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THE LINK

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NEW

SASRI WEBSITE

SASRI has just launched a brand new website which contains useful information for sugarcane farmers. Users will also be able to download Information Sheets on various topics including pests, diseases, nutrition, weed control, mechanisation, varieties and biosecurity threats. The FAS agricultural laboratory is also featured on the site and customers can view info on pricing, sample collection points, sampling methods and submission forms. The new website also provides an overview of the institute's research programme together with information on SASRI researchers ***(page 12)***.

In this issue...

Boor

Boor is 'n noodsaaklike mikrovoedingstof wat benodig word vir gewas groei, die korrekte plant beskikbare Boor moet egter verseker word. Gereelde grond- en blaaranalises sal bevestig of voldoende vlakke gehandhaaf word. ***(bladsy 18).***

Ripening

SASRI's Pur***Est***™ app has just been updated with new features. Make sure you download the latest version from your Google Play or Apple App Store ***(page 23).***

Cane Quality

To guarantee you are deriving the maximum RV from your cane, ensure that the cane submitted to the mill is always as MATURE, FRESH and CLEAN as possible. For more tips on improving cane quality see article on ***page 8.***

SASRI
Unlocking the potential of sugarcane

DIRECTOR'S MESSAGE

CAROLYN BAKER

The value of SASRI's R&D becomes apparent when the outcomes of the research programme not only meet identified needs but can also easily be incorporated into current farming practices to result in enhanced crop performance. Therefore, understanding grower needs correctly forms the foundation of every year's Programme of Work. Our research and extension team go to great lengths to engage growers through the local RD&E committees to learn about their issues and grapple with potential solutions. While RD&E committees meet twice annually in each region to address their specific issues, an annual RD&E workshop organised by SASRI is held in the irrigated and rainfed regions on alternate years.

RD&E committees are a feature of Extension and indeed were set up in each extension region and designed to assist the local extension specialists in defining the objectives, needs and problems of the particular area. This enables research and extension priorities to be established within the context of the local programme of work. The RD&E committee value lies in it being fully attuned to regional problems. Through active engagement with growers, the committee gathers a collection of representative issues from the region for debate that may culminate in the design and formulation of new research projects. Achieving full value from the RD&E process requires that dialogue in the regions is widespread amongst all growers to ensure that only representative issues are identified for consideration in the annual RD&E workshop.

This year the RD&E focus was on the irrigated regions and the annual RD&E workshop was held in Komatipoort in early March. The programme managers that lead each of SASRI's research programmes together with a group of key specialists representing the main research focus areas met with the local RD&E committee and interested growers to gather information and grapple with their needs. Insight into the specific issues that were raised was enabled through facilitated group discussions. The SASRI team had the opportunity of refining the issues and identifying the key concerns. A series of further engagements with all researchers at Mount Edgecombe will enable the design of new research project proposals whose merits are assessed for implementation (budget permitting) in due course.

In parallel with the RD&E process, SASRI compiles an annual report reflecting on the outcomes from research projects that have closed out. This report that is distributed to all extension specialists serves as the foundation for new recommendations and, in some cases, for further research.

On a completely different note, it is becoming increasingly apparent that our industry is vulnerable to an escalating number of pests and diseases (P&D). If we consider the events in the past few years: the arrival of thrips in 2005; detection of mosaic streak virus in 2007; tawny rust in 2009; the yellow sugarcane aphid in 2013; and the longhorn beetle in 2015, then the emphasis on biosecurity and importance of mitigating the risks posed by these P&Ds represents a significant priority at SASRI. Effective collaboration with all Local Pest, Disease and Variety Control Committees (LPD&VCCs) is therefore highly valued. With their support and guidance, SASRI's Biosecurity function is enhanced in a way that influences and complements the operational aspects of conducting surveys, collecting and managing data and reporting on P&D trends. Needless to say, the function is further enhanced when local growers also conduct their own scouting and report on specific incidences that can be followed up and verified through SASRI's Biosecurity.

RESPECT WATER: USE IT WISELY

Ashiel Jumman (Agricultural Engineer: Irrigation)

South Africa has always been a semi-arid and water scarce country. The mean annual precipitation in South Africa is 450 mm, well below the world's average of 860 mm. South Africa was ranked as the 30th driest country in the world. To give an indication of the aridity, consider that the largest river in South Africa, the Orange River, carries 10 times less water than the Zambezi River and 100 times less than the Congo. In the Northern regions of the industry (630 mm average rainfall), sugarcane cannot be grown without irrigation. A total of 62% of surface and groundwater resources are allocated to the irrigation sector in South Africa.

Whilst most farmers will agree that water is very important, anecdotal evidence suggests existing farming practices do not reaffirm this belief. This is highlighted by poor adoption of irrigation scheduling and low investment in professional design and specific hardware such as water meters. The need for careful water management, however, is ever increasing. The potable water saga in Cape Town and the effects of the drought in the northern sugarcane irrigated regions confirm this.

The Komati experience

The restriction in water allocations for the Komati river system are depicted in the graph below. The horizontal axis is a time series with a weekly time step. The water allocated per week as a percentage of the full water allocation (for all farmers in that region) is depicted on the vertical axis. Three events were recorded in January, February and November 2017 where high intensity rainfall events caused river levels to rise enough to allow farmers to abstract more than the normal weekly water allocations (> 100%). Farmers generally use these opportunities to stock water in their on-farm storage dams. Apart from this saving grace, farmers were restricted to less than 60% of the water allocations for the majority of the period. The annotations in the graph illustrate the severe restrictions of 15, 20 and 25% which were enforced for fairly large periods of time, coinciding with low rainfall periods in winter (in 2016 and 2017) and in the higher crop water demand period in the summer of 2016.

The water management authority of the Komati River system must be complimented for the good governance and excellent record keeping which allows for good management and effective reporting. The installation of water meters and protocols to capture the water meter data for meaningful and productive use are examples of systems which have been beneficially implemented.

Time for change

Now, more than ever before, irrigation management calls for the application of sound, scientific principles and practices to cope with the water challenges at hand. All of us have a collective responsibility in this regard. We need to invest the energy and effort required for our farming practices to reflect a clear appreciation of this scarce resource. Irrigation water management must be better than before, and we need to achieve that in a shorter space of time.

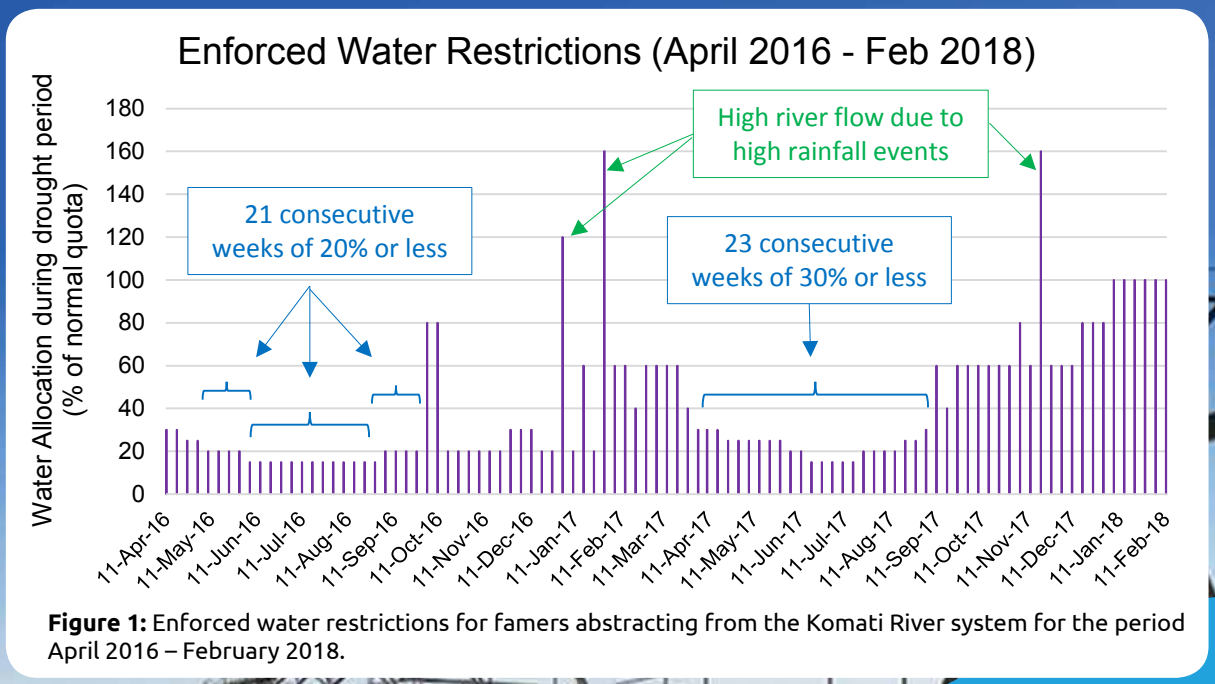

Figure 1: Enforced water restrictions for famers abstracting from the Komati River system for the period April 2016 – February 2018.

