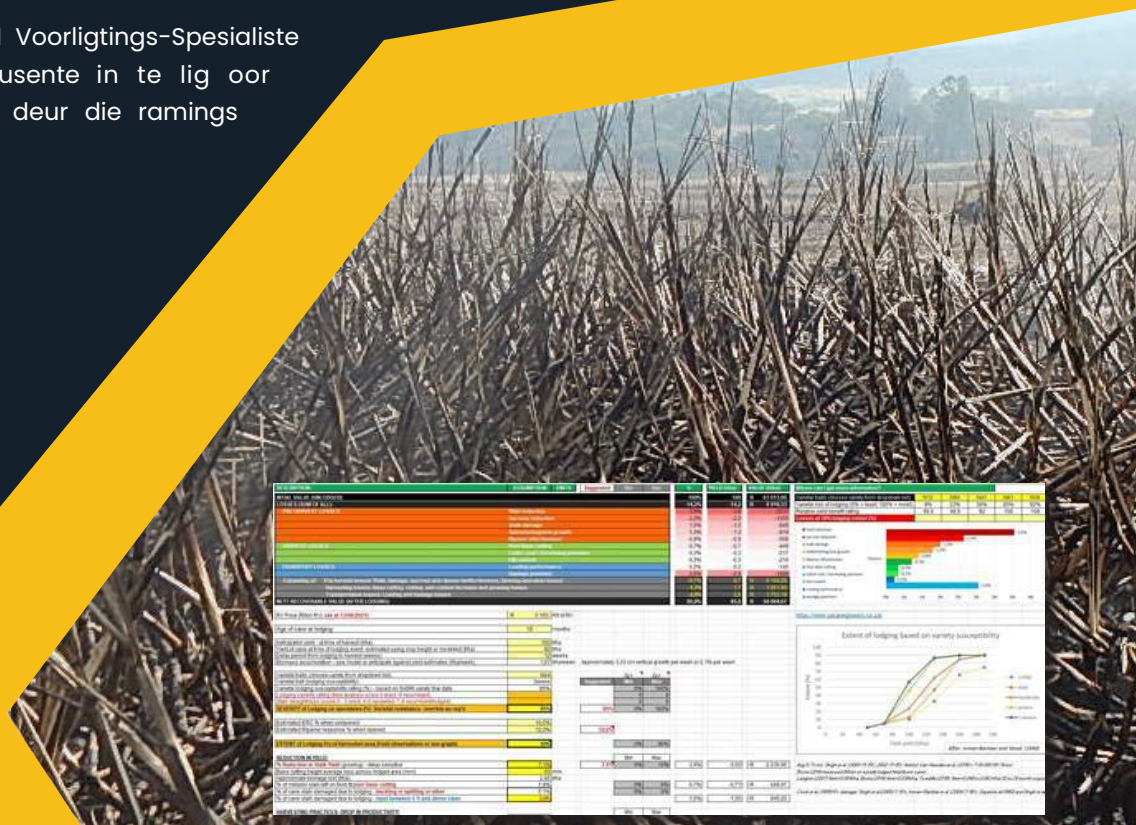
Dr Peter Tweddle *(Landbou-ingenieur)*

Benewens die bekende negatiewe gevolge wat die verskynsel "omvalriet" op gewasproduktiwiteit en geraamde herwinbare suikerkristal (GHS)-opbrengs het (ERC in engels), word die effektiwiteit van oes asook die vervoer daarvan, sowel as ander voorafgaande bestuursaktiwiteitbesluite wat gemaak moet word, (insluitend besluite om die gewas ryp te maak of nie, en om besproeiingstelsels uit die land te verwyder of nie), ook beïnvloed. Alhoewel dit verbasend is dat die omval van riet 'n relatief algemene verskynsel is, is daar nog weinig navorsing gedoen om die impak van die verskynsel op produsente se inkomste te bepaal.

In 'n projek wat onlangs afgehandel is, is die uitwerking van wat omvalriet het, op produsente se inkomste gekwantifiseer. Die kwantifisering sluit die verhoogde koste van die oes, die laai van die vrag, vervoer van die omvalriet en die gepaardgaande verminderde inkomste as gevolg van die vermindering in GHS-opbrengs in. Die gevolglike produk is 'n Excel-gebaseerde inkomsteverliesrekenaar wat verskeie kwantifiseerbare gevolge van suikerriet wat omgeval het, op suikerrietbedrywighede. Die sigblad is aangepas om 'n reeks situasies in te sluit, insluitend dié wat afkomstig is van 'n gewasberamingsimulasie of 'n meer gedetailleerde lessenaar-modelleringsimulator, as 'n manier om gewasproduktiwiteit en opbrengskoers en opeenhoping van sukrose tydens die inskrywing te skat. Die sigblad is volledig aanpasbaar volgens streek en die gewassikluslengte van die lande van individuele produsente, gebaseer op huidige landprestasieberamings.

