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SASRI
SOUTH AFRICAN SUGARCANE RESEARCH INSTITUTE
Unlocking the potential of sugarcane

Participatory commercial ripener demonstration trials have revealed some interesting results for longer cycle rainfed crops. See the article on page 16 for details on the favourable gross margins achieved.

DIRECTOR'S Message

Carolyn Baker

The past year

While 2020 will no doubt be remembered as the year that COVID-19 reached South Africa and turned many of our lives upside down, in the sugar industry it will also be remembered as the year that the Sugar Industry Master Plan was signed. While these notable events may have overshadowed some of the valuable work that SASRI has done during the past year in support of all sugarcane growers and their cane productivity, we have remained committed to the delivery of technology products that are designed to improve farming practices.

The COVID-19 restrictions imposed on all of us meant that considerable efforts were made to explore alternative technologies that would enhance engagement with growers, with the result that a number of our knowledge exchange resources were updated in addition to development of several new ones using digital technology. The eLibrary on SASRI's website provides an excellent platform for accessing this material and of course our YouTube channel will lead you directly to all video material. The manner in which SASRI staff have embraced the need to conduct their work in alternative ways, and have remained highly productive, has been remarkable.

Knowledge capital

The fact that SASRI has been able to respond so well to these changing circumstances and not only sustain existing research programmes but also identify and develop new research focus areas, reflects on the remarkable knowledge capital that is resident in SASRI – and that has been built up over a very long time.

The industry's proactive recognition of the value of research has been instrumental in ensuring the retention and dedication of our specialists in serving all sugarcane growers in the best way possible. It is well known that in any knowledge organisation the value of its offerings is directly linked to the expertise and competence of the specialists that it has, and at SASRI the challenge of securing and retaining this complement for the benefit of the industry has become increasingly difficult. Consequently, the development of the Master Plan and the demonstrated commitment of all stakeholders to contribute collectively towards the sustainability of the sugar industry, provides a very welcome signal that will boost staff morale and confidence.

The 2023 seedcane deadline

As we approach 2023, the focus on developing suitable seedcane sources for the industry is intensifying. Considerable progress has been made during the course of this past year in the development of certified and approved seedcane schemes in some parts of the industry, but much has yet to be done. SASRI's role in this process remains the same, with Extension providing advice and support and the Biosecurity Inspectorate inspecting seedbeds designated for planting as well as all certified and approved seedcane sources. On release of a new variety, SASRI provides a limited amount of either seedcane or tissue cultured plants of the new variety to each Local Pest Disease and Variety Control Committee (LPD&VCC) area for which the variety has been gazetted, for the LPDVCC to then direct and facilitate bulking up of the new variety prior to distribution to growers. The limitation on the amount of material that is distributed to the industry relates to limitations in the plant breeding programme, either on suitable land on SASRI's research stations where these new varieties have been selected and nurtured (in the case of seedcane production), or capacity constraints associated with the NOVACANE® facility at SASRI (in the case of production of tissue cultured material). This limitation places a considerable responsibility in the hands of the LPD&VCCs, which have to ensure that the restricted quantity of new variety material that they receive from SASRI is bulked up as successfully as possible, in order that the new varieties become available to growers as soon as possible. As always, SASRI remains dedicated to supporting these local structures to enable them to effectively serve the growers in each of their regions.

Topical Tips:

Rowan Stranack *(Extension & Biorisk Manager)*

Diseases and pests

Smut has been problematic this spring and summer after the relatively dry winter and spring. In the irrigated areas, pay attention to roguing fields of N19, N25, N36, N41 and N43. In the rainfed areas, N48, N54 and N59 need monitoring and roguing to make sure smut is controlled. When roguing diseased plants make sure the entire stool is removed, including the roots to prevent regrowth. Chemical roguing of smut, mosaic and off-types is also an option.

Pay attention to roguing for mosaic particularly on susceptible varieties such as NCo376, N19 and N57 and to keep grass on verges and open areas close to fields short to limit aphids from entering the fields. In the irrigated regions, there should be no planting of N57 during the summer months due to the risk of mosaic infecting this popular but intermediate mosaic susceptible variety. Other popular and intermediate mosaic susceptible varieties such as N12, N36 and N41 should also be closely monitored.

Outbreaks of yellow sugarcane aphid are likely to occur in summer and autumn. Regular scouting will provide early warning of an outbreak and trigger treatment if necessary. This is proving to be successful where growers are actively implementing this approach. Often the pest reappears in the same spot each year and these areas should be checked carefully. Spraying of insecticide 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.

Keep breaks, verges and waterways well mowed. These areas can harbour carriers of diseases such as mosaic, maize streak virus, and sugarcane yellow leaf virus, and pests such as the yellow sugarcane aphid. Consider chemical mowing to save money.

The big threat in the southern rainfed areas this summer will be eldana in unplanned carryover cane (See articles on pages 18 and 19). Scouting will prove critical in selecting and prioritising fields either for early harvest once the mills open, or for possible further treatment if harvesting will not be possible until winter. Eldana can destroy a crop if cane is left to age untreated.The cost and trouble to treat cane will be minimal in the face of total loss. Vigilance is key.

Topical Tips: Crop management

Fields heavily infested with eldana at harvest might retain a significant population of the pest in the stubble. Speak to your SASRI extension specialist or biosecurity officer or advisor for assistance in determining if stool treatment will be required.

