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THE LINK

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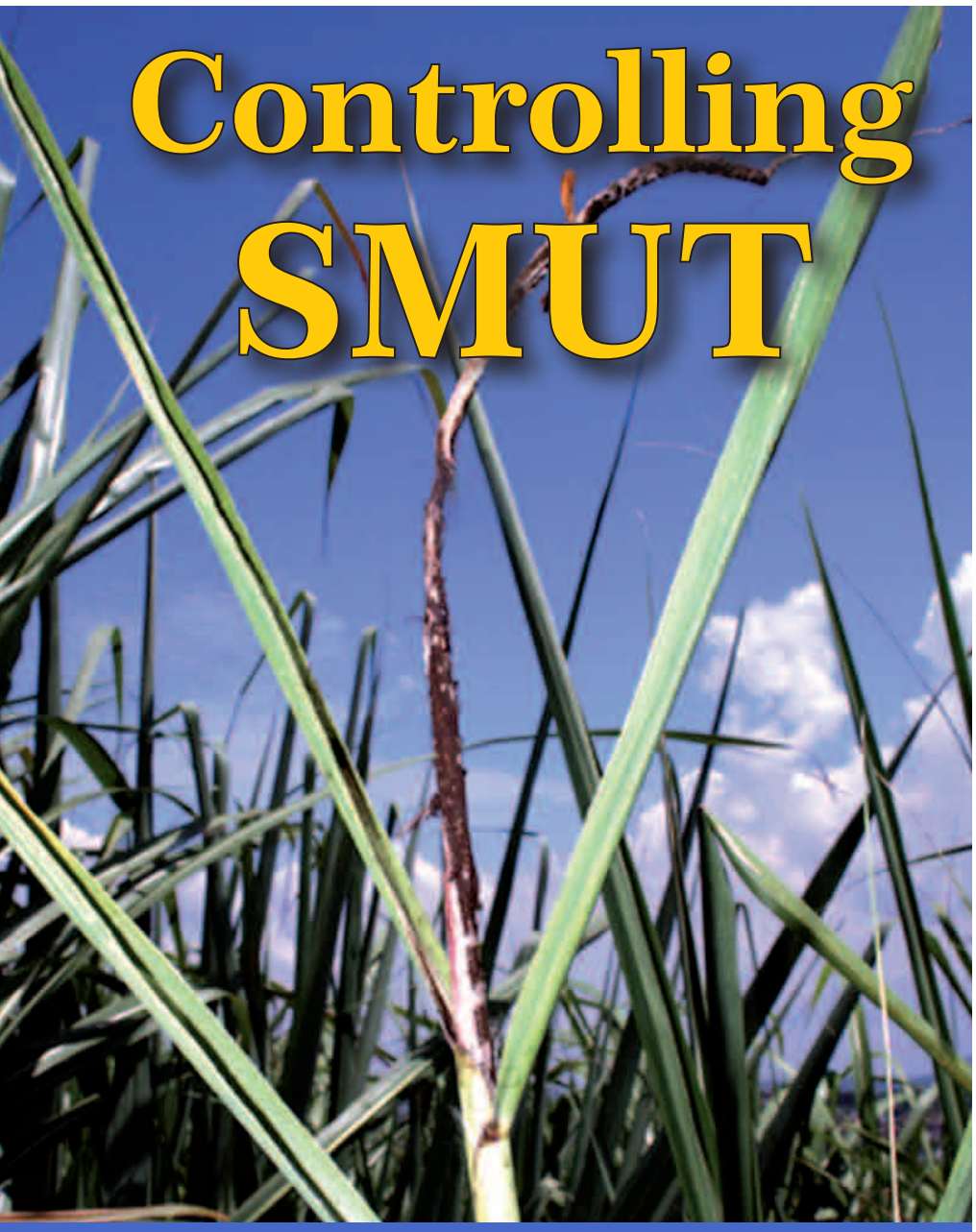
Controlling SMUT



Page 12: *Smut can occur in all areas but is currently widespread and most severe in the northern irrigated areas and in northern Zululand. The disease causes losses in cane tonnage and juice purity. Losses are most severe in susceptible varieties grown under poor conditions and increase with successive ratoons, especially if the disease is not managed effectively. Chemical roguing is proving to be an effective means of control for some growers in the Lowveld.*

Also in this issue...

Page 4: *The insect pest eldana costs the industry close to R 1 bn each year. SASRI Director, Carolyn Baker, discusses current recommendations and new strategies to curtail this loss.*

Page 8: *Most farmers do not make full use of their FAS soil test reports. Extension Specialist Adrean Naude, provides useful information to help you understand the report.*

Page 10: *Looking after the health of your soil is a fundamental requirement for successful farming. Senior Soil Scientist, Neil Miles, explains the basics.*

SASRI

Unlocking the potential of sugarcane

Topical Tips

January - April 2014

Pest and disease control

- Keep your eyes open for any unusual pest or disease symptoms; remember you are the first line of defence. Notify your local Extension Specialist or P&D Officer if you find something you do not recognise.
- Ratoon stunting disease (RSD) can cause severe yield loss. Up to 50% reduction in yield has been recorded in trials. If your fields are infected, it may be wise to sacrifice some crop growth by fallowing these fields until all traces of the previous crop are removed. This could take up to six months. Plan to sample all fields to be re-established this year.
- This is the time to inspect and rogue fields and nurseries for diseases and off-types. Diseased stools must be completely removed with all their roots, in the case of smut, place the diseased material in a bag, remove from the field and burn. Train your staff to identify smut before the whips emerge.
- Do your own surveys or get your Local Pest, Disease and Variety Committee to check carryover fields for eldana so that fields with the highest levels of damage can be harvested first in the coming season.