TOPICAL TIPS

MAY 2018

Rowan Stranack (Extension & Biosecurity Manager)

Cane quality

- With good rains having been received in most areas, your yields could be above average. Make the most of this by maximising your RV when delivering cane to the mill. See 'Çane Quality' article on page 8 for tips on how to achieve this.

Crop Nutrition

- Top yields are only possible if the crop is adequately fed. Optimum crop nutrition begins with a good root system and good soil health. This can be achieved by ensuring the effects of compaction are minimised, correcting sub-soil acidity and salinity/sodicity issues, the addition of organic matter and green cane harvesting. Only once these are in place can the crop take up nutrients effectively.

- Unfortunately, soil or leaf applied nutritional products that promise a 'silver bullet' type solution to poor yields are most often ineffective. They do not address the root cause of nutritional problems which often arise from poor soil health. Be very careful in spending money on products that claim a miracle cure for very little effort.

- Soil sampling done immediately after harvest will enable the results to be received in time for lime and other soil amelioration to be carried out, as well as for an adequate fallow period prior to planting later in the year. In plant fields take samples of both the topsoil AND subsoil layers 0-20; 20-40, 40-60; 60-80 cm to determine if subsoil acidity problems exist.

- To check your salinity/sodicity levels in the soil, the sampling depth advised is 0-30; 30-60; 60-90 cm.

- Remember to send your samples to the FAS Agricultural Laboratory for well-researched, unbiased, detailed and cost effective fertiliser recommendations - it does indeed "COST YOU LESS WITH FAS".

- Applying fertiliser too early on certain soils could result in unnecessary losses of nitrogen from volatilisation. FAS will indicate to you those soils where this problem is likely to exist. In addition, plan to split applications of nitrogen fertiliser on soils that are either very sandy or poorly drained particularly if urea based fertilisers are to be used.

Irrigation

- Winter is the best time to maintain and repair irrigation equipment. Simple checks include taking measurements of the following: operating pressures, nozzle wear and emitter flow-rates. The SA Irrigation Institute (SABI) offers training courses (for growers and managers) aimed at ensuring that irrigation system hardware is performing according to design specifications and accepted standards. Speak to your local Extension Specialist for assistance in this regard.

- In the Irrigated North during the winter (May – August), the water requirement of the crop is 50% or less than the summer water demand. Similarly, for emerging ratoon cane after harvest the water requirement over winter is only approximately 40% of that for mature cane. So, once a field is harvested in winter, and the soil is irrigated to field capacity, this will supply sufficient water for the crop for up to 30 days. Therefore the general rule for this time of year is do not over-apply water that the crop does not require. Over-irrigation will be detrimental to the roots and will result in loss of yield and cane quality.

Eldana & Yellow Sugarcane Aphid (YSA)

- Great strides have been made in the last few years in the chemical control of eldana in carryover cane. Fields for carryover to 2019 should already have been identified and an. With insecticide options now available for stubble treatments as well as the option to apply on younger cane, spray programmes need to be carefully planned and IRAC compliant. Consult your Extension Specialist or advisor for assistance.

- Insecticides are not the only key to eldana control. A long-term strategy is required and must include variety choice, harvesting cycle, crop nutrition, habitat management and insecticides. Ensure ALL appropriate strategies are in place to counter this threat.

- There have been some serious outbreaks of yellow sugarcane aphid recently. This is to be expected at this time of the year and there could be further peaks in winter. Whilst there now are products registered for the control of YSA on sugarcane, spraying cane when the damage is evident is generally too late and a waste of time and money. YSA is more prevalent on certain soils and on certain varieties. General scouting across the whole farm is essential. Take particular note of where outbreaks have occurred in the past and monitor these areas closely over the next few months. Spraying can then be timed and targeted when aphids are first observed to prevent a massive build-up of the pest.

Seedcane and disease control

- Fields for replanting must be tested for RSD prior to harvest. If found positive, fallow these fields for at least one year. Plant a low-growing green manure or cash crop during the fallow so that volunteers can be easily identified and removed. Fields tested positive for RSD may not be used as seedcane nurseries.

- Cane killed using glyphosate in summer this year, in preparation for planting in winter or spring, should be carefully checked for regrowth. Unfortunately, glyphosate seldom gives a 100% kill, and you need to return at least twice to remove regrowth.

- Using either Certified or Approved Seedcane to plant commercial fields is not only a legal requirement but makes good economic sense. Planting untested cane without a history of hot water treatment and inspections could well lead to the need for early eradication due to poor yields resulting from the build up of diseases such as RSD, smut or mosaic.

- Seedcane requirements need to be planned far in advance. For example, commercial fields to be replanted in 2020 require their nucleus or first-stage hot-water treated seedcane to be planted in spring 2018. This will

enable the seedcane to grow and be planted into a farm nursery in 2019 and from there, into commercial fields in 2020. So, if you have a seedcane scheme in your area from which you need to order seedcane later this year, start planning your replant programme for 2020. In the midlands areas where growth is slower, these time frames will be longer. Consult your Extension Specialist or Biosecurity Officer for advice.

Soil conservation

- Conservation structures and waterways should be constructed in the drier winter months. Damage caused to fields during the recent heavy rains in some parts have once again emphasised the critical need for such structures. A Land Use Plan is key to planning the siting and dimensions of these structures. Consult your SASRI Extension Specialist for advice.
- Conservation structures and waterways will work only if properly maintained. Check existing structures so you can face the rainy season with confidence. It's also time to maintain drains on your farm. Remember, this is permissible **by hand only.** Regular maintenance will prevent a build-up of sediment and prevent further drainage problems from developing.
- Winter is also a good time to establish grassed waterways. This is best done the **year before** a field is to be replanted. Use a fire tanker to water the newly planted grass until it is established. Remember to place revetts made of bundles of cane tops across new waterways to limit soil loss in the event of a storm.
- In addition to conservation structures and waterways, it is imperative to keep your soils covered with either crop residues or cover crops. *A covered soil is a protected soil.*

ORANGE RUST ALERT

Orange rust spores have once again been detected on spore traps located at the Komati Research Station, after being absent on the traps since 2016. The disease has yet to be observed on sugarcane in SA.

Please report any symptoms that resemble orange rust to your SASRI Extension Specialist Extension Specialist or Biosecurity Officer – see rust comparison chart. It may be difficult to distinguish tawny and orange rust in the field so it is better to report if you are unsure.

None of the South African varieties that have been evaluated in Australia and Florida have been rated susceptible but five varieties (N32, N41, N42, N49 and N52) have been rated intermediate (see below). However, a number of our varieties have not been tested under environments where orange rust is present, so please look for symptoms on ***all*** varieties of ***all*** ages in ***all*** regions of the industry.

Resistant	Intermediate
N12, N14, N21, N23, N25, N26, N29, N30, N31, N35, N37, N39	N32, N41, N42, N49, N52

KOMATI GROWER DAY A GREAT SUCCESS!

On 7 March, a group of SASRI scientists and managers travelled to Komati to host a grower day and annual RD&E Committees Workshop for the Irrigated Region.