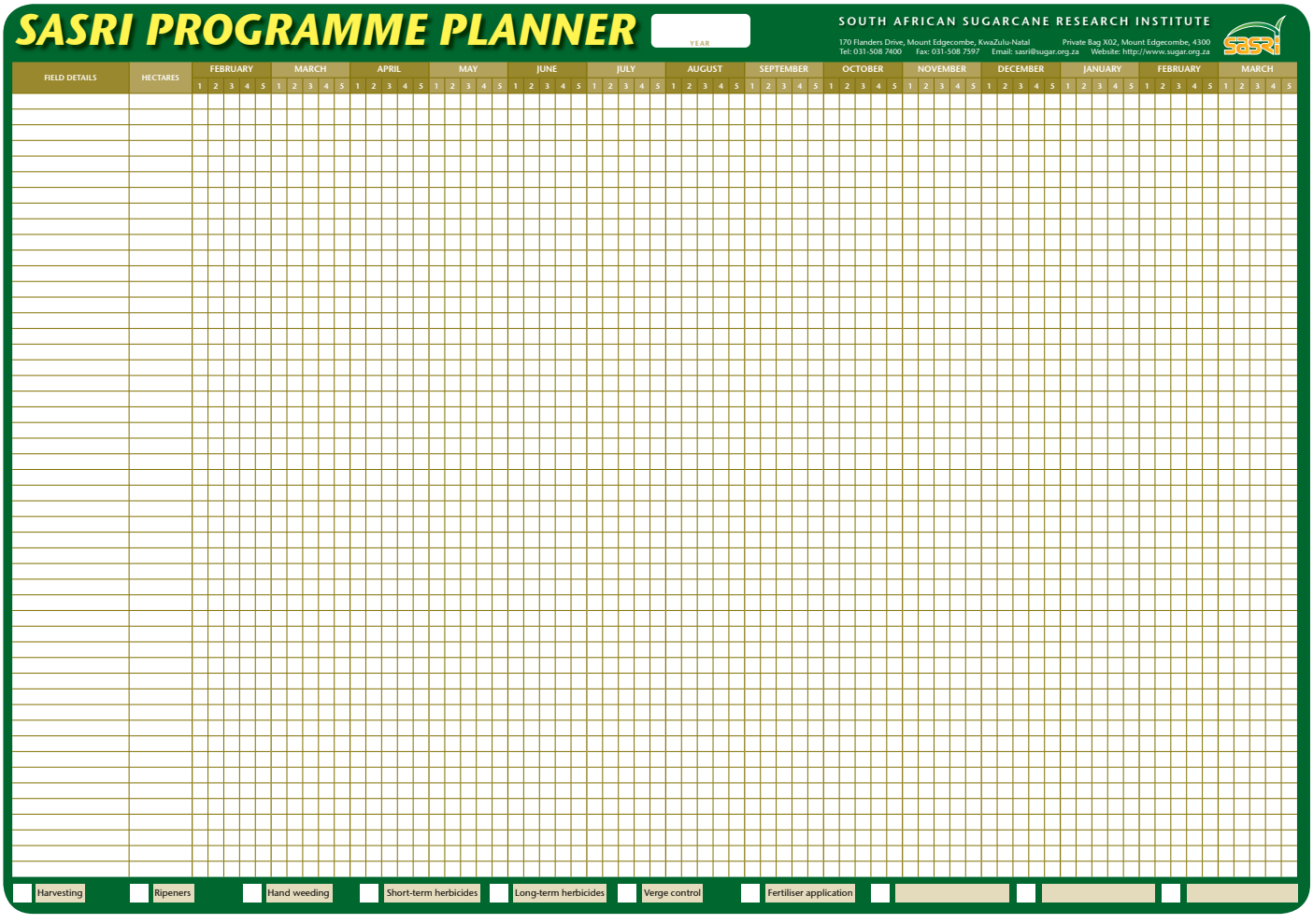
Although regarded as the so-called 'quiet time' of the season, in fact January February and March is when maximum growth takes place and maximum income is being generated. Growers with irrigation should be on full alert to ensure minimal disruption to water supply. Make sure growth is not lost to unnecessary weed competition and ineffective irrigation scheduling.

Planning your harvesting and replant programme for the coming season should be complete 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 – www.sasri.org.za/decision-support-tools/or speak to your SASRI extension specialist.

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 to each field and take note of all the necessary operations required to ensure the field will produce an optimum yield. A programme planning chart can be used to visually schedule all the necessary operations for the season ahead. At this stage, once all field inputs and operations have been decided, a budget can be developed.

The quieter times during the off-season are 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.

There are now many new sugarcane varieties available, each with specific characteristics and requirements. For effective management ensure that you have the latest Information Sheets on these varieties. It is going to be difficult for a while to keep track of which varieties are where on the farm. Painted stone markers at the field corners will leave no doubt until you are more familiar with their appearance.



Topical Tips: Weed control

Summer is the time to be working 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 put 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 to take extra care in fields where grasses are a problem.

Alien weed encroachment can be a problem on some farms. The off-season is an ideal time to start an alien plant control programme when there is less pressure from other operations. Herbicides also generally work better in the warm wet conditions. Start by tackling a small, manageable area that is not too overrun with undesirable vegetation. This way, you will see meaningful results in a short space of time. If you are unsure about the identification of weed species, contact your SASRI extension specialist who can get the problem plants identified.

Topical Tips: Crop nutrition and soil health

It is not too late to take leaf samples provided that 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 might be necessary in the coming season's fertiliser programme.

Plan to sample soils as early as possible in order that lime application and the planting of green manure crops can be done timeously. Green manures for winter fallows 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 dry 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 FAS. Speak to your SASRI extension specialist.

Quite often at this time of the year some fields will appear yellow and poorly grown. This generally indicates a lack of nitrogen, either as a result of not enough fertiliser being applied or nitrogen having been lost as a result of a heavy rainfall event. Take care, though, as yellow, nutrient deficient patches can also be attributed to other factors such as sugarcane yellow leaf virus, yellow sugarcane aphid, white grub or nematodes. Consult your SASRI extension specialist if in doubt.

Topical Tips: Soil conservation

It is important to ensure that during the rainy season all contour structures and waterways are flowing properly. Remove any sediment or other material affecting the flow of water in these structures. Blockages can cause over-topping of contours and result in erosion in fields. Similarly, smaller drains and culverts need to be kept clear as blockages can cause problems. The off-crop is also an ideal time to carry out routine maintenance of roads and structures in preparation for the coming season.

The protection of wetlands and watercourses is also essential in order 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 to encourage the rehabilitation of wetlands, and there is a wealth of information available.

The Sustainable Sugarcane Farm Management System (SUSFARMS®) is an excellent practical tool which can be used to gauge the level to which better management practices have been implemented on your farm. Speak to your SASRI extension specialist for more details or visit www.sasri.org.za/susfarms.

Understanding Soil Structure – A key to maintaining soil health

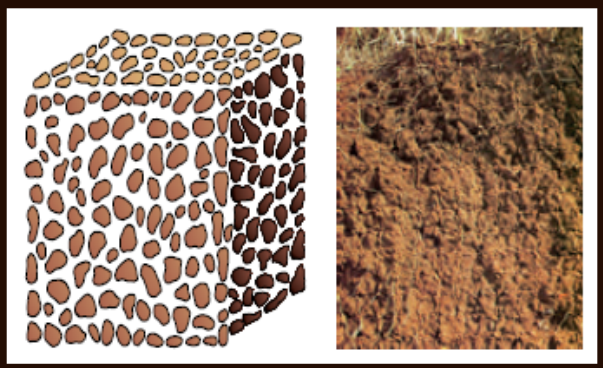
Rian van Antwerpen *(Senior Soil Scientist)*

In farming there is generally a strong focus on caring for the crop in terms of soil preparation, fertilisation, weeds, pests and diseases. When it comes to soil health, many farmers will conduct important operations such as the application of lime and gypsum for acidity or sodicity problems, organic matter to improve nutrient cycling and biological functions and avoiding unnecessary tillage of the soil to conserve organic matter and reduce compaction. However, few farmers will understand the underlying issues related to soil structure. A basic understanding of soil structure is necessary in order to maintain or improve the physical condition of soils.