Weed control

- With the good spring and summer rains, weeds will have plenty of opportunity to explode during the off-crop period. Maintaining your weed control programme is vital.
- Follow-up hand weeding of *Panicum* (Ubabe) and *Sorghum* (Uqhangabothi) spp and conduct under-canopy spraying of creeping grasses.
- Don't forget to mow verges and breaks.

Irrigation

- Plan a drying-off programme for irrigated fields.
- Schedule irrigation, do not over-irrigate.

Planting

- There are additional risks when planting in late summer and autumn as high soil temperatures, as well as the soil drying out as winter approaches are real possibilities. This could lead to the risk of the soil borne disease, pineapple sett rot, affecting germination. To avoid this, apply a fungicide to protect the setts, and adequately cover and compact the soil over the setts.
- For the midlands, now is the time to plant seedcane nurseries, so that the cane is at the optimum age in spring the following year for planting.

Nutrition

- The heavy rains in spring may have caused leaching of fertiliser, so keep an eye on your N levels - you may need a top-up before going into winter.
- Carry out leaf sampling in young ratoon or plant fields not affected by thrips. Leaf samples should be taken to assess the effectiveness of your fertiliser programme. The period for leaf sampling ends in March for the coastal and midlands areas and in April for the northern irrigated areas.
- Consider planting green manure crops such as winter oats in your replant fields.
- Carry out soil sampling, top and subsoil, in your plough-out fields after harvest.

Chemical ripening

- Plan and finalise your chemical ripener programme. Monitor your ripener programme.
- In the northern irrigated areas there are excellent opportunities to exploit the use of chemical ripeners as well as the scheduling of varieties to be harvested in their appropriate window periods to ensure the maximum possible income from every field.

Harvesting

- Plan your harvesting programme for the coming season.
- Access the latest SASRI crop forecast for the coming season. There is also a yield benchmarking facility available on the SASRI website; http://www.sugar.org.za/sasri. Look under 'Crop Resources' .Your SASRI Extension Specialist also has a simple tool to estimate yields.
- Estimate the crop for the coming season and submit your estimate timeously.

Management

- Plan all field operations for the coming season to help with determining income and expenditure estimates (budget) as well as identifying the times at which resources such as labour, fertiliser, herbicide and seedcane are likely to be required. SASRI has programme planning sheets available should you require them.
- Analyse individual field performance to assist in replant decisions such as variety selection, seedcane requirements and appropriate green manure crops.
- Plan and order seedcane requirements for next year.
- You can only manage effectively if you have good accurate information at your disposal. If you are not using a field record system, think seriously about buying a suitable package. There are many available for use with a personal computer. However, even basic manual records are good enough, provided the correct information is recorded.
- This period during the off-season provides an opportunity to train staff without much disruption to important operations. Courses that should be considered are: disease, pest and variety identification, planting, Junior or Senior Supervisor training, tractor care, basic workshop skills and welding. Contact the Shukela Training Centre on 031 – 508 7706 or your local extension office.

Land use planning

- Review the field layout in all your plough out fields, including contour banks and waterways.
- Speak to your local SASRI Extension Specialist about the possibility of having a land use plan drafted using the latest computer technology.
- Maintain and repair farm roads.

Contact your local SASRI Extension Specialist should you require help with any of the above.

The SASRI Extension Team

From the DIRECTOR

Dr Carolyn Baker

Getting to grips with Eldana

Seeking out the beast: *(L - R) Principal Entomologist, Graeme Leslie, SASRI Director, Carolyn Baker and Biorisk Manager, Rowan Stranack examine an eldana-damaged sugarcane stalk.*

Current debate regarding the declining yields attained by growers in regions where eldana is a problem has placed the spotlight squarely on the impact of this pest on industry productivity. Since its spread into sugarcane from its natural hosts in the late 1930s and then its proliferation in the 1970s, eldana has caused extensive crop loss particularly in the coastal areas. Conservative estimates of the annual cost to the industry are pegged at R940 million. The loss that this figure represents is attributed not only to direct loss as a consequence of the borer damaging the cane stalks, but also to the indirect cost of having to harvest a 15-18 month crop earlier at 12 months, thereby constraining the most productive sucrose accumulation period. Where eldana is controlled and cane is harvested at the correct age, growers are able to achieve yield improvements of up to 15%.

The question to ask is why we are unable to control this loss. This is not simple and there are several reasons, not least of all the fact that eldana, as an indigenous pest, cannot be eradicated easily. However the apparent inability of the industry to control the pest and limit its impact rests on variable application of the recommended better management practices (BMPs) as well as the absence of certain technologies that SASRI has been unable to provide to the industry. The range of BMPs that SASRI advocates are well-known and include:

choice of resistant varieties, use of good seedcane, limiting moisture stress where possible, managing nutrition, practising strict field hygiene and using insecticides when and where appropriate. Added to this list are several habitat management techniques that aim to improve the biodiversity on farms and encourage eldana moths to converge on natural hosts in preference to sugarcane. Missing from this list of control mechanisms however, is an effective biocontrol agent and the deployment of GM varieties containing the Bt gene.