Met situasie-spesifieke verfyning, kan van hierdie modelle verwag word om te help met plaas variëteit seleksie, oesbestuurspraktyke en na aanleiding van die hoë gepaardgaande kostes van omvalriet kan dit in plantteling variëteitkeuses en vrystelling besluite in spesifieke meulareas gebruik en toegepas word. Die kennis wat uit hierdie navorsing opgedoen is, kan ook lei tot die bevordering en aanvaarding van beter bestuurspraktyke of aanpasbare praktyke om die risiko's en erns van die probleme wat gepaardgaan met omvalriet te verminder. Die indirekte voordeel is dat die bewustheid van die omvang van die verlies as gevolg van omvalriet kan help om verskillende komponente van die voorsieningsketting te bepaal, van die kortstondige rietoes op die plaas, die prioriteit van die lewering van rietaanlegte, tot langtermyn planttelingstrategieë en holistiese variëteite van ekonomiese assessering.

Die modelle kan deur SASRI Voorligtings-Spesialiste gebruik word om hul produsente in te lig oor hul verliese wat voorheen deur die ramings geassosieer is.



Faktore wat die omval van riet en inkomste bepaal

Faktore wat die aanvang van omval gebeurtenisse kan veroorsaak, is hoofsaaklik die grootte van die oes en ongunstige weersomstandighede. Variëteiteienskappe, bestuurspraktyke en rietouderdom kan ook die omvang en erns van omvalriet beïnvloed.

Die ooglopende impak van omvalriet op die inkomste van die produsent hou verband met die fisiese eienskappe van die stingels en hoe ernstig dit die oes-, laai- en vervoerbedrywighede beïnvloed.

Die vertragingstyd tussen omval van riet en oes speel ‘n rol in die proporsionele verlies aan potensiële suikerrietopbrengs, stingelskade, stoel mortaliteit, rypwordingsverliese as gevolg van onvermoë, doeltreffendheid of verlore geleenthede en sukroseverliese.

Kwaliteitsverliese word beïnvloed deur die potensiaal van swak verbranding en swak oespraktyke wat kan lei tot ‘n toename in die veselpersentasie in riet as gevolg van verhoogde toppe, blare en sand in verhouding tot riet wat nie omval nie. Afhangende van die erns van die omvalriet, kan die vlakke van skade aan suikerriet en sukrose ook verhoog word.

Alhoewel opbrengs- en sukroseverliese beïnvloed word deur die vertragingstyd tussen omval en maal, hou ander faktore soos stronkbeskadiging, rypwordingspotensiaal en oeskwessies gewoonlik ‘n verband met die omvang van die omval van die riet self.

Quantifying the impact of lodging on grower revenue

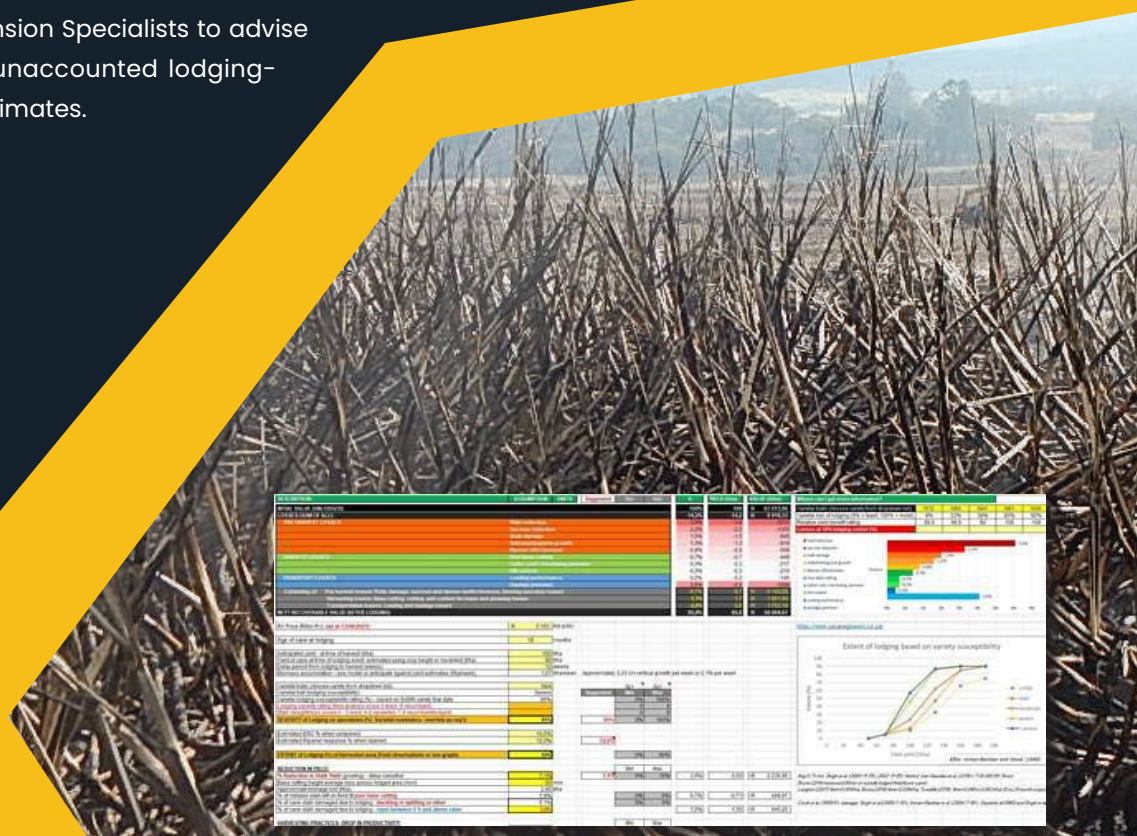
Dr Peter Tweddle *(Agricultural Engineer)*