The grower day was hosted on our Komati Research Farm and was very well attended by over 60 growers. Specialists who provided informative presentations included Peter Tweddle (Controlled Traffic and new ways of harvesting); Louis Titshall (Nitrogen nutrition); Neil Miles (Crop nutrition, getting it right!); and Sharon McFarlane, Karlien Trumpelmann and Marius Adendorff on latest trends in pest and diseases.

The day also involved a walk about to see the mechanised harvesting and RSD trial, the Variety Evaluation trial site and Plant Breeding fields on the Research farm.

After a sweltering afternoon of informative content, great discussion and instructive advice from our specialists, growers were treated to a well-needed braai and refreshments.

KEEPING CANE QUALITY HIGH

Rowan Stranack (Extension & Biosecurity Manager)

In most areas of the industry, rainfall during the growing season has been good. As a result, yields should be better than average, assuming nutrition and weed control have been adequate. The challenge now is to ensure this good work is not undone by inefficiencies at harvest time. With the current low RV price, it is vital to ensure that RV yields are maximised. Now more than ever before are the principles extremely applicable: make sure that cane delivered to the mill is as MATURE, CLEAN and FRESH as possible!

Whilst a cane estimate is a good general harvesting plan, this should be continually reviewed to ensure the most MATURE fields are harvested. Alternatively, as in the irrigated areas, a chemical ripener application plan can be implemented. In both these operations one can make use of the SASRI Pur***Est***™ app. Other important factors to consider are a variety's preference for harvest at a particular time of the season, damage from pests and diseases and climatic influences such as frost and drought. All of these can influence the appropriate time to harvest a field.

It is important to ensure that sugarcane sent to the mill is CLEAN and all soil and crop residues (leaves and tops) are removed. Not cleaning the stalks properly can reflect in high fibre% in the CTS analysis. In addition, base cut and top the stalks accurately. For example, a ten centimetre length of base stalk left uncut over a hectare equates to five tons of cane with a high sucrose content. Equally, topping too high and including stick that has no Recoverable Value is simply incurring transport costs for no return AS WELL AS reducing the RV% for that consignment by including more non-sucrose.

Sugarcane delivered to the mill must be as FRESH as possible. Losses in sucrose in the period between burn/harvest and crushing has been thoroughly researched. Deterioration sets in immediately after the cane is burnt and temperature determines the rate that losses occur. As a rule of thumb, initially around 1% of the sucrose yield present will be lost every 24 hours but this will increase significantly as temperatures rise and as the delay lengthens. Every effort should be made to keep burn/harvest to crush delays to below 48 hours, after which deterioration accelerates considerably, resulting in significant losses in income. The average delay across the industry is currently around 70 hours. This is unacceptably high and there is considerable room for improvement. Deliberately delaying delivery ***does not*** increase ***RV yield***, as some believe (Figure 1). The apparent increase in RV% is due to the drying out of the cane stalks, with an associated loss in mass resulting in a loss in overall RV yield. Burning more frequently and paying more attention to field access and to the management of haulage will go a long way to reducing the losses from deterioration.

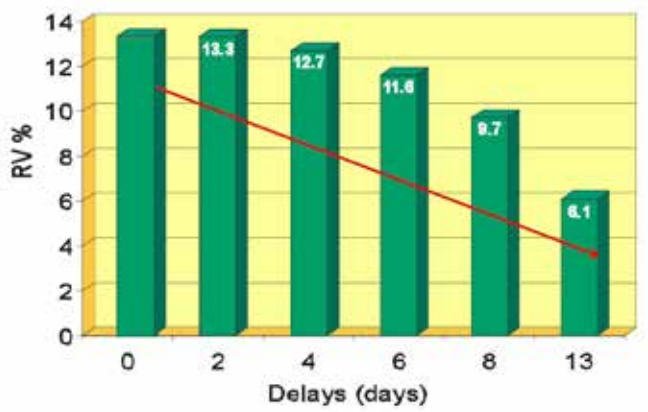

Figure 1. RV yield (RV%) loss over time (days) after harvest.

Considering RV% alone as an assessment of cane quality can be misleading. Your CTS report contains a wealth of additional information which can indicate the true condition of the cane delivered to the mill. Moisture, purity, non-sucrose and fibre data reflects the overall state of the cane, and, more importantly, can give an indication as to what needs to be done to *improve* cane quality.

Another area related to cane quality is that this is the time of year when frosts commonly occur. Management of frosted cane can be critical in maintaining cane quality as badly frosted cane can have very low quality. There are various categories of frost damage, each requiring a specific management response.

Sugar production really starts in the field: there are several agricultural practices that have an effect on cane quality. The idea is to increase sucrose content (%) (and therefore RV payment) by ensuring that mature, high purity (>85%) cane is delivered to the mill with minimal harvest to crush delay. In addition to increasing sucrose content, one should also aim to keep non-sucrose and fibre need as low as possible because high non-sucrose (>2%) and high fibre (>15%) reduce payment on RV.

'CHAIN'GING YOUR SOIL HEALTH

Using chains to bury small-seeded cover crops

Peta Campbell (Scientist: Weed Control) and Rodney Morgan (Farm Manager)

Growers on the North Coast have reported good results when using chains to cover sunn hemp seed planted on good tilth. Other methods of covering these seeds include the use of tyres or a heavy pole. In other parts of the industry, seeds are disced to cover them with soil, but this comes at increased costs.

Breakcrop trials

SASRI trials at two sites during 2016/17 included the precise planting of two legume cover crops using soil augers to a depth of 5 cm. Results showed that sunn hemp had poor emergence, whereas velvet bean had good emergence. Further trials in co-operation with THS and the SASRI Pongola farm, then tested the chain lattice covering method for three cover crop species (sunn hemp, oats, and velvet beans). First, glyphosate was used to kill the existing weed cover. Thereafter, the field was disced. Seed (50 kg/ha) was mixed with fertiliser (100 kg/ha MAP) and then sown by hand on good tilth. The seed was then covered with soil using chains.

Spreading seed and fertiliser by hand on good tilth

Chains used to cover seed

Sunn hemp and oats

A shallow burial with chains proved highly successful on three tested soil types (sand, sandy loam and clay). Seeds showed good emergence, dense growth, and, in the case of sunn hemp, high biomass. This method was also successful for covering a winter cover crop, oats on clay and sandy soils.

A fallow sandy loam field in Pongola with dense sunn hemp growth. Seeds were covered by the chain lattice

Velvet beans

In all three tested soils, half of the velvet beans stayed on the soil surface. Unfortunately, using the chains to cover the seeds was ineffective due to the large seed size. Germination of the crop was sparse allowing weeds to receive sufficient light and moisture to grow to the mature flowering stage.

Due to the growth habit of velvet beans, where it spreads by means of vines, a dense cover eventually formed, smothering the weeds. However the damage had already been done.

When handling larger seeds, one should ensure sufficient soil cover for effective germination. In KwaZulu-Natal, velvet beans are disced to cover seeds in flat areas. On slopes, it is planted in shallow holes every half-a-metre in the old cane interrow, with the holes being closed by foot.

Velvet beans are beneficial on slopes where cane planting is done by hand and no mechanical means for a good soil tilth is possible. On the North Coast, velvet beans on slopes are found to be valuable in promoting good soil moisture retention and providing increased soil tilth.

Building a chain lattice

Buying new chains can be costly. Growers with their own haulage trucks or tractors are encouraged to use the old/damaged chains to build a chain lattice. An example is shown in the adjacent figure where seven 10 mm x 5 m chains were attached to a solid metal beam mounted on the back of a tractor. There were also five cross rows to help keep the chains together while being dragged behind the tractor. This also created sufficient weight to press down lightly on the seeds. Smaller chains will be too light and will not cover seed properly.

When compared to discing seeds, the chain method is less costly and ensures shallow burial of small seeds, which promotes dense emergence of the breakcrop.

Chain lattice attached to the tractor

Benefits of using sunn hemp and oats as breakcrops include improving soil health, i.e. by increasing organic matter and smothering weeds, and preventing them from producing seed that adds to soil seed bank reserves. However, if planted break crops are stunted or have sparse growth, weeds will grow to maturity in dense patches and produce seed.