These last two control mechanisms, while recognised as being of potential value have faltered for different reasons. The search for a suitable biocontrol agent (parasitoid) has been ongoing at SASRI since the mid-1970s and despite significant promise, none have been able to establish themselves in the field and develop sustainable populations, largely as a result of sugarcane not emitting the correct chemical signals to attract the parasitoids when it has been attacked by eldana. Then with regard to GM: SASRI's ability to develop and grow a GM Bt variety was established in 2000 when, under a research and development licence, proof of concept was demonstrated in pot trials at Mount Edgecombe. However commercialisation of this technology was hampered by two things: (1) inability to acquire commercial rights to the gene construct; and (2) reluctance by the industry to follow the GM route.

While the search for a suitable biocontrol agent continues, it is exciting to note that industry role-players have become more supportive of a GM approach and steps towards developing a strategic plan and business case for GM sugarcane are under way. It is undoubted that such an approach, while not serving as the proverbial silver bullet, might go a long way towards addressing the eldana problem if it is used in conjunction with the suite of BMPs for eldana control advocated by SASRI.

Extension Changes

SASRI will be bidding a fond farewell to **Tom Fortmann** who retires at the end of this year. Tom has served the Zululand North region for 33 years as Extension Specialist, and is extremely proud of the excellent record the area has in relation to pest and disease control and to good conservation practices. His involvement in the many seedcane schemes has contributed greatly to the well-being of the area.

Tom is currently busy handing over the reins to **Tshifhiwa Radzilani** who hails from Limpopo Province, where he worked as Extensionist for the South African Subtropical Growers Association. Tshifhiwa specialised in Stink Bug control in macadamias and litchis. He has presented several papers at international congresses on Stink Bug control. Tshifhiwa has a B Tech (Agriculture) degree and is currently completing his M Tech (Agriculture).

Info Pack 2013

The latest version of the useful and popular InfoPack disc will be mailed towards the end of January. This resource is a collection of electronic versions of almost all SASRI publications, including The Link, Ingede, Information Sheets, Manuals, Booklets, Posters & Training Videos. Look out for this fantastic resource in the mail or contact your Extension Specialist.

Harvest to crush:

Don't Delay!

There is a myth doing the rounds among some sugarcane farmers which suggests that profits can be increased by delaying delivery to the mill after the cane has been harvested. These farmers have noticed that RV% increases when harvested cane is left lying in the field. They believe that any loss in mass during this delay is simply dehydration (moisture loss) without any loss in tons RV, and that this translates into reduced transport costs.

SASRI needs to set the record straight. Tons RV will decrease after harvesting. The increase in RV% a few days after harvesting is due to mass (the carbohydrate component of the cane) loss. Only one-third of this mass loss comes from moisture loss. The other two-thirds is a result of metabolic activity which causes physical loss of tons RV, which in turn results in reduced income.

A series of trials were conducted to establish the net effect of harvest-to-crush delays on income. Results show that, in cold winter months (average temperature 9°C), there is no impact on revenue (and certainly no increase). The same amount of delay during warmer periods (average 21°C) resulted in up to

3% loss in income. The negative impact on income is likely to be much more severe under hot conditions. Unfortunately, there were no hot days during the trials, but further trials will be held to verify this. In all cases described above, the delayed cane will result in extraction losses in the mill and a further loss to both grower and miller.

During our trials, great care was taken to clean and top each individual stick of cane. In the commercial situation, there is bound to be much more extraneous matter and less effective topping, which will result in far greater degradation than we have shown. Also, our trials were conducted with a maximum delay of four days. There is already ample published evidence that the tons RV declines even more rapidly after four days.

There is absolutely no evidence to suggest that the farmer benefits by delaying delivery to the mill. On the contrary, our results show that the loss in income increases with temperature. The increase in RV% (due to its increased concentration in a reduced mass load) gives the false impression of increased cane quality. In reality, as the length of the delay increases, the physical loss of tons RV will result in reduced profits. SASRI therefore recommends that every effort be made to limit harvest-to-crush delays to the minimum possible duration.

Peter Lyne *(Agricultural Engineer)*

IMPROVE YOUR PROFITS!

It is worth reminding yourself often that, under the RV cane payment system, you can improve your profits by delivering cane that is mature, clean and fresh.