Besides the known negative impacts on crop productivity and ERC yield, the phenomenon of lodging also directly or indirectly affects the efficiency of harvest and transport, as well as other preceding management activities, including decisions to ripen or remove irrigation systems from lodged fields. Surprisingly, despite lodging being a relatively common occurrence, little work has previously been done to assess its impact on revenue.

A recently completed project has quantified the effect of lodging on grower revenue by assessing the increased costs in harvesting, loading and transporting of lodged cane and the associated reduced income due to the reduction in ERC yield. The resulting product is an Excel-based revenue loss calculator that has incorporated various quantifiable effects of lodging on sugarcane operations. The spreadsheet is tailored to include a range of scenarios, including those derived from either a crop estimate simulation or a more detailed desktop modelling simulator as the means to estimate crop productivity and rate of yield and sucrose accumulation at the time of lodging. The spreadsheet is fully customisable by region and crop cycle length or to the fields of individual growers based on current field performance estimates.

With scenario-specific refinement, these models are anticipated to assist with on-farm variety selection decisions, harvest management decisions and, due to the high costs associated with lodging, may also be used in plant breeding variety selection and variety release decisions for specific mill areas. The knowledge gained from this research may also lead to the promotion and the adoption of better management practices or adaptive practices to reduce the risks and severity of lodging events. The indirect benefit is that the awareness of the magnitude of lodging losses may help to guide various supply chain components from short-term on-farm cane harvesting, mill area cane supply prioritisation through to long term plant breeding strategies and holistic variety economic assessment comparisons.

It can be used by SASRI Extension Specialists to advise their growers on previously unaccounted lodging-associated losses in their estimates.



Factors affecting lodging and revenue loss

The factors triggering the onset of lodging events are primarily crop size and adverse weather conditions. However, varietal characteristics, management practices and cane age may influence the extent and severity of lodging events.

The obvious impact of lodging on grower revenue is linked to the physical attributes of the lodged stalks and how severely these impact harvesting, loading and transport operations.

The lag time between lodging and harvesting plays a role in proportionate loss of potential cane yield, stalk damage and stool mortality, ripening losses due to inability, efficacy or lost opportunities and sucrose losses.

Quality losses are affected by the potential of poor burning and poor harvesting practices that may result in increases in fibre percent cane from increased levels of tops, leaves and sand relative to unlodged harvesting conditions. Lodging may also increase the levels of cane stalk damage and sucrose losses depending on the severity of the lodging event.

While yield and sucrose losses are influenced by the lag time between lodging and milling, other factors such as stalk damage, ripener potential and harvesting issues are generally related to the magnitude and the extent of the lodging event itself.

Reducing salinisation of irrigated sugarcane land

Dr Rian van Antwerpen *(Senior Soil Scientist)*

SASRI has completed a joint project with the Water Research Commission (WRC) and the University of the Free State (UFS) aimed at developing guidelines for improved diagnosis and management of salinity in the irrigated production regions of the sugar industry.

Salinity status

Approximately 30 to 35% of the total annual sugarcane crop is produced under irrigation and estimates suggest that as much as 20% of the land on which production occurs is affected by water-logging or salinity. Water quality assessments conducted by the SASRI Fertiliser Advisory Service (FAS) indicate that the quality of irrigation water, especially in winter, is generally poor and the resulting application of salts to soils through irrigation leads to soil health deterioration and eventually to the development of saline or sodic soils.