GENERAL

ABOUT US

- Identify with SASRI's vision, values and purpose
- Get to know our history
- Meet the Management Team

RESEARCH FOCUS

- View the four research programmes and see the key research areas of each
- Get to know SASRI research staff and what they do
- Learn about our Post- Graduate and Degree/Diploma Programme
- View all R&D partnerships and collaborations held by SASRI

EXTENSION & BIOSECURITY

- Get to know the Extension and Biosecurity staff in your area

HUSBANDRY

PEST CONTROL

- Eldana control
- Information and cost of nematode analyses

DISEASE CONTROL

- Link to SASRI's Biosecurity Inspectorate
- View a list of gazetted varieties
- Receive RSD sampling and diagnosis advice

WEED CONTROL

- Guidance on the development of a Whole-Farm Weed Management Plan

VARIETIES

- Access variety information sheets
- Information on our quarantine service

MECHANISATION

- Get latest mechanisation reports
- Get lists of machinery & equipment products and suppliers
- View relevant Information Sheets, articles, papers, posters and reports
- Access useful links

TOOLS

DECISION SUPPORT TOOLS

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- Access the Mycanesim web-based tools and the CANESIM Crop Forecasting system
- Link to WeatherWeb
- Get information on the Pur***Est***™ smartphone app for ripening
- Find out more about RustCalc and FertiCalc smartphone apps

YIELD BENCHMARKING

- Access the Mycanesim web-based tools and the CANESIM Crop Forecasting system to perform yield benchmarking

NEW SASRI WEBSITE

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- Find out about the SUSFARMS® manual and Progress Tracker

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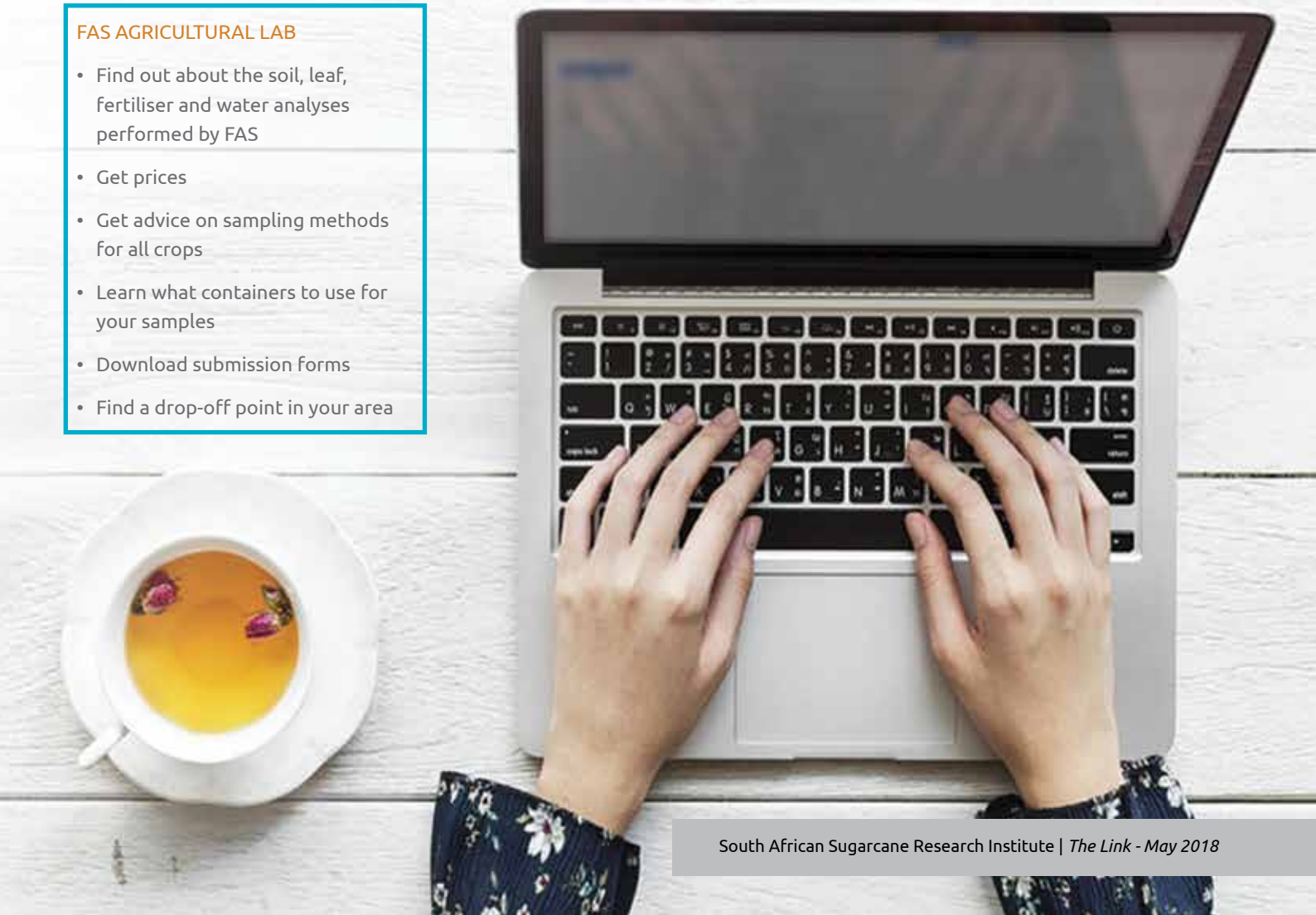
- Get prices
- Get advice on sampling methods for all crops
- Learn what containers to use for your samples
- Download submission forms
- Find a drop-off point in your area



SASRI CLIMATE CHANGE RESEARCH

How does sugarcane respond to increased atmospheric CO_2?

Alana Patton (former SASRI Crop Scientist: Agronomy) and Riekert van Heerden (Senior Scientist: Sugarcane Physiology)

One of the most measurable effects of climate change is that atmospheric CO_2 concentration is at its highest level in modern history, and is predicted to double by 2100. Sugarcane may respond favourably to increased CO_2 by increased water use efficiency and biomass, but contrasting reports from research conducted in other countries exist.

From 2014, SASRI has embarked upon a collaboration with North-West University (NWU) in Potchefstroom to undertake research on the effects of increased CO_2 on sugarcane growth, biomass and water use.

Sugarcane varieties NCo376 and N31 were grown for 7 months in 12 state-of-the-art open-top chambers under current (400 ppm) and elevated (750 ppm) CO_2 at the Open Top Chamber facility at the Potchefstroom campus.

The results from the experiment show that both varieties displayed a significant decrease in stomatal conductance and transpiration in response to elevated CO_2. Water use efficiency, on the single-leaf level, increased by 57% and 71% for NCo376 and N31, respectively. Despite the noteworthy response in terms of water use, no significant differences in total biomass or stalk dry biomass were found in response to elevated CO_2.

Although this research did not show an increase or decrease in sugarcane yield, the water saving by the crop under elevated CO_2 could be highly impactful in the face of climate change and increased atmospheric CO_2. Further research, from 2017 onwards, will focus on how drought stress affects sugarcane grown under elevated CO_2.

OPDATERING NOU BESKIKBAAR!

Gedurende 2016 het SASRI die mobiele toepassing, Pur***Est***™, vir beide iOS en Android bedryfsisteme vrygestel. Pur***Est***™ stel die kweker instaat om vinnig die volwassenheid (sapsuiwerheid) van riet op die plaas te beraam en besluite te neem ten opsigte van sy rypmaakprogram. Pur***Est***™ kan verder help met afdroog- en oesbesluitneming deurdat die toepassing ook stronkvog% en RV% beraam. Kwekers kan sodoende hul oesprogramme fyner bestuur deur die kapvolgorde van lande te prioritiseer.

'n Opdatering van Pur***Est***™ is sopas vir beide iOS en Android bedryfsisteme vrygestel.

Nuwe Eienskappe

Engels, isiZulu en Afrikaans taalweergawes. Na installering kan die gebruiker geredelik die taalweergawe verander.