MATURE

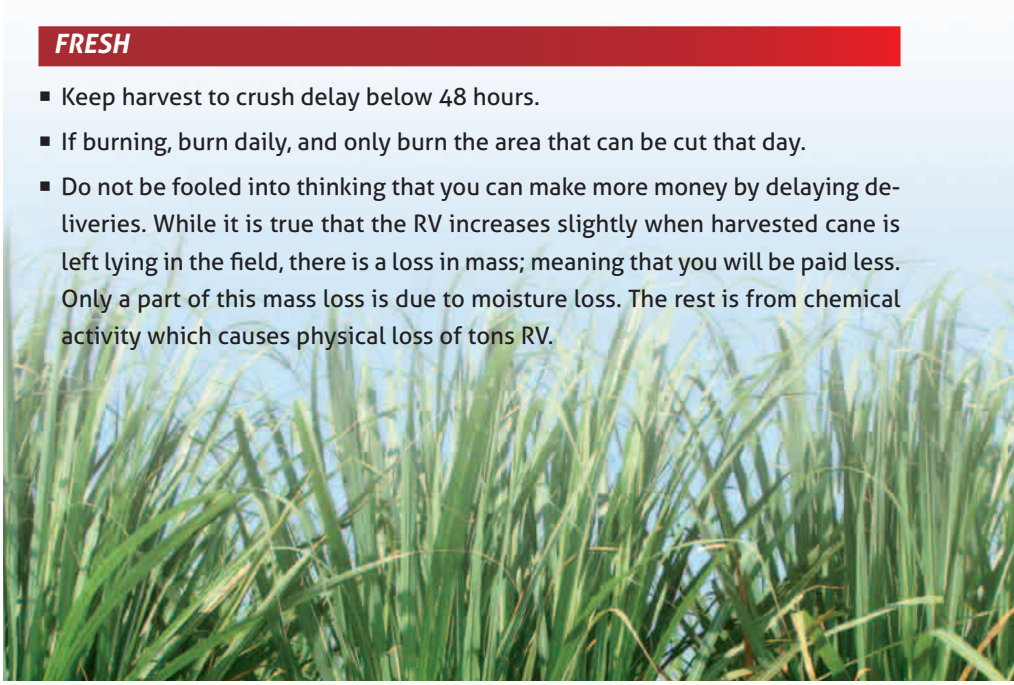
- Good husbandry results in good cane.
- Match varieties to soils, climate and harvest cycle.
- Harvest cane at the right age for your area.
- Harvest varieties at the recommended time.
- Apply chemical ripener when appropriate.

CLEAN

- Do not send tops, trash, soil, or roots with your cane – these will affect RV negatively.
- Ensure that there are no stones, boulders or chains in your deliveries. The damage to mill equipment caused by the presence of these items results in downtime, which is costly to the industry.

FRESH

- Keep harvest to crush delay below 48 hours.
- If burning, burn daily, and only burn the area that can be cut that day.
- Do not be fooled into thinking that you can make more money by delaying deliveries. While it is true that the RV increases slightly when harvested cane is left lying in the field, there is a loss in mass; meaning that you will be paid less. Only a part of this mass loss is due to moisture loss. The rest is from chemical activity which causes physical loss of tons RV.



Understanding your Soil Test Report

When farmers submit soils for analysis to FAS at SASRI, they receive a detailed analysis report with a wealth of information. Unfortunately, many farmers do not make full use of this report, possibly because they may not understand how to interpret the information provided. To help with this, **Adrean Naudé** , SASRI's Extension Specialist on the North Coast has prepared a poster (see next page) which provides explanations for each section of the report . Always consult your Extension Specialist if you do not fully understand your FAS report – this will ensure that you get the full value for the money paid for the analysis.

Understanding a Soil Fertility Report

e.g. 123456A
Unique number issued to a farmer and specific farm when registering at a specific mill

SASRI accountnumber linked to a specific grower number.

CLIENT DETAILS
Grower No.
FAS No. 8926
Grower Name
Company Name
P O Box
Mt Edgecombe

BILLING DETAILS
Order No:

ADVISOR DETAILS
Email : test@sugarfarm.co.za
Extension Area: SASRI

The area specified will determine which Extension Specialist will receive a copy of the results.

Date sample is received at FAS, not date sample placed in FAS collection box

Unique number issued by FAS, linking report with specific sample and grower

Date FAS sends report to farmer

FERTILISER ADVISORY SERVICE - SOIL ANALYSIS REPORT
SA Sugarcane Research Institute
Tel: 031 508 7474 / 75 Fax: 031 508 7593 Email: fertiliser.advisory@sugar.org.za

Date Received :	01/08/2013	FAS Lab ID :	GS 28324	Report Date :	28/08/2013

Important for farmer to link soil analysis with correct field on farm. NB: It is the grower's responsibility to ensure that the identical field number is listed on both the submission form and the soil sample box.

- 0 – 20 cm for topsoil samples; 20 to 30 samples per field taken with a Beater auger for one composite FAS sample box.
- Plant cycle recommendations are given for P +2R, thereafter fields should be sampled every 2nd year.

In plant crop indicate variety to be planted. In ratoon crop indicate current variety.

Important in determining fertiliser application rates, trash blanket influences K rates and choice of N carrier.

Irrigated cane has slightly different thresholds and yield cut-offs to rainfed cane.

Some green manure crops fix atmospheric N. N recommendation is adjusted according to the crop grown and the green manure yield.

CROP AND FIELD DETAILS

Sample ID or Field Number	Field1
GPS Coordinates	
Sample Depth	0 to 20 cm
Crop	Plant Cycle
Variety	UNKNOWN
Is Cane Trashed ?	No
Is Cane Irrigated ?	No
Green Manure Crop Type	None
Green Manure Crop Yield	N/A
Attainable Yield at Harvest	100 tons cane/ha

Green manure yield influences N recommendation. Important to indicate if seed/grain was harvested or left in field.

- For plant-crop soil sample, recommendations are given for the plant crop and 2 ratoons.
- Fertiliser applications for plant-crop (in furrow) are different to those recommended as topdressing in a ratoon.
- Lime and gypsum recommendations may differ between plant and ratoon crops.

Attainable yield is used in fertiliser recommendations. Take into account the soil potential and general soil health when determining the yield target for the crop.