Growers' knowledge and perceptions

A socio-economic survey revealed that a large portion of farmers do not know the soil salinity status of their farms, the water quality used for irrigation, or the threshold values used to diagnose salinity. This situation prevailed despite the farmer-friendly publications, reliable laboratory testing facilities and competent Extension Specialists in the SA sugarcane industry.

This indicates that conventional methods of sharing information and knowledge are not sufficient. To improve the sharing of technology, strategies involving farm visits and situation analysis, demonstration plots, study group meetings, farmer-to-farmer contact, and availability of easy-to-follow literature are avenues that should be considered. Purposeful and deliberate effort is required to establish examples of implementation and to gather and make accessible relevant economic and practical information to all farmer groups.

EMI Technology

Fields are not uniformly affected by salts, as they may accumulate in specific zones within a field depending on the topography, distribution of soil type and water tables. Hence, addressing the salt problem may be more cost-effective if the affected areas within a field can be easily identified and directly targeted.

This project provided proof of concept that electro-magnetic induction (EMI) scanning technology is suitable for the detection and mapping of the distribution of salt-affected areas within fields. Combining EMI survey data with the outputs from a model such as the Soil Water Management Program (SWAMP) assists in formulating recommendations that will best improve the condition of salt-affected or salt-prone areas. Included in such recommendations are the geolocation of salt-affected areas, its depth, surface and subsurface drainage properties of the site, the type of salt present, the amount of salts to be removed and the amount of water required to remove the salt.

Decision support system (DSS) for estimating salt dynamics

Soil characteristics from the two field studies were used to populate the soil water management program (SWAMP) used to simulate the effect of water quality and irrigation management on soil health. However, the model was developed for seasonal crops such as maize and wheat and could not be used with a perennial crop such as sugarcane. Instead, the model was run for 11 years with a summer and winter crop to simulate 27 irrigation scenarios. Results indicated that the surface layer could be kept free of salts with weekly irrigation of 20 mm or more. However, this is not sufficient to supply the water needs of a sugarcane crop. It was recommended that the sugarcane industry works with the developers of SWAMP to accept perennial crops such as sugarcane into the model. The industry needs such a model, and SWAMP would not need much more work to achieve this goal.

Creating awareness

A further important outcome of the project is the awareness that was created about the impact of salts on sugarcane production. Roadshow events, attended by 87 growers, led to the receipt of several requests from growers for assistance with salt problems. However, it is a concern that many growers who may be at risk of experiencing the negative effects of salts in the farming enterprises would not have attended the roadshow events. It is for this reason, and from the outcome of the questionnaire survey, that a knowledge exchange campaign on this subject is strongly recommended.

Ratoenverdwergingsiekte (RSD) en meganiese-oesmasjien:

Verminder die risiko van verspreiding

Sharon McFarlane *(Senior Plant Patoloog)*

Ratoenverdwergingsiekte (RSD) is 'n siekte wat bestuur kan word en dit word beheer deur skoon (siektevrye) saadriet te gebruik vir plant, plaas implemente te dekontamineer (ontsmet) en om te sorg dat die land se braakperiodes lank genoeg is voordat daar weer geplant word. Anders as siektes soos smut en mosaïek, word RSD nie deur wind, reën of insek vektors versprei nie. As gevolg hiervan is die siekte dus nie 'n risiko vir naburige plase wanneer die vlakke hoog op een plaas is nie. Wanneer 'n land geplant is, is die hoof risiko vir besmetting wanneer die riet gekap of geoes word. Die siekte kan van een land na die volgende versprei word deur middel van gekontamineerde kapmesse. Die gebruik van rietkappers deur kontrakteurs, verhoog die risiko van verspreiding van RSD as die werkers van plaas tot plaas gaan met besmette kapmesse. Die risiko van verspreiding is laag indien die kapmesse ontsmet is voordat 'n ander plaas binnegegaan word, mits al die reëls en regulasies nagekom word.

Meganieseoesmasjiene word in sommige areas van Suid Afrika gebruik en dit skep 'n ander probleem. Na aanleiding van navorsing wat in Australia en Amerika gedoen is, is daar gevind dat die risiko van die verspreiding van RSD met meganieseoesmasjiene hoog is omdat dit moeilik is om die meganieseoesmasjien te dekontamineer (ontsmet). Primêre kommer vir kwekers wie streng RSD bestuurspraktyke toepas en wie se plase vry van enige RSD is, het nou 'n verhoogde risiko vir die verspreiding van RSD in die saadriet kwekerye asook in plaas tot plaas verspreiding wanneer meganieseoesmasjiene nie ordentlik skoongemaak is voordat hulle op die plaas kom nie.