An introduction to soil structure

Soil structure is the arrangement of soil particles (sand, silt and clay) into granules, crumbs or blocks. The main building blocks are clay, Ca and soil organic matter (SOM). To create structure in very sandy soils is almost impossible and, if achieved, they will be unstable and will not last long. Clay particles in a flocculated condition along with a cementation agent is required to create aggregates (the initial small units called crumbs). The most common cementation agent is Ca but also include Fe and Al. SOM however is essential and serves as food for microbes who breakdown the SOM into humus like products to become building material. The microbes also excrete a thick, gluey substance that helps to bind particles together to strengthen the structure. This is a relatively slow process, but significantly visible results can be achieved within three months under favourable conditions. These conditions include the presence of all building material, moisture (not saturated), fresh organic matter (labile component of SOM) and the absence of adverse conditions such as tillage, traffic and water logging.

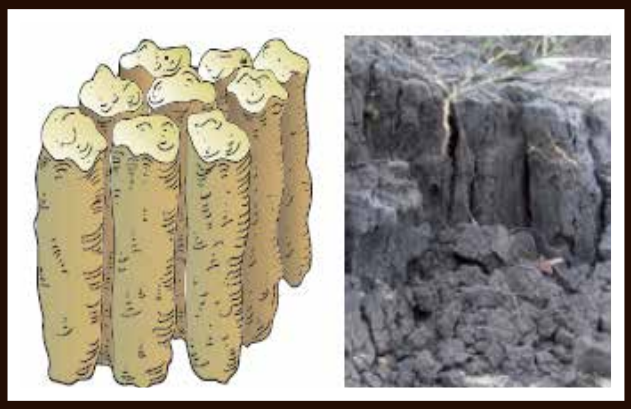
A number of structure types can be found but not all are favoured in agriculture. The preferred structures are:



- Ped structure (crumb like structure units and the majority are about 20 mm in diameter and smaller): These soils are well-drained and well-aerated with no restriction to root development. The ped structure can be present in the top- and subsoil layers. These are amongst the best agriculture soils for crop production. These are often referred to as having a friable and loose structure with good tilth.

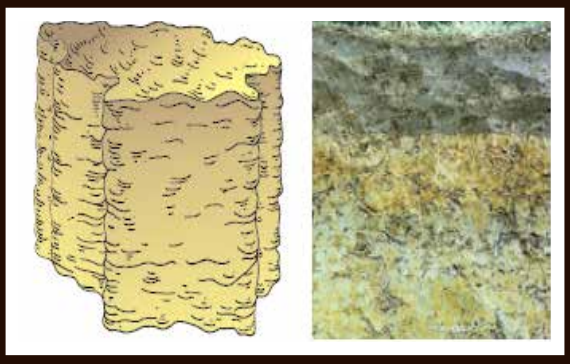
- Blocky structure (units are generally the size of golf to cricket balls and are often covered by an extremely thin clay layer). Due to a relatively high clay content their water and nutrient retention are relatively high, and the production potential of these soils is normally rated from moderate to high. The drawback is the larger structure units, especially if the density is fairly high, which often prevents the penetration of roots. This means the roots have to stay on the surface of the ped with limited access to the water and nutrients inside the ped that can be slowly available for uptake. These structure units occur almost exclusively in the subsoil.

Unfavoured soil structure types are:



- Column structure (the horizontal distance of the unit is much smaller than the vertical length): Despite very high water and nutrient retention ability, water infiltration rates are slow, water tables can develop under extended periods of rain or irrigation and root

distribution is largely restricted to spaces between structures. This structure is associated subsoils of high clay soils (and made worse by dispersive or sodic conditions). These are seen when severe erosion has removed topsoil layers to expose the subsoil.



- Massive structure (layer with a very high clay content and no recognisable structure units). The mechanical strength of this layer is high, water infiltration is extremely slow and the colour highly variable or mottled, which is an indication of long periods of alternating wet and dry periods and mostly lack of aeration. It is highly unlikely that roots will be found in this layer. This soil, however, is in the ideal location to build a dam. With excessive tillage, loss of flocculating/aggregating agents, etc, one can induce a massive condition in otherwise physically good soils (such as high clay Hutton soils).

- Structureless or single grained structure (similar to beach soil): These soils tend to be very sandy with low water and nutrient storage capacity. Roots often penetrate to extreme depths in the search for water. Erosion and nematodes are often severe problems. Increasing organic matter levels is necessary to increase both water and nutrient holding capacity. The surface should be permanently covered with crops or a mulch to guard against crusting and soil erosion.

Improving soil structure

- It is not the structural units themselves that are important but rather the pore or air spaces between units (called porosity). These are the voids where water is held, air is present, surface of clay particles storing nutrients can be found and where roots grow in order to support the plant.
- One of the first signs of deteriorating soil physical properties is stress in the crop, ie. water stress (due to reduce water availability and poor root growth) and the build-up of unwanted gasses in the soil (mainly carbon dioxide and methane). These stresses weaken the crop making it vulnerable to attacks by pests (e.g. eldana) and diseases (e.g. RSD), while impairing its ability to efficiently take up nutrients and water. The soil conditions responsible for stress includes crusting, compaction, shallow depth, dryness and water logging.
- There are several steps a farmer can take to improve soil structure:
- Explore using minimum or non-inversion tillage to maintain topsoil organic matter, reduce runoff and cut costs.
- Increase soil organic matter levels by green cane harvesting, planting green manure fallow crops, applying composts and manures and integrate livestock into your farming operation.
- Include periodic soil tillage or subsoiling in minimum-tillage systems to incorporate especially lime (to improve soil pH) but also gypsum (to address sodic conditions), break compacted layers and to aerate the soil (but try not to invert the soil). Be aware of conditions and practices that destroy structures such as sodification (Na causing dispersion and structure collapse), lack of SOM, tillage (physically destroys structure and enhances SOM mineralisation) and infield traffic (causes compaction).

How to observe your soil structure

- Open a pit (do not use an auger – it will destroy the structure units) and chip away the first 20 cm covering the surface wall. Inspect the wall for structure units by removing pieces of soil from the wall at different depths.
- Note also any hard layers, their depth and thickness (signs of compaction) and the change in structure from the topsoil (first layer varying in depth from 20 to 40 cm) to subsoil.
- Look for signs of earthworm activity (good sign) and root diameter (should be fine and well branched) and root distribution (should be uniformly present in the first 60 cm).
- To test the stability of structure units from different depths, add it slowly to a dish of deionised water (water used for batteries). Ideally the structure should be mostly intact (recognisable) after 10 minutes. If the peds collapse, but the water remains clear, then it suggests reduced structural stability but that should remain productive with good management. If the ped disintegrates completely and the water goes cloudy, then you have dispersive soil that is very prone to structural collapse. Careful management and remedial actions are required to correct this condition.