Two methods for determining P, Truog method for soil pH < 5.5 and the Resin method for pH > 5.5, the latter being more accurate/reliable on higher pH soils.
P is key in plant's energy supply chain and establishing a healthy root system. Important for plant crop and should be applied in the plant furrow.

Key nutrient for sugarcane and utilised in great amounts – up to 300 kg/ha of K. Excess K can induce Mg deficiency. Crops deficient in K tend to be less resistant to disease, cold and drought.
K thresholds are influenced by clay %, yield target and base status of the soil.

Acidic portion of CEC. The lime recommendation is based on this, not pH. Approximately 95% of this is made up of Al and 5% H

Sum of available major cations. Gives an estimate of the effective Cation Exchange Capacity (CEC) of non-saline soils.

Soil pH measured in $CaCl_2$ – about 0.75 units lower than that measured in water.
Soil pH should ideally be between 4.5 and 7.5

Analysis	Unit	Sample Value	Threshold	Result in kg/ha	Comment
pH (in calcium chloride)		3.77			
Phosphorus (Truog) [1]	mg/L	8.4	17.4	17	Low
Potassium (K)	mg/L	53	141	107	Low
Calcium (Ca)	mg/L	86	300	173	Low
Magnesium (Mg)	mg/L	35	50	71	Low
Sodium (Na)	mg/L	13			
Exchangeable Acidity (Al+H)	cmol/L	1.54			
Total Cations [2]	cmol/L	2.45			
Acid Saturation	%	62.9	20.0 [5]		Limiting
Exchangeable Sodium % (ESP)	%	2.0			Not limiting
Ca/Mg (Equivalence ratio)		1.5			Not limiting

Indicator of aluminium toxicity. Determined as (Al+H) as a percentage of the total cations.

Calculated ratio, if < 1, calcium may be deficient, and gypsum is applied at 1 – 2 t/ha to rectify.

Calcium is important for growth: activates numerous enzymes, plays structural roles and mitigates the effect of toxic aluminium in soil. Deficiency can be corrected by adding lime or gypsum to the soil.

Magnesium is essential for photosynthesis. Deficiency is cost-effectively corrected by the application of dolomitic lime.
Mg is leached from topsoil when gypsum is applied, hence the standard application of dolomitic lime when gypsum is applied.

Non-essential for sugarcane growth. Excessive sodium, relative to Ca and Mg, results in sodic soils with serious physical problems. The sodicity hazard is reliably reflected in the ESP value.

ESP: Total amount of Na expressed as a % of the total cations, an indication of the sodicity of a soil

Micro-elements:

- Zn – most frequently deficient. Some fertilisers may contain Zn – zinc sulphate usually applied to correct.
- Cu – availability low in soils with high pH and high organic matter. Corrected by applying copper sulphate.
- Mn – vital to plant but in excess can cause iron deficiency and is toxic to plant. Mn is more readily available at low pH. When toxic correct pH with lime; for deficiency apply manganese sulphate.
- Fe – when deficient causes chlorosis (pale yellow/white leaves on young cane) and yield depression; can be corrected with a ferrous sulphate foliar application.

Analysis	Unit	Sample Value	Threshold	Result in kg/ha	Comment
Zinc (Zn)	mg/L	0.6	1.5		Low
Copper (Cu)	mg/L	0.5	0.8		Low
Manganese (Mn)	mg/L	4.0	2.0		Adequate
Iron (Fe)	mg/L	306	3		High
Silicon (Si)	mg/L	10	15		Low

Silicon: Poor tillering when deficient. Increases yield, reduces lodging, reduces P & D infestation e.g. eldana; renders cane more drought tolerant.

Organic Matter is a major contributor to soil health and fertility, it supplies nutrients to the plant and increases the soil CEC. Used in determining N category of soil.

Clay % is an indication of the clay content of the soil. Value used in the determination of the N category, N, P and K recommendations.

Analysis	Unit	Sample Value	Threshold	Result in kg/ha	Comment
Clay	%	18			
Organic Matter Estimate	%	1.1			
Nitrogen (N) Category [3]	cat	1			
N Volatilization [4]	%	0.9	15.0 [5]		Not Limiting
Volume Weight	g/mL	1.34			

Four soil N categories, reflecting varying N mineralisation potentials are recognised:

- Category 1: < 2% organic matter
- Category 2: 2 – 4% organic matter, < 35% clay
- Category 3: 2 – 4% organic matter, ≥ 35% clay
- Category 4: > 4% organic matter

These categories are used in deriving the N recommendations for the field.

Indication of the extent to which urea will volatilise in the soil.
< 5% = not limiting
5 – 15% = moderate
> 15% = limiting

➢ When limiting avoid using urea and urea-based blends.

0.8 – 1.0 g/ml = humic soil
1.0 – 1.3 g/ml = clays and loams
1.3 – 1.6 g/ml = sandy loams and sands

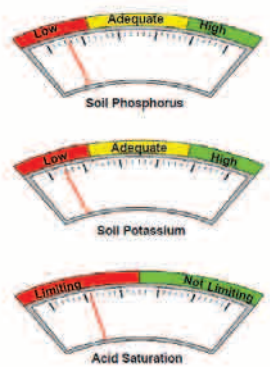
Analysis Notes :

1. P analysis by Truog method if sample pH <= 5.50. If pH > 5.50, Resin method used.
2. Sum of potassium, calcium, magnesium, sodium and (Al+H). In non-saline soils, this is a measure of the effective cation exchange capacity (ECEC).
3. Rating of potential N release from the soil organic matter (1 = low, 4 = high). N recommendations are adjusted according to this rating.
4. Potential N volatilization. If >15, urea should not be used as a topdressing.
5. Maximum permissible.