Met behulp van veldproewe het SASRI die doeltreffendheid van 'n prosedure ondersoek om meganieseoesmasjiene te ontsmet om die risiko van RSD verspreiding te verminder, ondersoek. Alternatiewe ontsmettingsmiddels volgens die huidige standaarde, Jeyes Fluid en spiritus, is ook getoets.

Die ontsmettingsprosedure het behels dat soveel as moontlik plant- en grondreste uit die oesmasjien met die hand verwyder word. Daar is gefokus op alle toeganklike dele van die oesmasjien wat waarskynlik in aanraking sou kom met die geoesde rietry, of waar besmette sap kan ophoop en op die rietry kan drup. Dit sluit die basissnyers, oesverdelers, vernouings, rollers, boudhyser, bagasiebak, kapperboks, hysbak en topper in. Fyn puin is uit hierdie dele verwyder met water wat onder hoë druk uit 'n vuurwa van 200 L gespuit is. Skuimende kwaternêre ammoniumverbinding (QAC), wat in hierdie studie geïdentifiseer is as effektief teen die RSD-bakterie, is met 'n rugsakspuit vir al hierdie dele vir 'n kontaktyd van vyf minute toegedien.

Uitkomste en aanbevelings

- Die proewe bevestig dat RSD deur meganieseoesmasjiene oorgedra kan word. Terwyl die ontsmettingsprosedure verspreiding verminder, is die risiko om RSD in die voorheen gesonde lande deur besmetteoesmasjiene in te bring, nie uitgeskakel nie.

- Die ontsmettingsprosedure het twee mense tot 40 minute geneem om te voltooi, maar dit is nie moontlik om toegang tot alle dele van die onderstel van die oesmasjien aan die rand van die land te kry nie. Om die doeltreffendheid van die prosedure te verbeter, moet die oesmasjien by die depot of plaaswerkswinkel gedekontamineer word, verkieslik terwyl die oesmasjien op die sleepwa of in 'n aangewese gebied staan sodat daar maklik toegang tot die onderstel gekry kan word. Die gebruik van 'n ontsmettingsbad (betonbak) by die depot, of hoëdruk-ontsmettingsspuite wat op die sleepwa aangebring is, moet oorweeg word.

- Die resultate van hierdie proewe dui daarop dat dit waarskynlik ondoeltreffend is om die oesmasjien in die middel van 'n land te stop om te ontsmet. Die proses is tydrowend en toegang tot sommige dele sal meer beperk in die land wees. Die dekontaminasie in die land van meganieseoesmasjiene word dus nie aanbeveel nie.

- Skuimende QAC wat bensalkoniumchloried en didecyldimetielammoniumchloried met 'n oppervlakteaktiewe stof 2-butoxy-etanol bevat, by 'n konsentrasie van 3% word voorgestel as 'n geskikte alternatief vir Jeyes Fluid en spiritus. Benzalkoniumchloried word effektief in ander suikerrietbedrywe gebruik om die verspreiding van RSD te beperk. Hierdie produk is in Suid -Afrika geregistreer en dit is deur CropLife Suid -Afrika bevestig dat 'n spesifieke registrasie van die produk vir gebruik as 'n ontsmettingsmiddel op plaaswerktuie en masjinerie in die suikerbedryf nie nodig is nie.

RSD and mechanical harvesters: Reducing the risk of spread

Sharon McFarlane *(Senior Plant Pathologist)*

Ratoon stunt (RSD) is a manageable disease and can be controlled primarily by planting healthy seedcane, decontaminating farm implements and ensuring adequate fallow periods before replanting. Unlike diseases such as smut and mosaic, RSD is not spread by wind and rain or insect vectors and should therefore not be a risk to neighbouring farms when levels are high. Once a field has been planted, the main risk of spread is at harvest - the disease can be spread from one field to another via contaminated cane knives. The use of cane cutters through contractors increases the risk of spread as contractors move from farm to farm. However, it is possible to decontaminate cane knives easily and effectively before entering another field or farm and, provided the recommendations are followed, the risk of spread is low.

Mechanical harvesters are being used in some areas in South Africa, and these pose a different challenge. Based on research done in Australia and the USA, the risk of RSD spread by mechanical harvesters is high due to the difficulty of effectively decontaminating the machines. Primary concern for growers who have strict RSD management practices in place and whose farms are currently RSD-free, is the increased risk of spread into seedcane nurseries as well as farm-to-farm spread if harvesters are not properly decontaminated before entering farms.