Keep an eye out for EYE SPOT in autumn

Sharon McFarlane *(Plant Pathologist,)* David Wilkinson *(Extension Specialist: Midlands North)* and Janet Edmonds *(Biosecurity Officer, Midlands North)*

Please be on the look out for eye spot in the Midlands and other high-lying areas of the industry in April / May, particularly if conditions have been cool and wet.

Eye spot is generally considered a minor disease of cane and has been in our industry since the 1920s. Serious losses (up to 33%) have occurred periodically in other countries when conditions have favoured widespread and severe infections in susceptible varieties, but such losses have not been experienced in South Africa previously.

After over 20 years of being largely absent in our industry, severe symptoms were observed in some fields of N61 near New Hanover and Bruyns Hill in May 2020. The cool wet weather in early- and mid-April would have favoured development but the severity of the symptoms observed indicates that N61 is susceptible.

The disease is caused by a fungus and fungicide trials are planned in suitable fields from March 2021. The Biosecurity teams will check for symptoms in all varieties, particularly as autumn approaches.

Please approach your Biosecurity Officer or Extension Specialist if you need assistance!

POTASSIUM MANAGEMENT: The crop optimiser

Louis Titshall *(Senior Soil Scientist)*

Potassium (K) plays a vital role in several metabolic functions in the crop and is important for sugar production, photosynthesis and respiration in the plant. It is necessary for regulating uptake of other nutrients and provides protection against several stress conditions, such as drought. Typically the requirement is between 1.5 to 2 kg K per ton of cane produced. On the negative side, sugarcane is known to be a luxury consumer of K and is capable of taking up K well in excess of crop requirement, without any apparent negative effect on crop growth. This has often led to the belief that sugarcane requires excessively high amount of K fertiliser, but this is not true. Too much K in the crop has been linked to poor sugar recovery and high ash content. Excessive K in the soil can also negatively impact on the soil salt balance and lead to reduced uptake of other nutrients such as Ca and Mg. Overall this can lead to a poorer quality crop while unnecessary money has been spent on K fertiliser.

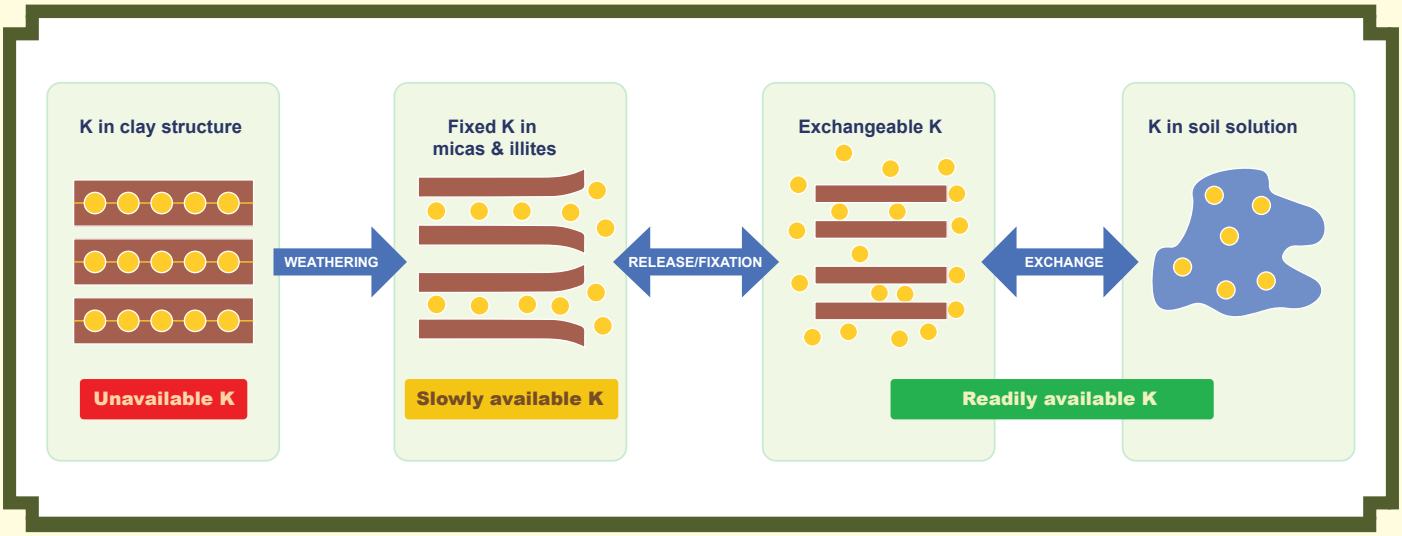


Figure 1: Potassium in the soil exists as unavailable structural K in soil minerals, slowly available K (reserve K) held between clay layers that can be released slowly into soil solution and available K (exchangeable and solution K) that the plant can readily use.

Potassium availability in soils

Potassium exists in the soil in three main forms, namely: Readily available, slowly available and unavailable K (Figure 1):

Readily available K is the component most easily accessed and used by the crop. It consists of the K in soil solution (i.e. free K between soil particles) and the K loosely held on exchange site on clay minerals and organic matter. As the crop uses K from solution, additional K is released into the soil solution from the exchange sites.

The next fraction is the **Slowly available K,** this referring to the much slower release of this K for crop uptake. Generally in less weathered and some alluvial soils there are high amounts of soil minerals that are able to trap K ions between the structural K layers ("fixed" interlayer K). This K can be slowly released into the soil solution due to changes in the concentrations of other K fractions, though this can take from several days to weeks to occur. The rate of the release will depend on the type of clay minerals holding the K, the amount in the readily available fraction, soil moisture and the availability of other cations to exchange with. At SASRI we call this fraction the "Reserve K" and we estimate this amount during routine soil testing. We use this value to adjust the amount of K we expect a soil to require, to allow for optimal crop growth.

The last component is the K held tightly by soil minerals, called **Unavailable K.** This component is usually ignored as the rate of release occurs over very many years and even decades, so contributes little to seasonal nutrient budgets.

Getting the best from your K

At SASRI we use different K thresholds for different soil types and conditions. For instance, in sandy soils, a lower threshold is used due to low ability of sands to store K.

In high base status, clay soils, common in the irrigated regions, we use a much higher threshold to account for the high K holding ability of those soils and the competitive effects of high Ca and Mg levels. In addition to the available soil test, the Reserve K is used to adjust the K requirement to prevent you from overspending and over-applying unnecessary K fertiliser. It is also worth considering adopting green cane harvesting and mulching practices. Cane leaves also accumulate K. If you retain these during harvesting you can lower you K requirement by as much as 30% for following crop cycle.