Additional supplementary notes relating to the analytical results.

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

KEY INDICATORS



Quick reference indicators of key soil-parameters

Lime recommendations are based on two measured criteria in the topsoil:

- Acid saturation levels (reliable indication of aluminium toxicity) and
- Adequacy of calcium (Ca) and magnesium (Mg) levels in the soil.

Gypsum recommendations are based on clay % and acid saturation in sub-soils.

N recommendation are based on:

- Organic matter and clay content of topsoil
- Specified attainable yield
- Residual N from green manures

Minimum P recommendation for plant crop is 20 kg P/ha. Maximum P recommendation for plant crop is 100 kg P/ha. Plant-crop P is applied in the furrow.

Potassium recommendations are based on:

- Existing soil K level
- Clay content of soil
- Base status of the soil
- Indicated attainable yield
- Burning or trashing

LIME AND NUTRIENT RECOMMENDATIONS

Crop	Lime t/ha	Lime Type	N kg/ha	P kg/ha	K kg/ha
Plant	4.0	Dolomitic	140	40	250
Ratoon 1	0.0		170	0	205
Ratoon 2	0.0		170	25	205

POSSIBLE FERTILISER OPTIONS

	Fertiliser	Furrow (kg/ha)	Topdress (kg/ha)
Plant	2-3-4 (30)	400	
+	Urea		250
+	Pot.Chloride		400
or	MAP(33)	200	
+	Urea		250
+	Pot.Chloride		500
Ratoon 1	4-0-5(48)		800
or	Urea		350
+	Pot.Chloride		400
Ratoon 2	6-1-7(47)		850
or	MAP(33)		100
+	Urea		350
+	Pot.Chloride		400

N.B. The above fertiliser options are approximations based on commonly used products.

Criteria used in deriving fertiliser recommendations:

- If N volatilisation is ≥ 15%, urea should be avoided.
- Listed blends are the closest approximations to our recommendations, based on the commercial blends most commonly available.

Agronomic Comments:

- Where high levels of Eldana are anticipated, it is advisable to reduce N recommendations by 20 to 30 kg/ha.
- The maximum K that should be applied in the planting furrow is 100 kg/ha. The remainder should be broadcast.
- Lime should be incorporated into the soil 3 to 6 weeks before planting.
- If lime is not incorporated into the soil, urea or urea-based blends should not be used.
- Zinc is below threshold. Where possible use a fertiliser mixture that contains zinc.
- Silicon is low; consider using a silicon-based amendment.
- Copper is low. Consult your Extension Specialist for advice regarding the correction of this potential deficiency.

Important agronomic comments related to the application of recommended fertiliser and other products.

SASRI
SOUTH AFRICAN SUGARCANE RESEARCH INSTITUTE

Poster prepared by:
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SOIL HEALTH

Neil Miles
(Senior Soil Scientist)

Soil Health in Perspective

A heart-rending example of the consequences of the greedy exploitation of soils is provided by the American 'dust-bowl' disaster in the first half of the last century: continuous cropping and associated tillage of soils over long periods with no thought of replenishing nutrient or organic matter reserves reduced large parts of the North American Great Plains to a dust bowl. Only as more sustainable farming methods were adopted could the decline be reversed.

Soil health needs to be considered from three perspectives: chemical, physical and biological. Let's take a closer look at these.

Chemical health

Soil tests from reputable labs are required for an objective evaluation of a soil's chemical health. Characteristics of a soil that is chemically healthy include the following:

- Adequate supplies of plant-available nutrients (nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and the spectrum of micronutrients) are present in the soil. This implies that farming practices (application of manures and fertilisers) have ensured the replacement of nutrients removed in harvests. Importantly, there should also not be evidence of 'over-loading' with nutrients such as phosphorus and nitrogen, which can lead to pollution of underground and surface waters (excesses of phosphorus are not unusual where chicken litter is continuously applied to soils - in particular to sandy soils).

- Organic matter levels should be favourable. It should be borne in mind that optimum organic matter levels vary widely between soil types, so the uninformed salesman who insists that your soil "should have 3% organic matter, otherwise you're in trouble!" is displaying his ignorance.
- Aluminium or manganese toxicities, or salinity (excess salts) and sodicity (excess sodium) problems should not be present. These detrimental chemical conditions will be considered in more detail in future articles.

Physical health

When we talk about physical soil health, we consider aspects such as how well water enters and is stored in the soil, how 'dense' or hard it gets when dry, and how easily roots can grow through it.

Ideally, soils should be spongy and well-aerated. Soils with these characteristics will allow water to infiltrate rapidly, storage of water will be excellent, and seedling emergence and root growth will be unimpeded. Compacted soils and soils that 'set hard' have restricted flow of air and water through them. Surface sealing and crusting often exacerbate the problems of air and water entry into degraded soils.