Using field trials, SASRI has investigated the efficacy of a procedure to decontaminate mechanical harvesters to reduce the risk of RSD spread. Alternative disinfectants to the current standards, Jeyes Fluid and methylated spirits, were also tested.

The decontamination procedure involved removing, by hand, as much plant and soil debris from the harvester as possible. Focus was placed on all accessible parts of the harvester that were likely to come into contact with the harvested cane row, or where infected juice could accumulate and drip onto the cane row. These included the base-cutters, crop dividers, throat, rollers, butt lifter, boot, chopper box, elevator and topper. Finer debris was removed from these parts with water sprayed under high pressure from a 200 L fire cart. A foaming quaternary ammonium compound (QAC), identified in this study to be effective against the RSD bacterium, was applied to all these parts with a knapsack for a contact time of five minutes.

Outcomes and recommendations

- The trials confirmed that RSD is transmitted by mechanical harvesters. While the decontamination procedure reduced spread, the risk of introducing RSD into previously healthy fields via contaminated harvesters was not eliminated.

- The decontamination procedure took two people up to 40 minutes to complete but it was not possible to access all parts of the undercarriage of the harvester at the field edge. To improve the efficacy of the procedure, decontamination of the harvester should be conducted at the depot or farm workshop, preferably while the harvester is raised on the trailer or in a designated area that allows easy access to the undercarriage. The use of a disinfection bath (concrete sump) at the depot, or high-pressure decontamination sprayers fitted to the trailer should be considered.

- The results of these trials indicate that stopping the harvester in the middle of a field to decontaminate is unlikely to be effective. The process is time-consuming and access to some of the parts will be more restricted in the field. The in-field decontamination of mechanical harvesters is therefore not recommended.

- A foaming QAC containing benzalkonium chloride and didecyl dimethyl ammonium chloride with a surfactant 2-butoxy-ethanol at a concentration of 3% is proposed as a suitable alternative to Jeyes Fluid and methylated spirits. Benzalkonium chloride is used effectively in other sugarcane industries to limit the spread of RSD. This product is registered in South Africa and it has been confirmed through CropLife South Africa that specific registration of the product for use as a disinfectant on farm implements and machinery in the sugar industry is not required.

Control of giant *Panicum maximum*

Anushka Gokul *(Agrochemical Scientist)*

Sugarcane fields on the South Coast have, over the past couple of years, been experiencing a tufted grass growing vigorously next to and within fields, competing with cane for water, light and nutrients thereby reducing sugarcane yields and quality. The weed begins to grow between sugarcane rows and is as tall as the sugarcane.

It has been identified as **giant** *Panicum maximum* (uBabe grass, Guinea grass) which is a perennial, tufted grass with a short, creeping rhizome. The stems of this robust grass can reach a height of up to 3.5 m with stems of 5 mm to 10 mm diameter. As the stems bend and nodes touch the ground, roots and new plants are formed.

This grass shares the same genus and species with the **common** *Panicum maximum,* yet they are phenotypically different. The difference includes the thickness and hardness of the stalks and the height at which the **giant** *Panicum maximum* grows. It remains green till late in winter and flowers from September to March, producing large seed heads which are green to purple and are widely dispersed by wind, birds, and farm machinery.

Management strategies to control the weed

An effective and sustainable integrated weed management strategy should be applied, which combines herbicides and farm hygiene to minimise weed seed spread.

1. ***Reduce seed bank in the soil.***
   - Management of this weed is difficult. It is recommended that young giant *Panicum maximum* should be removed before it matures, thus preventing seed development and the dispersal of the seed.
   - Mature plants should be excavated; this is an intense and lengthy process.

2. ***Minimise soil seed reserves.***
   - Weed seedling cycles can be broken by implementing a fallow period on fields with high giant *Panicum maximum* pressure.

3. ***Good Farm hygiene.***
   - Farm machinery and vehicles should be cleaned between fields to prevent the transportation of seeds from one area to another.

Giant *Panicum maximum* growing in sugarcane fields and as tall as the cane.