Vermoë om besonderhede te wysig (bv. variëteit, landnommer, riet ouderdom en versameldatum) van gestoorde rekords.

Vermoë om gestoorde rekords selektief via e-pos van foon af te laai (bv. rekords vanaf slegs een plaas af rekords wat binne 'n sekere datum tydperk val).

Die opsie om kwaliteit eienskappe te beraam van monsters wat uit meer as drie stronke per land bestaan. Die gebruiker kan nou ekstra rye skep waarin data van addisionele stronke (soveel as 12) op die rekenaar skerm van die toepassing ingesleutel word (instede van slegs die oorspronklike drie stronke).

Vermoë om onvolwassenheid in die boonste derde van stronke te identifiseer selfs as beraamde sapsuiwerheid hoër as 85% (drempelwaarde waar bo chemiese rypmaking gewoonlik nie aanbeveel word nie) is. Onder hierdie omstandighede word die gebruiker bewus gemaak van die moontlikheid dat rypmakers wel toegedien kan word, veral as die heersende groeikondisies van so aard is dat 'n verdere verlies in volwassenheid verwag word (bv. na goeie reënval of na die winter).

Indien u reeds Pur***Est***™ op u foon geïnstalleer het moet u seker maak om na die nuutste weergawe op te dateer.

Nuwe gebruikers kan die toepassing via "Apple iStore" of die "Google Play Store" aflaai.

SOIL HEALTH

BORON IN CROP NUTRITION – ESSENTIAL BUT DANGEROUS!

Louis Titshall and Neil Miles (Senior Soil Scientists)

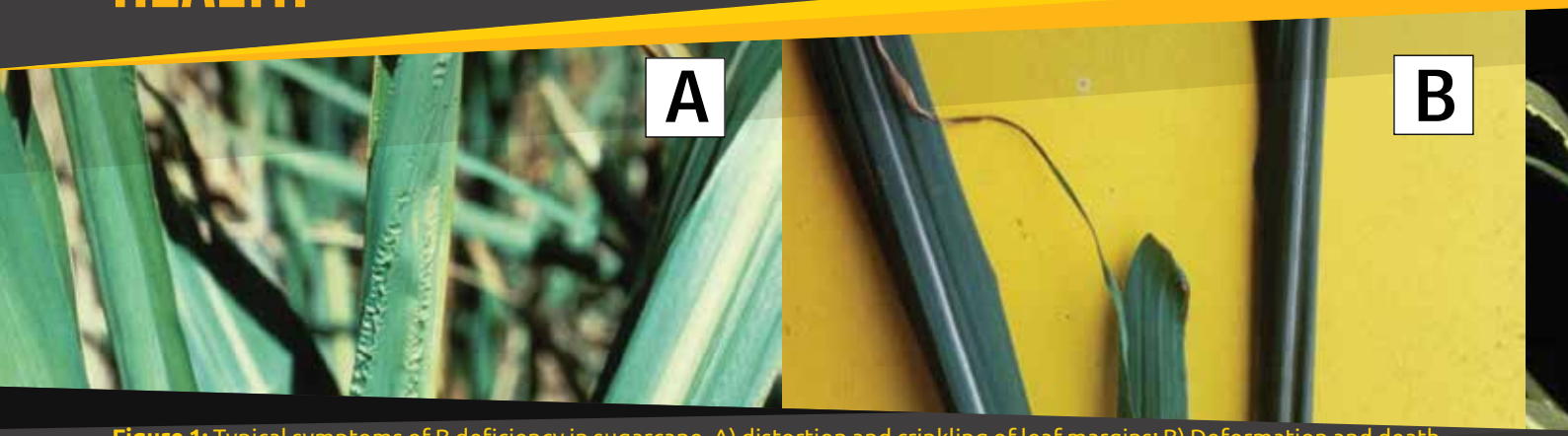


Figure 1: Typical symptoms of B deficiency in sugarcane. A) distortion and crinkling of leaf margins; B) Deformation and death of leaf tips; C) Brittle young plants with excessive tillering and D) Formation of translucent lesion between veins . Images from https://edis.ifas.ufl.edu.

Boron (B) falls in the same chemical group as silicon (Si), and is essential for plant growth. It is required for the translocation of sugars and protein synthesis, and is implicated in the control of cell wall and membrane formation in plants. It remains one of the poorest understood plant micro-nutrients.

In the plant

Boron has a very narrow adequacy range and caution has to be used when supplying B, as an over-supply can easily lead to toxicity. While published values for the adequate range in sugarcane leaf material vary, typical ranges are from 2 – 10 mg/kg. However some researchers (such as in Florida in the USA) suggest an optimal range of 5 – 20 mg/kg. In sugarcane, deficiency symptoms are characterised by distortion ("crinkling") and chlorosis of leaf margins and tips (particularly on young leaves) with the formation of clear lesions or water-pockets between leaf veins in severe cases. A tell-tale feature is the formation of tears on leaf margins and so-called tip-dieback, and in the case of young plants, this may lead to small, brittle leaves with excessive, bunched tillers (Figure 1).

Toxicity is manifested as chlorosis of leaf margins and tips with rapid necrosis and death of the leaf thereafter. The most common cause of toxicity is over-fertilisation with B or the use of B-rich irrigation water. Leaf analysis is usually considered to be better than soil tests to detect sufficiency, mostly due to the unreliability of soil B tests (see box).

In the soil

Boron in the soil is naturally derived from the parent material or from organic matter breakdown. As a general rule, soils that form from finely-grained sedimentary rocks (shales and mudstones), particularly if of marine origin, tend to have higher B than those derived from other rock types.

Boron availability is greatest in the soil pH range of 4.5 to about 7.5. While it is widely deficient on many soil types, it is most commonly deficient on sandy, well-drained soils (particularly under high rainfall conditions) where it is readily leached, or in heavy soils that are limed to high pH, where the formation of unavailable B forms occurs. Boron can be easily leached from the soil under high rainfall or irrigation as it is soluble and mobile in the soil. Under dry soil conditions availability is greatly reduced, primarily because it requires adequate moisture to move to the roots.

Fertilising with boron

Table: The most common soluble sources of Boron (B) available and their available percentages of B

	Sources of Boron (B)	B%
Soluble	Borax	11%
	Solubor	20%
	Sodium borate	20%
	Sodium tetraborate	14%
	Boric acid	17%
Less Soluble	Colemanite	10%
	Mineral B	2 - 6%
	B frits or pellets	

Borax is reported to be the most commonly used B-fertiliser. The more soluble forms are usually preferred as these can be dissolved in water and either irrigated on the crop for foliar applications or onto the soil. The less soluble Colemanite or the B-frits are usually only advised where severe deficiency is evident and the soil is freely draining, as these forms are slower-release and likely to limit leaching losses.

As commonly available B fertilisers tend to be soluble and are relatively mobile under typical soil conditions, and furthermore, as most plants have a very narrow adequacy range, only small amounts are recommended at any one time. For sugarcane it is usually advised to apply 1 kg B /ha if a soil application is being used. Because application rates tend to be low, applying dried product can be difficult so it may need to be very well blended with other fertilisers or fillers of similar particle size to ensure even distribution. Dissolving soluble forms of B in irrigation water is an alternative approach where overhead irrigation is used. Where B is to be furrow or drip irrigation applied, some caution to avoid excessively high concentrations around plant roots must be taken. Foliar application is considered an effective means of treating deficient plants, where 0.2 to 0.4 kg B ha dissolved in 200 to 300 L of water is usually adequate.