The rate at which water is able to infiltrate the soil is of critical importance, and this has a major bearing on the effectiveness of rainfall or irrigation. If the infiltration rate is low, there will be surface ponding, runoff and erosion following moderate or heavy rainfall, thereby reducing moisture supplies for crop growth. Sandy soils tend to have faster infiltration rates than clays, although infiltration in clay soils can be excellent where organic matter levels are favourable.

Biological health

A biologically-healthy soil will have teeming populations of organisms, including bacteria, fungi, earthworms and many species of insects. The roles these organisms carry out in soils are too numerous to consider in any detail here, but examples include the following:

- The breaking down of organic materials in the soil (old roots, crop residues, manure, etc). This process, carried out by a range of soil organisms such as bacteria, fungi and earthworms, has many positive spin-offs, including the production of humus, the release of nutrients for crop growth, and the cementing of soil particles into aggregates which improve the infiltration of air and water.
- Fixation of nitrogen from the atmosphere for crop growth. Bacteria living in nodules on the roots of legumes such as sunnhemp and soybeans, as well as 'free-living' bacteria, are able to convert appreciable amounts of nitrogen from the atmosphere into forms that can be used by crop plants.
- Earthworms have been described as 'the keepers and restorers of soil fertility'. In addition to decomposing soil organic matter, their casts are rich in plant nutrients, while their burrows promote soil aeration and water infiltration.

An obvious goal in any farming practice should be to create conditions that favour beneficial organisms, which are in the majority, while decreasing populations of harmful organisms. Fortunately, sustainable farming practices such as the correct use of lime and gypsum, rotating crops, and minimising tillage, go a long way towards achieving this goal!

CHEMICAL ROGUING for smut

a) Smut whips emerging from the top of infected stalks (left). b) Incipient whips: infected shoots with small, erect spindle leaves, thin stalks and elongated internodes (right).

When sugarcane is infected with smut, a long, black whip-like structure emerges from the top of the stalk over time *(see picture, above left)*. These whips produce billions of infectious spores that are well adapted to wind dispersal, but can also be spread in rain and irrigation water. To reduce the risk of spread from infected to healthy plants both within the field and to surrounding fields, smut-infected stools need to be identified and removed (rogued) every four to eight weeks. Ideally, roguing should start when stools are in the incipient whip stage *(see picture, above right)* and before whips begin to emerge.

Digging out infected stools is a common method of roguing (see SASRI Information Sheet 2.5: Roguing), but this is often difficult and time-consuming, particularly when the soil is hard. In many cases, the stool is not removed completely and much of the infected plant is left in the ground to re-grow, providing a source of infection later on.

Chemical roguing is proving to be effective for some growers in the Lowveld. With this method, incipient and emerging whips are removed (cut about half way up the stalk to ensure the entire whip is removed). These are placed in bags and later burnt, away from the field. About 10mL of a 10% solution of glyphosate is then sprayed over as much of the infected stool as possible without spraying the surrounding stools. Sprayed stools will die off after a four to eight week period.

Advantages of chemical roguing

- Provides an efficient method of roguing. A single labourer can cover approximately 6 ha/day at infection levels <2%)
- Increased likelihood of killing the entire infected stool.

Notes on preparing the glyphosate mix:

- Add high quality ammonium sulphate (2%) to treat salts in the water. A buffer is not necessary if ammonium sulphate is added to the tank mixture.
- Add a suitable surfactant to improve uptake and efficacy of glyphosate. Follow label recommendations.

Notes on varieties

It is particularly important to check fields of varieties that are rated intermediate or susceptible to smut and to rogue when necessary. In the Lowveld, N32 is most commonly infected with smut followed by N25, N19, N41 and N14 while in Pongola, smut has been observed on N25 and N41. N32 has been degazetted and may not be planted. A number of varieties in the midlands are susceptible to smut, including the new releases N50 and N54. Smut has also recently been observed in N48.

Sharon McFarlane *(Pathologist)*,
Karlien Trumpelmann
(Lowveld PD&VC Officer) &
Dane Ralfe *(Sugarcane Farmer)*

Dane Ralfe farms approximately 365 ha of sugarcane in Mpumalanga, where smut is a major problem. In this article he shares his experiences in controlling this disease.

Smut Control in Mpumalanga

When the smut levels on your farm begin to exceed 2%, manual smut removal by digging out the entire root stock is no longer effective. In drip-irrigated fields, stools are very large and the ground is extremely hard. Labourers therefore tend to cut off the base of the infected whip and leave the roots behind, which in effect is 'whip-roguing'. This results in the problem disappearing for a short while only.

The most effective time to rogue is just after the first spring rains, and before the cane reaches full canopy. This is a very short period, and manual roguing is not quick enough.

Chemical roguing is very quick, cheap and effective means of smut control. All you need is a pair of secateurs, hand held 2L sprayer (not a knapsack), chemical-proof, elbow-high gloves and a 10% Glyphosate mix. Use a surfactant with the glyphosate mix to increase its effectiveness. Only rogue in correct weather conditions; not in the rain, or if there is a strong likelihood of rain.

Always use the same person to rogue as this not a job for temporary labourers. If they do it constantly, they gain invaluable experience in identifying smut early. They also learn which varieties are more prone to smut on your farm and which fields have higher levels than others. I use one specialist roguer who has been doing my roguing for four years. He therefore has a much better idea of the smut levels on the farm than I do.