Potash (or KCl) is the most common soluble fertiliser salt used for K applications. Some growers have access to molasses, vinasse or CMS, all of which can contain considerable quantities of K. Ensure you have these tested for nutrient levels so you can adjust your K fertiliser application rates accordingly. There is little evidence to support split applications (unlike N where split applications are generally advised). On plant cane, splitting the dose between furrow application and broadcast is advised. In clay soils an effort to incorporate top dressed K is advised. Avoid applying more than about 100 kg K/ha (or 200 kg KCl/ha) in the furrow when planting as this can cause salt burn to the setts. In ratoon crops, banded applications on either side of the stool lines work well. Always apply the fertiliser to moist soil and try coincide applications with expected rainfall or irrigate-in soon after topdressing. Potassium movement is severely restricted in dry soils, and roots cannot access the nutrient under dry conditions.

Reservations about Reserve K

Since the adoption of the Reserve K measure and adjustments to the K rate in FAS recommendations, some growers started receiving FAS reports that indicate much lower K recommendations than they have traditionally been used to (this being particularly true for samples for the irrigated regions). This has caused confusion and scepticism among growers and fertiliser advisors, especially if you have become accustomed to regular application of high rates of K.

If you are in doubt and don't believe such drastic K reduction are sensible, you can undertake the following on-farm test to check and refine your K fertiliser recommendations going forward:

- In the fields you want to evaluate if the reduced K recommendation has merit, demarcate a small plot in that field of around 20 meter long with 7 to 10 rows of cane (or bigger if more practical).
- In the main field, apply K as you have previously done or as advised with no Reserve K adjustment.
- In the marked sub-plot, apply the lower K rate.
- Monitor the crop response between the main field and your test plot.

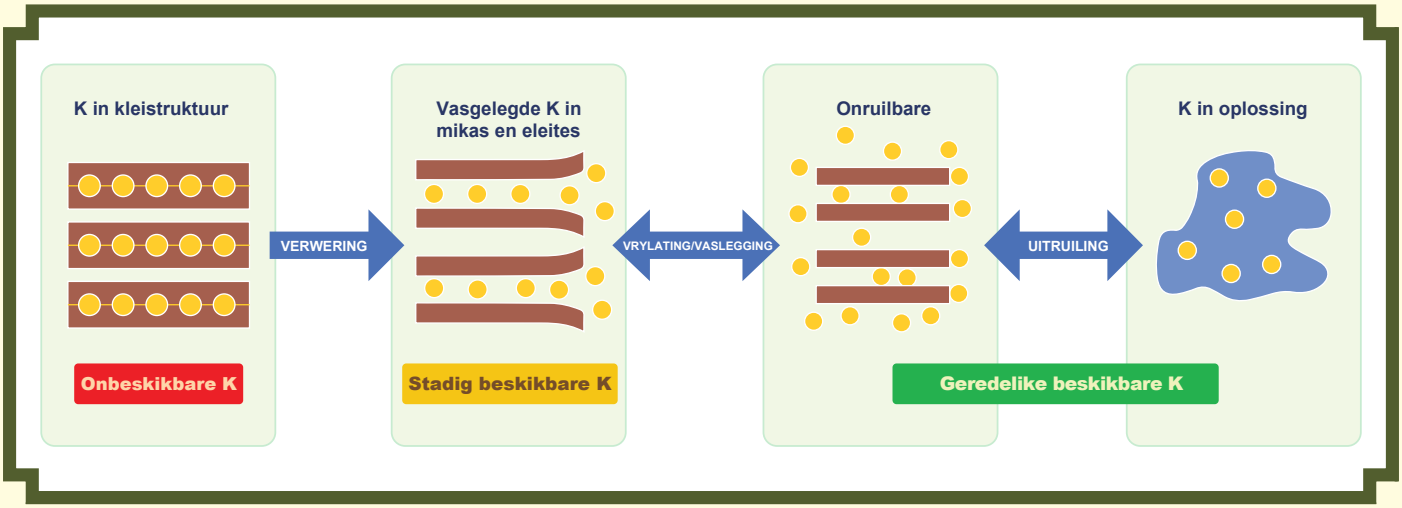
If you cannot detect a difference between the main field and test plot then you know the Reserve K adjusted recommendations are saving you money and not affecting crop yield. If you do see differences you can start to adjust your K applications to optimise your K fertiliser use.

It is likely that you can apply much less than you currently are using when you have good stores of soil K. If you want greater certainty, undertake comparative leaf testing later in the season to ensure the crop is at optimal K levels.

KALIUM BESTUUR:
Die gewas optimaliseerder

Louis Titshall *(Senior grondwetenskaplike)*

Kalium (K) speel 'n kardinale rol in verskeie metabolise funksies in gewasse en is belangrik vir suiker produksie, fotosintese en respirasie in suikerriet. Kalium word benodig vir die beheer en regulasie van opname van ander voedingstowwe en bied ook beskerming teen stres situasies, byvoorbeeld droogtes. Die gemiddelde hoeveelheid Kalium wat benodig word om 1 ton suikerriet te produseer is 1.5 tot 2 kg. Aan die ander kant word dit algemeen aanvaar dat suikerriet 'n oordadige (luukse) verbruiker van Kalium is en dat die plant die vermoë besit om meer op te neem as wat benodig word, met geen negatiewe effek op die groei van die suikerrietplant nie. As gevolg van hierdie vermoë van die suikerrietplant word dit algemeen aanvaar dat suikerriet groot hoeveelhede Kalium benodig om te groei, maar dit is egter nie die geval nie. Hoë hoeveelhede Kalium in suikerriet word verbind met lae suiker vlakke en hoë asvlakke. Te veel Kalium in die grond kan 'n negatiewe invloed op die sout balans in die grond tot gevolg hê en dit kan veroorsaak dat die opname van ander voedingstowwe soos Kalsium en Magnesium verminder kan word. Alles in aggenome kan hierdie situasie tot 'n laer kwaliteit gewas of oes lei en onnodige geld word uitgegee om meer Kalium-kunsmis te koop.



Figuur 1: Kalium in die grond bestaan as onbeskikbare struktuele Kalium in grond minerale, stadige (geredelik beskikbare) Kalium wat tussen klei lae stadig beskikbaar gestel word in 'n grond oplossing, en beskikbare kalium (uitruilbare en oplossing Kalium) wat die plant geredelik kan gebruik.

Beskikbaarheid van Kalium in grond

Kalium kom in drie verskillende vorms voor in grond, naamlik: maklik (geredelike) beskikbare, stadige beskikbare en onbeskikbare Kalium (Figuur 1):

Geredelike beskikbare Kalium is die komponent in grond wat die maklikste beskikbaar is vir gebuik deur die gewas. Dit bestaan uit K in die grond oplossing (vrye K tussen grond deeltjies) en die K wat losserig op die uitruil punte van klei minerale en organise materiaal sit. Terwyl die gewas K uit die grondoplossing gebruik, work addisionele K vrygelaat in die grond oplossing deur die uitruil punte.