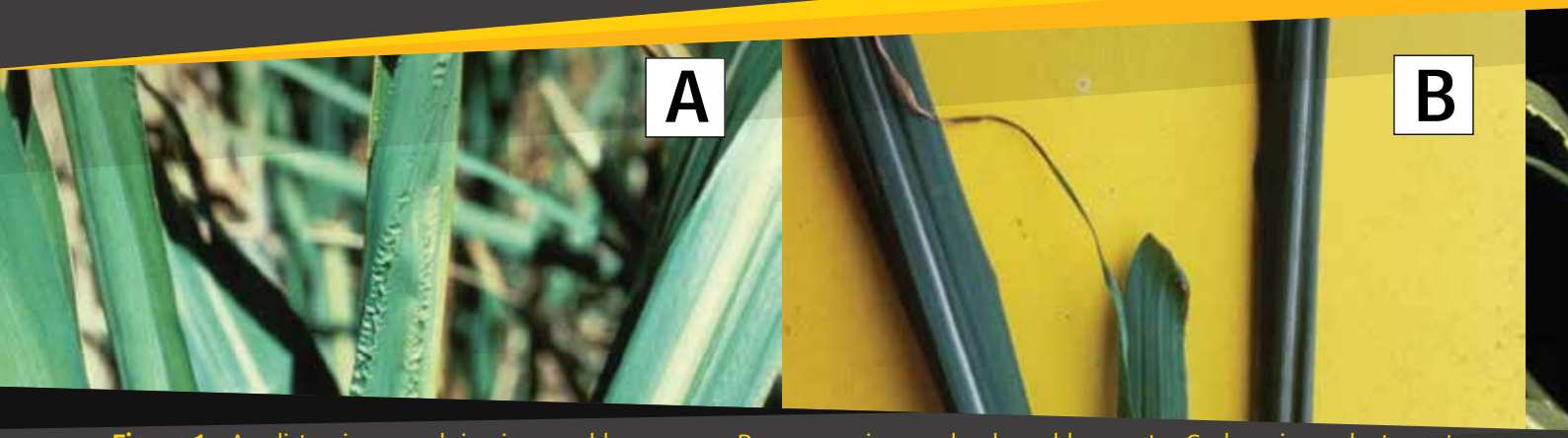
Analytical considerations

Leaf analysis for total B is by acid-digestion of the leaf material. Currently FAS analyses leaf material using X-Ray Fluorescence spectroscopy, but this technique is not sensitive to certain elements, including B. This is why B is offered as a supplementary analysis by FAS as it requires a different method to determine.

With respect to soil analyses for B, the accepted standard method for soil B availability is the "hot-water" soluble extraction method. However, the method can result in highly variable results and is prone to several interferences that affect the reliability of the extraction. This reduces the usefulness of the method to accurately predict soil levels. There are also no sound calibrations in terms of the actual soil-test value, B-fertiliser application rates and crop response.

GRONDGESONDHEID: BOOR AS GEWASVOEDING – NOODSAAKLIK, MAAR GEVAARLIK!

Louis Titshall en Neil Miles (Senior Grondwetenskaplikes)



Figuur 1: A - distorsie en verkrimping van blaarmarges, B - vervorming en dood van blaarpunte, C - bros jong plante met oormatige hergroei, en D - vorming van deurskynende letsel tussen are. Illustrasies van https://edis.ifas.ufl.edu.

Boor (B) val in dieselfde chemiese groep as silicon (Si), en is noodsaaklik vir plantgroei. Boor word benodig vir die vervoer van suikers en proteïensintese in die plant, en is betrokke by die beheer van selwand en membraanvorming in plante. Boor bly een van die elemente wat die minste verstaan word van al die plantmikrovoedingstowwe.

In die plant

Boor het 'n baie nou effektiwiteitsband en moet versigtig gebruik word wanneer dit aan 'n plant toegedien word, aangesien 'n oordosis maklik tot toksisiteit kan lei. Terwyl gepubliseerde waardes vir die efektiwiteitsband in suikerrietblaarmateriaal wissel, is tipiese drempelwaardes van 2 -10mg/kg. Sommige navorsers (soos in Florida, VSA) stel egter 'n optimale drempelwaardes van 5 – 20mg/kg voor. In suikerriet word tekortsimptome gekenmerk deur vervorming ("verkrimping") en chlorose van blaarmarges en punte (veral op jong blare) met die vorming van duidelike letsels tussen die blaarare in ernstige gevalle. Kenmerkend is die vorming van skeure op blaarmarges en sogenaamde "tip-dieback" (blaarpunt), en in die geval van jong plante kan dit lei tot klein, bros blare met oormatige, gebondelde uitloopsels (Figuur 1).

Toksisiteit word geopenbaar as chlorose van blaarmarges en blaarpunte met vinnige nekrose en die dood van die blaar daarna. Die mees algemene oorsaak van toksisiteit is oorbemesting met B of die gebruik van B-ryke besproeiingswater. Blaaranalise is beter as grondontledings om tekorte te bepaal, hoofsaaklik as gevolg van die onbetroubaarheid van grond B toetse (Figuur 2).

In die grond

Boor wat in grond voorkom is natuurlik afkomstig van die moeder materiaal of van organiese materiaal wat afbreek. 'n Algemene reël is: grond wat gevorm word uit fyn, korrelrige sedimentêre gesteentes (skali en modderstene), veral as dit van mariene oorsprong is, is geneig om 'n hoër B inhoud te hê as dié van ander rotstipes.

Boor beskikbaarheid is die hoogste in grond met 'n pH reeks van 4,5 tot ongeveer 7,5. Alhoewel tekorte kan voorkom op meeste grondsoorte, is dit die algemeenste op sanderige, goed gedreineerde gronde (veral onder hoë reënvaltoestande) waar dit maklik uitgeloog word, of in swaar gronde wat tot hoë pH gekalk word, waar die vorming van onbeskikbare B vorms plaas vind. Boor kan maklik uit die grond geloog word onder hoë reënval of besproeiing aangesien dit oplosbaar en beweegbaar in die grond is. Onder droë grondtoestande word beskikbaarheid aansienlik verminder, hoofsaaklik omdat dit voldoende vog benodig om na die wortels te beweeg.

Bemesting met boor

Tabel: Die mees algemeenste bronne van oplosbare Boor (B)

	Boor (B) bronne	B%
Oplosbaar	Boraks	11%
	Solubor	20%
	Natriumboraat	20%
	Natriumtetraboraat	14%
	Boorsuur	17%
Minder oplosbaar	Colmanite	10%
	Minerale Boor	2 - 6%
	B frits of korrels	

Na berig is Borax die mees gebruikte B-kunsmis. Die meer oplosbare vorms word gewoonlik verkies aangesien dit in water opgelos kan word en óf op die gewas besproei word as blaarvoeding of as grondtoediening. Die minder oplosbare Colemaniet of B-frits word gewoonlik slegs aangeraai waar ernstige tekorte duidelik is en die grond vrylik dreineer. Hierdie vorms stel die boor stadiger vry en verlaag die loogverliese.

Algemene beskikbare B-bemestingstowwe is geneig om oplosbaar te wees, en is relatief mobiel onder tipiese grondtoestande. Aangesien meeste plante 'n baie klein effektiwiteitsband het, word slegs klein hoeveelhede vir toediening aanbeveel. 'n Grondtoediening van 1kg/ha B word gewoonlik vir suikerriet aanbeveel indien nodig. Aangesien toedieningshoeveelhede geneig is om laag te wees, kan droë produk verspreiding moeilik wees. Dit word aanbeveel dat die droë produk baie goed gemeng moet word met ander kunsmis of vuller-produkte van soortgelyke partikelgrootte om eweredige verspreiding te verseker. Oplosbare vorms van B in besproeiingswater is 'n alternatiewe benadering waar oorhoofse besproeiing gebruik kan word. Waar B in vore of met drupbesproeiing toegedien word, moet 'n mate van versigtigheid toegepas word om oormatige hoë konsentrasies rondom plantwortels te vermy. Blaarvoeding word beskou as 'n effektiewe manier om plant tekorte te behandel, waar 0,2 tot 0,4kg B/ha wat in 200 tot 300L water opgelos word gewoonlik voldoende is.

Analitiese oorwegings

Blaarontledings vir totale B word deur suurvertering van die blaarmateriaal gedoen. Tans ontleed FAS blaarmateriaal met behulp van X-Ray Fluorescens-spektroskopie. Hierdie tegniek is egter nie sensitief vir sekere elemente nie, wat B insluit. Daarom word B analiese aanvullend aangebied deur FAS aangesien 'n ander metode vereis word om B te bepaal.