4. ***Herbicide application.***
   - There are no herbicide products specifically registered for giant *Panicum maximum*, however the following active ingredients are registered for the control of common *Panicum maximum*:

Active ingredients registered for *Panicum maximum*			
1	acetochlor	19	diuron + hexazinone
2	acetochlor + ametryn	20	diuron + metribuzin
3	acetochlor + benoxacor	21	diuron + sulcotrione
4	acetochlor + dichlormid	22	glufosinate-ammonium
5	alachlor	23	glyphosate
6	ametryn	24	haloxyfop-R-methyl ester
7	ametryn + triazines	25	imazapyr
8	amicarbazone	26	indaziflam + isoxaflutole
9	atrazine + s-metolachlor	27	isoxaflutole
10	atrazine + sulcotrione + triazines	28	mesotrione
11	benoxacor + metolachlor	29	mesotrione + s-metolachlor + terbuthylazine
12	chlorimuron-ethyl	30	metazachlor
13	chlorimuron-ethyl + metribuzin	31	metribuzin
14	chlorimuron-ethyl + metribuzin + pendimethalin	32	MSMA
15	clomazone	33	pendimethalin
16	clomazone + hexazinone	34	s-metolachlor
17	dimethenamid-P + saflufenacil	35	sulfentrazone
18	diuron	36	tebuthiuron

- Always use registered combination of herbicides and follow label recommendations.
- Herbicides should be applied timeously.
- Herbicides with different modes of actions should be rotated to reduce developing herbicide resistance.

Large seed heads are produced by giant *Panicum maximum*. Seeds are dispersed by wind, birds and farm machinery.

ORANGE RUST ALERT

Sharon McFarlane *(Senior Plant Pathologist)*

Orange rust has been reported on an estate in Angola.

Please be on the lookout for symptoms on all varieties of all ages and in all regions of the industry. Report any suspicious symptoms to your local SASRI Biosecurity Officer or SASRI Extension Specialist.

Orange rust is likely to spread rapidly through the industry after the first infections are observed.

Severe infections have been reported from spring to early autumn in Brazil and Florida. Infections are favoured by warm (20-22°C), humid (RH>97%) overnight conditions. Severity is reduced when temperatures exceed 32°C for extended periods.

Orange rust spores have been detected on a spore trap located on the SASRI Research Station at Komatipoort in the past, but the disease has not as yet been observed on sugarcane in South Africa.

Yield effects

Rust pathogens reduce photosynthesis and use up nutrients while invading the plant. They damage the epidermis of the leaf, affecting the plant's ability to regulate water loss, causing severely infected leaves to die prematurely. All these factors contribute to yield loss. Severity, persistence and associated yield loss will vary from year to year depending on the climatic conditions and the varieties being grown, but losses of 15 to 30% have been demonstrated.

Spread

Rust pathogens produce spores that are microscopic, light and hardy making them well adapted to rapid short and long-distance dispersal by wind and water splash. Rust is not spread by planting infected seedcane.

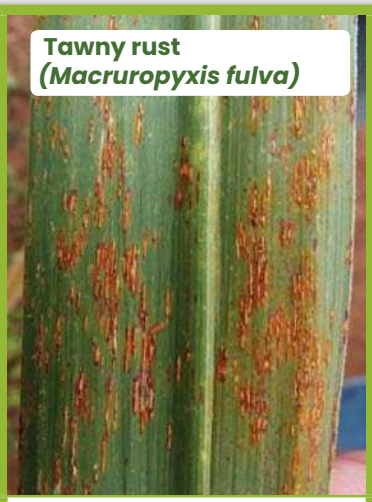
Management

Varietal resistance is the most economical management option but it becomes more challenging to breed for resistance when more than one rust pathogen attacks a crop. Resistance to one rust does not mean a variety will be resistant to others e.g. N12 has excellent resistance to brown rust but has some susceptibility to tawny rust. Mixed rust infections on one variety have also been observed. Genetic changes in rust pathogens can result in resistant varieties becoming more susceptible.

Planting no more than 30% of your farm to one variety can reduce the risk and impact of pests and diseases.

A commercially available fungicide is registered for the management of orange rust on sugarcane in South Africa. Contact your Extension Specialist for advice.

Characteristics of the three rust species infecting sugarcane

	Brown rust *(Puccinia melanocephala)*	**Tawny rust** *(Macruropyxis fulva)*	**Orange rust** *(Puccinia kuehnii)*
			
Lesions (pustules)			
Colour	Dark brown to reddish-brown	Dark brown to reddish-brown, may be some purpling around the border	Orange to orange-brown
Size	Up to 20 mm long and 3 mm wide	Up to 20 mm long and 3 mm wide	Up to 4 mm long and 3 mm wide
Distribution on leaf	More concentrated near the leaf tip	More concentrated near the leaf tip	More concentrated towards the leaf base, tend to occur in groups
Spores			
Colour	Cinnamon to orange-brown	Bright orange when fresh becoming dark- reddish brown over time	Orange
Position on leaf	Mainly on lower leaf surface. Very rarely on upper leaf	Most abundant on lower leaf surface. Common on upper leaf surface	Mainly on lower leaf surface.Very rarely on upper leaf surface
Abundance (fresh pustules)	Usually sparse	Abundant, easily transferred to clothes and skin	Relatively abundant
Age of cane	Less than 6 months	All ages	All ages
Favourable conditions	Cool (less than 25°C), misty or light rain, heavy dews, high humidity Limited by temperatures exceeding 30°C	Cool (15 to 23°C), misty or light rain, heavy dews, high humidity Limited by temperatures exceeding 30°C	Warm, wet, high humidity Limited by temperatures exceeding 32°C
Season Most common but not limited to:	August to November, March to June	August to October, June	September to April
Other notes		Often most severe on the leaves closest to the ground in young plants As fresh orange spores disperse, more difficult to distinguish from brown rust	