Die volgende komponent is die **stadig beskikbare K,** hier word verwys na die baie stadiger vrylating van K vir gebruik deur die gewas. Gewoonlik, in minder verweerde en in sommige alluviale gronde is daar hoë hoeveelhede grond minerale wat K – ione tussen die strukturele K lae kan vasvang (vaste tussenlaag K). Hierdie K kan stadig in die grondoplossing vrygestel word as gevolg van veranderinge in die konsentrasies van ander K-fraksies, wat van 'n paar dae tot 'n paar weke kan duur. Die tempo van vrystelling sal afhang van die tipe kleiminerale wat met die K verbind is, die hoeveelheid in die maklik beskikbaar fraksie, grondvog en die beskikbaarheid van ander katione om mee uit te ruil. By SASRI word daar verwyn na as "Reserwe K hierdie is 'n geskatte waarde tydens roetine grondtoetse. Hierdie waarde word gebruik om die hoeveelheid K aan te pas wat ons verwag dat die grond mag benodig om optimale gewasgroei moontlik te maak.

Die laaste komponent is die K wat styf vasgehou word deur grond minerale, genaamd Onbeskikbare K. Hierdie komponent word gewoonlik geïgnoreer aangesien die tempo van vrystelling oor baie jare en selfs dekades kan plaasvind, en dra dus min by tot die seisoenale voedingsbegrotings.

Kry die beste uit jou K

SASRI gebruik verskillende K-drempels vir verskillende grondtipes en grondtoestande, byvoorbeeld in 'n sanderige grond word 'n laer drempelwaarde gebruik omdat sand 'n lae vermoë het om K te stoor. In hoër basisstatus kleigronde, wat algemeen voorkom in die besproeiingsgebiede, word 'n baie hoër drempelwaarde gebruik om die hoë K-houvermoë en ook die mededingende gevolge van hoë Ca- en Mg-vlakke in hierdie grond in berekening te bring. Benewens die beskikbare grondtoets, word die Reserwe K ook gebruik om die K-vereiste aan te pas om te verhoed dat teveel geld bestee word en dat teveel K in die grond toegedien word. Dit is ook die moeite werd om groenstok oes- en deklaagpraktyke te oorweeg. Suikerriet blare versamel ook K. Indien die droë blare tydens die oesproses op die land agtergelaat word, kan die K-vereiste met tot soveel as 30% verlaag vir die volgende gewassiklus.

Potas (of KCl) is die mees algemene oplosbare kunsmissout wat vir K-toedienings gebruik word. Sommige suikerriet boere het toegang tot molasse, vinasse of CMS, wat almal aansienlike hoeveelhede K kan bevat. Maak seker dat die voedingsvlakke getoets word, sodat die toedieningshoeveelhede vir K kunsmis daarvolgens aangepas kan word. Daar is min bewyse wat dit die moeite werd maak om verdeelde(split) toedienings te ondersteun (anders as N waar verdeelde (split) toedienings gewoonlik aangeraai word). Dit word aanbeveel om op plantriet die dosis te verdeel tussen die plantvoor toediening en wanneer oppervlak verspreigings toedienings gedoen word. Oppervlak toedienings K in kleigronde word aanbeveel. Vermy toediening van meer as 100 kg/ha (of 200 kg KCl/ha) in die voor wanneer geplant word aangesien dit soutbrand op die suikerriet stokke (sets) kan veroorsaak. Streep toediening van kunsmis aan beide kante van die stoele van ratoen lande word aanbeveel. Dien die kunsmis altyd toe op vogtige grond of probeer om die toedienings te doen net voor reënval of besproeiing verwag word kort ná toediening. Kaliumbeweging word streng beperk in droë gronde, en wortels het nie toegang tot die voedingsstof onder droë toestande nie.

Kwellings en vrae oor Reserwe-K

Sedert die aanvaarding van die Reserwe K-maatstaf en aanpassings aan die K-aanbevelings in FAS, het sommige suikerriet boere begin om FAS-verslae te ontvang wat dui op baie laer K-aanbevelings as waaraan hulle gewoond was (dit geld veral vir grond monsters vanuit die besproeiingsstreke). Dit het verwarring en onsekerheid onder suikerrietboere en kunsmisadviseurs veroorsaak, veral omdat hulle gewoond geraak het aan die gebruik van hoë vlakke K.

Indien daar enige twyfel bestaan oor die drastiese K-verlaging aanbevelings en voel dit nie sinvol is nie, onderneem die volgende plaasproef om u K-kunsmisaanbevelings in die toekoms na te gaan en te verfyn

- In die lande wat u wil evalueer of die verminderde K-aanbeveling enige meriete het, merk 'n klein area in die land van ongeveer 20 meter lank met 7 tot 10 rye riet (of groter as dit meer prakties is).
- Pas die K-koers toe soos voorheen aanbeveel of soos geadviseer is in die hoof land, sonder om die reserwe-K aan te pas.
- Pas die laer K-koers toe op die gemerkte toets area.
- Monitor die verskille in die gewas tussen die hoof land en die toets area.

Indien geen verskille tussen die hoof land en die toets area waargeneem word nie, kan aangeneem word dat die aangepaste aanbeveling van Reserwe-K 'n besparing aandui sonder om die oesopbrengs te beïnvloed. Indien verskille wel waargeneem word, kan die K-toedienings aangepas word om K-kunsmisgebruik te optimaliseer.

Dit is waarskynlik dat baie minder K toegedien kan word as wat tans gebruik word, indien die grond 'n goeie K-vlak het. Om meer sekerheid te hê, kan blaarmonsters later in die seisoen geneem word van beide die hoof land en die toets area om die resultate te vergelyk. Sodoende kan verseker word dat die gewas op die optimale K-vlakke is.

Participatory commercial ripener demonstration trial results in longer-cycle rainfed crops

Riekert van Heerden *(Senior Scientist: Sugarcane Physiology)*

The benefits of using chemical ripeners for cane quality management in immature annual-cycle (12-month harvest age) sugarcane crops have been demonstrated extensively, both in formal small-plot research trials and in participatory commercial demonstration trials with growers. These benefits have also been demonstrated in formal small-plot research trials in longer-cycle (18-month harvest age) rainfed crops in the Midlands. However, demonstration of these benefits under commercial conditions in longer-cycle (18 – 24 months harvest age) rainfed crops have received little attention.

During the past two years this knowledge gap was addressed in collaboration with growers situated along the KZN South Coast and in the Midlands. Nine ripener demonstration trials were conducted in commercial fields with rainfed varieties harvested during April – July at harvest ages of 18 months or older. Trials were situated in the Dalton, Eston, Richmond, Jolivet and Park Rynie regions.