Met betrekking tot grondontledings vir B is die aanvaarde standaard metode vir beskikbaarheid van grond B die "warm water" oplosbare ekstraksie metode. Hierdie metode kan egter hoogs veranderlike resultate tot gevolg hê en is geneig tot verskeie fluktuasies wat die betroubaarheid van die ekstraksie beïnvloed. Dit verminder die nut van die metode om grondvlakke akkuraat te voorspel. Daar is ook nie goeie kalibrasies in terme van die werklike grondtoetswaardes, B-kunsmis toedieningshoeveelhede en gewas respons nie.

BE WISE, DON'T OVER-FERTILISE

Alex Searle (Extension Specialist: Umfolozi) and Neil Miles (Senior Soil Scientist)

- Minimal cultivation of a field using a green manure crop is possible without hindering other processes.
- Organic matter left on the surface isn't a practical hindrance for establishment operations.
- Green manure crops are valuable, especially in the case of their N release potential at planting.
- Indicator plots are highly beneficial and ensure optimum crop nutrition.
- This trial underlined the profitability of soil sampling for promoting the efficient use of fertilisers.

An interesting crop nutrition investigation was undertaken at Umfolozi in the past season. In March 2017, a three hectare field was planted to N49 certified seedcane. Only phosphorous (P) was applied in the planting operation, with no nitrogen (N) and potassium (K) being supplied either at plant or for the rest of the year. The findings of this study confirmed that this approach to fertilisation resulted in optimised yields with no apparent yield loss having occurred.

Establishing the crop

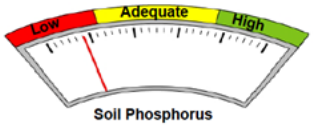
Prior to crop establishment, a green manure mix of sunnhemp, sorghum and sunflower was ploughed in after just 6 weeks of growth (due to factors out of our control). The green manure was disced in with a single pass without mowing, and lines were pulled for planting seven to ten days later.

A soil sample was taken prior to the green manure being planted. Results indicated that there was a favourable level of 'reserve K' in the soil. This information, coupled with the knowledge that the green manure would supply large amounts of N, led to the decision to apply only super phosphate at a rate of 30 kg P/ha in the furrow at plant.

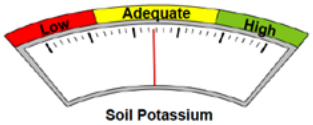
Analysis	Unit	Sample Value	Threshold	Result in kg/ha	Comment
pH (in calcium chloride)		5.65			
Phosphorus (P)	mg/L	10.4	11.6		Low
Potassium (K)	mg/L	276	179	552	Adequate
Calcium (Ca)	mg/L	3365	300	6730	High
Magnesium (Mg)	mg/L	1061	50	2121	High
Sodium (Na)	mg/L	132			
Exchangeable Acidity (Al+H)	cmol/L	0.05			
Total Cations [1]	cmol/L	26.89			
Acid Saturation	%	0.2	20.0 [4]		Not limiting
Exchangeable Sodium % (ESP)	%	2.1	7.0		Not limiting
Ca/Mg (Equivalence ratio)		1.9			Not limiting
Zinc (Zn)	mg/L	2.1	1.5		Adequate
Copper (Cu)	mg/L	6.3	0.8		Adequate
Manganese (Mn)	mg/L	18.8	2.0		Adequate
Iron (Fe)	mg/L	29	3		Adequate
Silicon (Si)	mg/L	58	15		Adequate
Clay	%	45			
Organic Matter	%	3.4			
Nitrogen (N) Category [2]	cat	3			
N Volatilization [3]	%	0.7	10.0 [4]		
Volume Weight	g/ml	1.16			
Reserve K	cmol/L	2.82	1.80		High
Sulphur (S)	mg/L	7	10		Low

Note: Thresholds, Comments and Key Indicators are sample specific and based on the attainable yield indicated on the submission form.

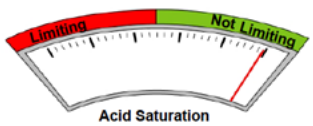
KEY INDICATORS



Soil Phosphorus



Soil Potassium



Acid Saturation

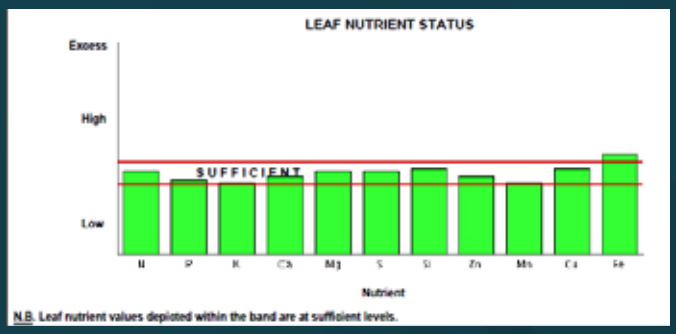
FAS Soil Analysis Report with Reserve K results taken before planting the crop

Planting the crop

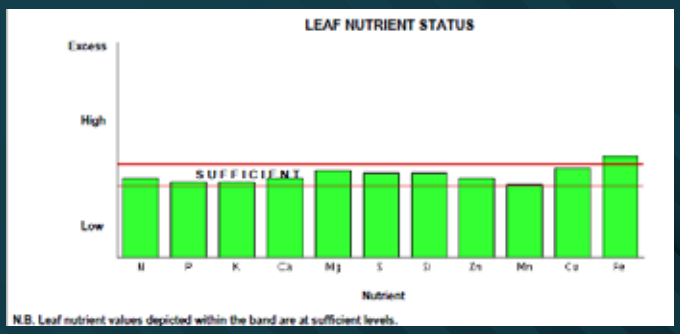
Planting commenced on 22 March, and good rains were received. Being a rainfed crop, advantage was taken of the favourable moisture conditions to apply two pre-emergent herbicides (Metribuzin + chlorimuron-ethyl and pendemethalin), giving this herbicide combination the best chance of success. This resulted in weed control being limited to a cheap follow-up and light hand weeding of broad leaf species about 20 weeks after planting.

To evaluate the adequacy of N and K nutrition in the crop, an indicator plot was established in the corner of the field 10 lines in from the road. The indicator plot dimensions were 5 lines at 1.4 m row spacing by 10 m, totalling an area of 70 m^2. During the next 8 months 2 L of 1:0:1 was applied to this plot every month (to coincide with rainfall). This equates to the equivalent of 56 kg/ha of N and K applied monthly or a total of 452 kg/ha of N and K for the duration of the crop. Applications finished in December 2017 and leaf samples were taken from the indicator plot and the surrounding 'untreated' cane.

Leaf sample results from FAS show no appreciable difference in the nutritional status of the plants from the treated and untreated areas. The image above right shows the indicator plot and the bottom right shows the untreated cane (seedcane was harvested from a portion of the field). The crop in this image is 11 months old from plant date. Colour and vigour appear similar from the treated and untreated areas. The entire field was harvested at 13 months of age with a yield of 144 t/ha.



Indicator plot results



Seedcane plot results

Food for thought..

Consider: if a chicken farmer told you he gave his chickens more food than they needed you would expect him to go broke. So why do cane farmers so nonchalantly give their cane more 'food' than it needs? You don't get more chicken, you won't get more cane either. It's expensive and wasteful. The nutrition has already been supplied to the crop using the green manure and the N released from the break down of organic matter through cultivation practices. Take advantage of your investment by optimising efficiencies in all areas of production!

HOW LOW SHOULD I GO?

Fertiliser recommendation errors induced by sampling at the incorrect soil depth

Sandile Mthimkhulu (Assistant Research Officer), Neil Miles (Senior Soil Scientist) and Louis Titshall (Senior Soil Sceintist)

Soil testing is a best management practice that is aimed at optimising fertiliser application rates, improving nutrient use efficiency and minimising possible environmental impacts of fertilisation. However, the success of this practice is highly dependent on the correct methods being employed in the taking of samples: research shows that incorrect soil sampling procedures generally account for more than 80% of all errors occurring in the generation of fertiliser recommendations. A key factor in soil sampling is the depth to which samples are taken. As the recommended sampling depth for nutrient recommendations varies from one type of crop to another, it is important that growers take samples to the FAS-specified sampling depth as shown in Figure 1.