WEATHER

Phillemon Sithole *(Agrometeorologist)*

Review

Most of KwaZulu-Natal received normal to above normal rainfall during the late autumn to early winter months (April to June) while the irrigated northern region of Mpumalanga was generally very dry over the same period. The industry then became extremely dry with many areas recording little to no rainfall between early June and the end of July, 2021 (Fig. 1).

Minimum temperatures during early winter were generally mild with no frost events reported until mid-July when extreme cold conditions (Fig. 2) were experienced across the industry. Parts of the Midlands North region suffered severe frost for a few consecutive days during the week-long cold spell. This resulted in some of the worst frost damage in the region in many years, including in fields traditionally regarded as 'frost free.' Indications are that the 2021 area affected by frost will surpass the 3500 ha reported in 2020.

Irrigation water supplies were adequate in the irrigated parts of the industry and are expected to remain stable through the dry season, thanks to the good 2020/21 summer rainfall as reported in the May 2021 issue of *The Link*.

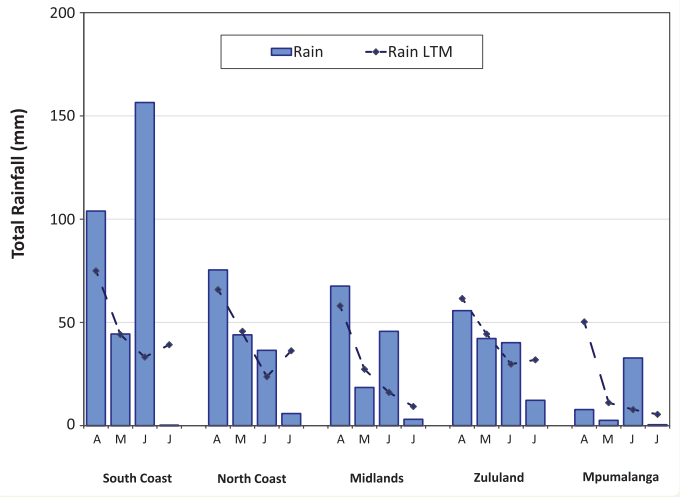


Figure 1: Regional average monthly total rainfall (Rain) for April to July, 2021, compared to the monthly long-term mean (Rain LTM).

Outlook

The El Niño-Southern Oscillation (ENSO) is currently in a neutral state which is projected to last through to the early 2021/22 summer season. A neutral ENSO phase is generally favourable for normal summer rainfall in the eastern parts of South Africa.

The *South African Weather Service* and the *European Centre for Medium-Range Weather Forecast* predict normal- to above-normal rainfall in the spring and early summer months (September to December), while the *International Research Institute for Climate and Society* predicts below-normal spring rainfall with an improvement towards normal -to above-normal in the early summer months.

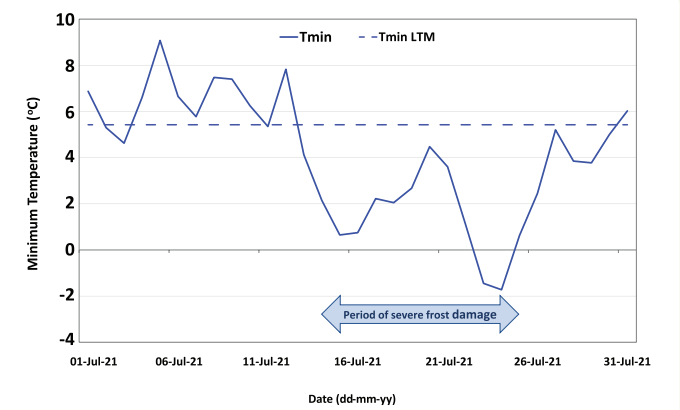


Figure 2: Average daily minimum temperature (Tmin) for sites in the Midlands North region for July 2021 compared to the corresponding monthly long-term mean (Tmin LTM).

Please visit the SASRI WeatherWeb https://sasri.sasa.org.za/weatherweb for the latest industry weather reports and links to up-to-date seasonal climate forecasts.

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