An informed selection process was followed to ensure suitability of the commercial crops for demonstration trial purposes. Severely lodged crops, that have not yet re-established an upward-facing leaf canopy, and crops suffering from Eldana infestation or other pest and disease issues, were avoided. Shortly before application of the ripener treatment the suitability for spraying was established in each field through visual inspection in conjunction with whole-stalk juice purity estimation with a hand-held refractometer and the **Pur*Est***® smartphone application. In this way the spraying of crops suffering from drought stress, or other yield limiting factors, were avoided.

TRIAL LAYOUT

Demonstration trial fields were demarcated into unsprayed (control) and ripened treatments. Both treatments were always located adjacent to each other and with all crop variables (variety, ratoon number and crop age) being equal. In cases where a visible yield gradient was evident the treatments were positioned so that the gradient was captured as best as practically possible in both treatments. Products containing the active ingredient fluazifop-p-butyl were applied in all trials, either by helicopter or crop spraying drone, at intended spray-to-harvest intervals aligned with SASRI recommendations and product label specifications.

The participating growers remained the principle decision-makers in terms of actual spray and harvest dates.

Shortly before the intended harvest date a ripener efficacy assessment was conducted in each trial to note the uniformity and degree of visual ripener symptoms characteristic of fluazifop-p-butyl (e.g. cessation of stalk growing points, desiccated leaf spindles and side-shooting). Harvest readiness of fields were evaluated with a hand-held refractometer and discussed with the grower so that agreement could be reached on the actual harvest date.

HARVEST TIME

Harvesting of the fields were carried out by the growers in conventional commercial fashion, but with the cane consignments from the control and ripened treatments being transported to the mills separately. Upon prior arrangement, the majority of cane consignments were tested by the Cane Testing Service (CTS) at the mills. The RV% data, and the individual cane consignment payloads, were used to calculate the RV yield in each of the treatments.

GROSS MARGINS

The benefit of ripening, expressed as the gross margin difference in R/ha between the control and ripened treatments, was established for each trial. This was done by taking into account RV yield income, ripening (chemical and application) cost, as well as harvesting and transport costs. The RV price, applicable to the specific harvest month, was used to calculate RV yield income in each trial. Subtraction of above costs from RV yield income allowed determination of gross margins.

The outcome of each trial was discussed with the participating grower. The table below summarises the cane quality, yield and economic results obtained in each of the 9 demonstration trials.

The effects of fluazifop-p-butyl treatment on RV%, cane yield, RV yield and gross margin return in longer-cycle rainfed crops in participatory commercial demonstration trials on grower farms during 2019 – 2020.

Region	Variety	Harvest Age	Harvest Month	Treatment	RV	Cane Yield	RV Yield	Gross Margin Return
		(months)	(month & year)		(%)	(t/ha)	(t/ha)	(R/ha)
Eston	N31	22	May 2019	Control	9.0	65.0	5.85	-
				Ripened	11.0	62.3	6.85	+4000
Richmond	N48	23	May 2019	Control	9.5	141.6	13.45	-
				Ripened	11.6	131.7	15.27	+8818
Richmond	N54	18	Apr 2019	Control	9.6	157.7	15.13	-
				Ripened	10.9	153.5	16.73	+6692
Park Rynie	N58	18	Jul 2019	Control	13.4	102.7	13.76	-
				Ripened	14.4	103.1	14.84	+3994
Richmond	N41	24	Apr 2020	Control	10.8	96.02	10.4	-
				Ripened	12.3	92.17	11.36	+4322
Park Rynie	N41	18	May 2020	Control	12.6	81.4	10.26	-
				Ripened	13.6	83.5	11.40	+4579
Dalton	N48	18	Apr 2020	Control	11.2	112.3	12.6	-
				Ripened	13.2	102.6	13.6	+5373
Park Rynie	N51	19	Jul 2020	Control	11.5	91.9	10.6	-
				Ripened	11.7	93.8	11.0	+1496
Jolivet	N52	18	Apr 2020	Control	9.6	111.4	10.72	-
				Ripened	10.6	97.4	10.34	+541

RESULT HIGHLIGHTS

- In all trials the ripener treatment resulted in increases in cane quality (RV%).
- The effects of the ripener treatment on cane yield varied between trials. Analysis of rainfall data from nearby weather stations indicate that the growing conditions after spraying can influence the magnitude of the cane yield effect induced by the ripener.
- Except for one trial, the RV yields in the ripener treatments were always higher than in the control treatments. The only exception was the trial at Jolivet. The lower RV yield in the ripener treatment was caused by an excessively long spray-to-harvest interval, which eroded cane yield amidst very good growing conditions. This emphasises the need to take cognisance of the importance of appropriate spray-to-harvest intervals to strike a balance between RV% and cane yield responses for best RV yield outcomes.
- Gross margin returns in all trials were favourably influenced by the ripener treatments and ranged between R541/ha – R8818/ha. The positive financial outcome in the trial at Jolivet, which was realised despite the lower RV yield, was brought about through savings in harvesting and high transport costs due to long distance from the mill.

IN SUMMARY

This collection of participatory commercial ripener demonstration trials highlight the potential for significant financial benefit from chemical ripening in longer-cycle rainfed crops, provided care is taken in the identification of crops suitable for ripening. Informed ripening decisions should be based on crop growth vigour and maturity status, which can greatly vary between seasons due to variable rainfall quantity and distribution.

The knowledge gained from these participatory ripener demonstration trials will be exchanged with growers and other stakeholders at several contact events.

Acknowledgements:

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Cane quality management in carry-over crops

Riekert van Heerden *(Senior Scientist: Sugarcane Physiology)*

Due to several reasons, including Covid-19, there will be a substantial carry-over crop to harvest in the rainfed coastal and inland regions when the 2021/2022 milling season starts. It is well-known that these carry-over crops often suffer from poor cane quality when harvested.

There are several reasons for this. These include:

- Severe lodging caused by high yields. Lodging causes stalk and leaf smothering, damage to stalks, side-shooting and the development of bull shoots inside the field.
- Eldana infestation that is very common in carry-over crops unless controlled through a pesticide spray programme.
- Other pest and disease issues such as sour rot.
- Flowering cane that is carried over often suffers from severe pithing (cavity formation inside the stalks) and profuse side-shooting.
- Non-judicious use of chemical ripeners including inappropriate choice of chemical, application to drought-stressed crops or application to Eldana-infested cane.
- Missed opportunities by not ripening carry-over crops deserving of treatment. This will be an important consideration for the 2021/2022 season because many of the mills are planning to start very early (March).

In this article we will focus on the informed and judicious management of cane quality in carry-over crops, which speaks to the last two points above.

There are often contrasting opinions regarding the use of chemical ripeners in early-season carry-over crops. On the one hand it is claimed that older crops (18 – 24 month harvest age) do not require chemical ripening because of natural ripening as the crop ages. On the other hand it is sometimes claimed that all crops will respond favourably to ripeners, irrespective of harvest age and growing conditions. Neither of these stances are conducive to the optimal management of cane quality in carry-over crops.