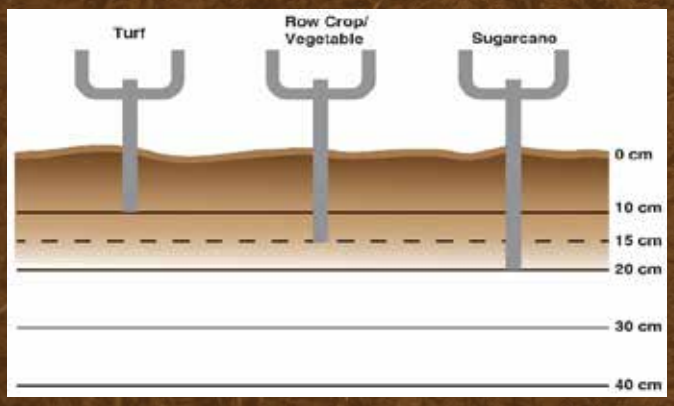


Figure 1: Recommended soil sampling depths for different types of crops.

Research has shown that most of the sugarcane feeding roots are found in the top 20 cm soil layer, and the recommendations given by FAS are based on field-trial research with samples taken from this depth. However, approximately 10% of the soil samples analysed by the FAS in the past six years (2012 - 2017) were collected from incorrect sampling depths – usually 0 - 10, 0 - 15 and 0 - 30 cm. Sampling to the incorrect depths can have serious implications (crop losses, wasteful expenditure and possible environmental pollution); this is due to nutrient levels generally decreasing sharply with depth (Figure 2).

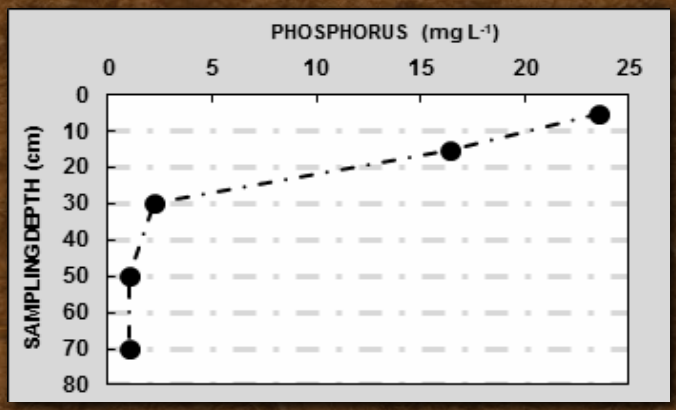


Figure 2: Variation in soil test phosphorus with depth in a humic soil at Eshowe.

Soil samples taken to 30 cm depth usually have lower levels of P and K due to the inclusion of relatively infertile subsoil ("dilution effect"). Samples taken to 10 or 15 cm tend to have higher nutrients levels due to the concentration of nutrients nearer the surface as a result of fertiliser applications and higher levels of organic matter at the soil surface. Sampling at these incorrect depths may lead to less or more than the required fertiliser being applied. As a way of illustrating possible insufficient supply of fertiliser associated with the incorrect depth, the results of soil samples taken at 0 - 10 and 0 - 20 cm from a research trial established on a sugarcane farm at Eshowe were used (Table 1). The higher test values of P and K measured at 0 - 10 cm soil depth would have resulted in lower nutrient recommendations leading to an insufficient supply of nutrients and likely reductions in crop yield.

Table 1: The soil sample results and sugarcane ratoon crop recommendations

Soil sample results			Ratoon crop recommendations	
Depths	Phosphorus	Potassium	Phosphorus	Potassium
cm	mg/L		kg/ha	
10	13	101	0	120
20	8	63	10	200
Difference			10	80

UPDATE NOW AVAILABLE!

Riekert van Heerden
(Senior Scientist: Sugarcane Physiology)

During 2016, SASRI released the Pur***Est***™ App on both iOS and Android platforms. Pur***Est***™ is a mobile application tool that allows the grower to rapidly estimate crop maturity (whole-stalk juice purity) to make ripening decisions on the farm. Pur***Est***™ can also assist with drying-off and harvesting decisions by estimating stalk moisture and RV percentages so that growers can manage and prioritise fields that are ready for harvest.

An update of Pur***Est***™ has just been released on both iOS and Android platforms.

New features

English, isiZulu and Afrikaans language options. After installation the user can seamlessly change between the three language options.

Ability to edit details (e.g. variety, field number, crop age and sampling date) in saved records.

Ability to export saved records selectively (e.g. only records within a certain date range or from one farm).

The option to estimate quality parameters from samples consisting of more than three stalks per sugarcane field. The user can now add data fields for additional stalks (up to 12) on the calculator page of the App (instead of the original three stalks only).

Ability to detect immaturity in the top third of stalks even if estimated juice purity is greater than 85% (the threshold above which chemical ripening is usually not recommended). Under these conditions the user will be made aware of the possibility to apply chemical ripeners, especially if growth conditions are such that a further decline in crop maturity can be expected (e.g. after very good rainfall or after winter).

If you already have Pur***Est***™ installed on your phone, ensure that you update to the latest version.

For new users, download the app via the Apple iStore or Google Play Store.

WEATHER

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

Review

The first half of the 2017/18 summer rainfall season was generally good with most parts of the industry recording near-normal to above normal rainfall for the period October to December 2017. January and February rainfall was mostly below normal, particularly in the coastal areas (Figure 1). The January 2018 rainfall was one of the lowest ever recorded for the month in the rainfed parts of the industry. However, there was a remarkable improvement in March with most parts of the industry recording very good rainfall. Overall, the industry had a normal 2017/18 summer rainfall season.

Irrigation water supplies in the irrigated regions have improved significantly when compared to the same period last year with a number of dams now at or approaching full capacity. The only exceptions are the Pongolapoort and Goedertrouw dams in Zululand which are still well below 50% of their full capacity.

Outlook

The El Niño-Southern Oscillation (ENSO) system is expected to shift from the current weak La Nina state to a neutral phase in May and remain in this phase through the winter of 2018. There are increasing signs that ENSO may develop into an El Nino in the summer of 2018/19. Late summer rainfall in eastern South Africa are often below normal during such events.

The *South African Weather Service* (SAWS) predicts (with low skill level) normal to above normal rainfall and minimum temperatures during winter months (May to July) of 2018. While the *International Research Institute for Climate and Society* and *European Centre for Medium-Range Weather Forecasts* both predict normal to below normal rainfall over the same period.

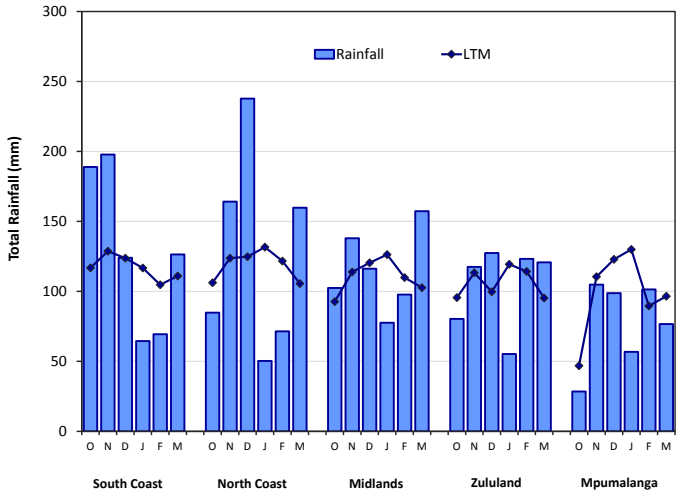


Figure 1: Regional average monthly total rainfall from October 2017 to March 2018 compared to the monthly long-term mean (LTM).

Please visit the Weatherweb available via the SASRI website: www.sugar.org.za/sasri for links to up-to- date seasonal climate forecasts and also for the latest rainfall and other weather data.

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