In the previous article the participatory commercial ripener demonstration trials that we reported on clearly highlighted the potential for significant financial benefit from chemical ripening in rainfed crops at harvest ages between 18 – 24 months. However, this is certainly not the case in all older crops. This means that special care should be taken to determine suitability for ripening in carry-over crops and that ripening decisions should be based on field-by-field merit.

The following are important recommendations that should be taken into account when deciding on the management of cane quality in carry-over crops:

- Eldana-infested (> 5e/100) carry-over crops should not be ripened, since the chemical effects on the plant are known to intensify infestation. Growers are encouraged to start scouting carry-over fields for eldana from early-January.
- Drought-stressed carry-over crops should not be ripened, because this will place added stress on the leaf canopy, which could lead to excessive stalk desiccation, intensification of Eldana infestation and other pest and disease problems.
- Lodged carry-over crops, that have not yet re-established an upward-facing leaf canopy, should not be ripened. This requirement is important, because the leaf canopy must be in a position to efficiently intercept the chemical spray droplets.

- Flowering carry-over crops should not be ripened due to the general poor growing state of these crops (very few green leaves), high risk of Eldana infestation and pith formation that will curtail the ripening process.

- In carry-over crops not suffering from any of the above the best way to determine suitability for chemical ripening is through visual inspection of crop growth vigour in conjunction with estimation of whole-stalk juice purity with a refractometer and the **PurEst®** smartphone application.

- High summer rainfall of favourable distribution can easily cause certain carry-over crops to become suitable for chemical ripening due to extended favourable growing conditions. Good indicators are abundant mature green leaves (ideally more than 8) and whole stalk juice purities of less than 85%. However, many older crops will maintain juice purities above 85%, despite immaturity (low Brix% values) in the upper parts of the stalk. If this immaturity level is large enough, chemical ripening can still be financially rewarding. The **PurEst®** smartphone application will automatically inform the user when testing of such crops take place.

- Whole-stalk juice purities in carry-over crops tend to be too high (> 75%) for using Ethephon® (and other trade names). In carry-over crops falling into this category the use of these products must be avoided because of detrimental consequences including loss of maturity and intensification of Eldana infestation. In these carry-over crops, products with the active ingredient fluazifop-p-butyl or trinexapac-ethyl are suitable alternatives.

- Chemical ripening is not the only intervention that can be considered to manage cane quality in carry-over crops. If immaturity (lower Brix% values) only affects a few internodes below the apical meristem, a downward adjustment of topping-height could be a better solution to manage cane quality, especially in carry-over crops that were not suitable for treatment on the required spray date.

- During planning of the ripening and harvesting programme keep the SASRI spray-to-harvest interval guidelines in mind. Spray date guidelines can be obtained in SASRI Information Sheets 12.4 and 12.5 and with the spray date guide calculator in **PurEst®**. A too short interval between spraying and harvesting will result in missed opportunities because of insufficient time for ripening, while a too long interval can lead to excessive cane yield loss under good growing conditions, even in older crops. These effects have been observed in previous commercial demonstration trials where the spray-to-harvest intervals were excessively long. Optimal spray-to-harvest intervals can easily vary between seasons and varieties. The best approach to track the completeness of the chemical ripening process is through refractometer testing between spraying and the planned harvest date.

WEATHER

Phillemon Sithole *(Agrometeorologist)*

Review

Winter to early spring (June to September 2020) was generally characterised by very dry conditions across most parts of the industry (Figure 1). There was considerable improvement from mid-September when most rainfed parts of the industry started getting good rainfall, with November rainfall well above average rainfall in the coastal and midlands regions. However, the northern irrigated areas in Zululand and Mpumalanga were still recording below average rainfall, with falling dam levels and river flows. Irrigation water demand was also rising as we moved into the warmer summer months.

Outlook

The El Niño-Southern Oscillation (ENSO) developed into the cool La Niña phase in mid-November and is expected to last through the 2020/21 summer season. The La Niña phase is generally associated with increased chances of above average summer rainfall over eastern South Africa. The *South African Weather Service, European Centre for Medium-Range Weather Forecasts and International Research Institute for Climate and Society* all predict normal to above normal rainfall during late summer (January to March 2021) in the rainfed areas while drier conditions are expected in the northern irrigated areas.

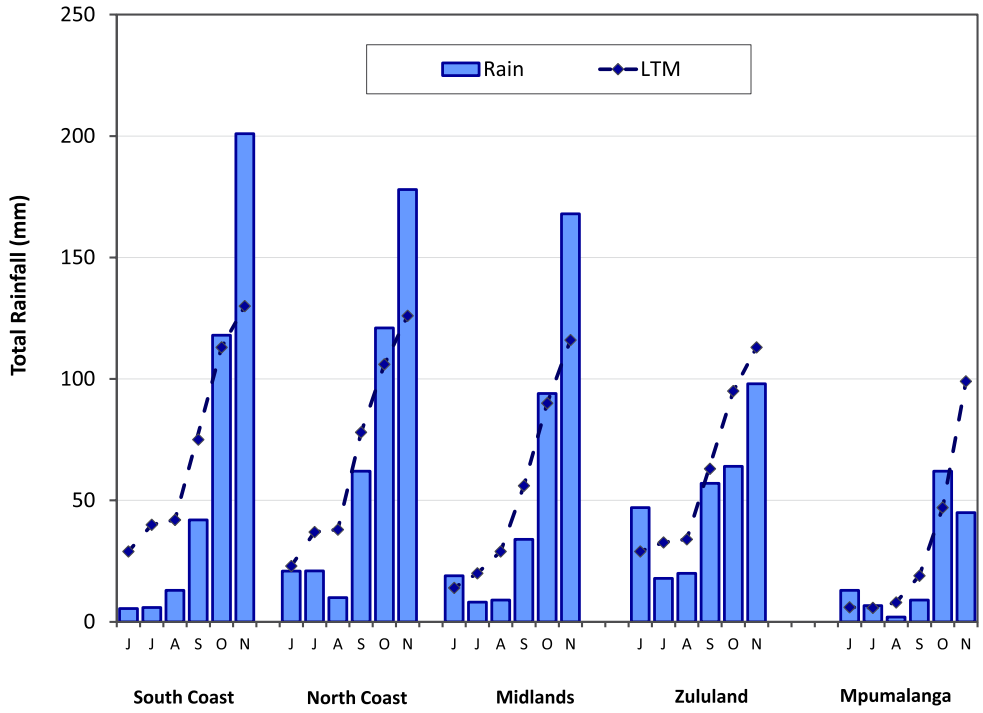

Figure 1: Regional average monthly total rainfall (Rain) for June to November 2020, compared to the monthly long-term mean (Rain LTM).

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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