He starts at the beginning of the season when the ratoon is ankle-high and will finish when the last cut field has canopied. He does not have to do the whole farm at one go. He will cover about 6 ha a day, and will cover the entire farm (365 ha) during the course of a season. He covers every field twice, and in the case of problems fields, thrice. After the first spring rains when the smut tends to show itself a lot, I usually allocate two additional people to this task (only for two months) to reduce the possible spread of the disease.

Correct roguing procedure

Start by identifying the whip. If you are early and there is just an elongation of one of the stems and no signs of spores, do not cut it as you can obtain a more effective kill if uncut with lots of leaf surface area to apply the chemical.

If the whip has elongated and there are signs of spores, cut the shoot as far down as possible making certain that you leave some leaves on that particular stalk. Hold those leaves in your gloved hand and give them a full cover spray. Just as smut is systemic, so is the glyphosate, and it will act on whatever part of the root system the smut has infected. From our experience, when we cut the infected whips very low without leaving any leaf surface, we find that there sometimes is regrowth from smut whips that did not share the same roots as the rest of the stool.

If roguing is done effectively, as an area wide approach, there is no reason to degazette varieties because of smut. Under climatic conditions similar to ours, Swaziland farmers are able to farm NCo376 to this day, while it has been degazetted in our area for over a decade.

At high levels of smut, chemical roguing is the only effective option. One cannot hope for a super variety - even some resistant varieties may eventually succumb. Roguing must therefore become an annual farm practice.

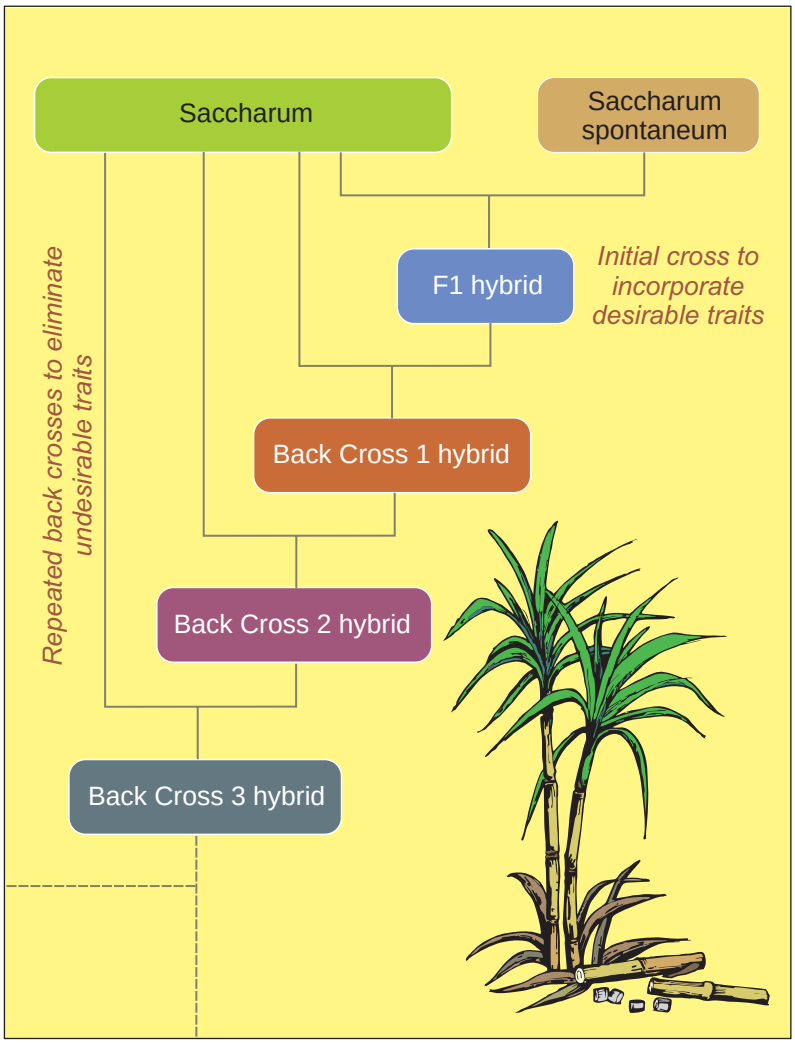
Dane Ralfe
(Mpumalanga Sugarcane Farmer)

The never-ending quest for Better Sugarcane Varieties

Plant breeding is one of the key activities at SASRI, with plant breeders constantly endeavouring to produce superior varieties. The breeding programme seeks to develop location-specific varieties that are high in sugar yield, have great ratooning ability, as well as adequate resistance to important pests and diseases. Early sugarcane varieties released by SASRI include the popular NCo310 and NCo376 both of which were not only successful locally, but have also been grown in several countries around the world, where they were responsible for the economic survival of those sugar industries. To date, more than 60 varieties have been released from the SASRI breeding programme. Of significance is the fact that five of the varieties released in the last 15 years demonstrate yield gains of more than 15 tons/ha.

To further improve our plant breeding programme, SASRI is currently devoting some research efforts to introgression breeding, a practice that forms a significant and successful component of sugarcane breeding programmes in Australia, the United States, China, Barbados, Argentina and elsewhere in the world. Introgression breeding involves the movement of a gene from one species into the gene pool of another by crossing the two species in question, and then subjecting the resulting hybrid to repeated backcrosses with one of its parent species.

Introgression Breeder Tasmien Horsely in the Plant Breeding facility at SASRI.



In the case of sugarcane, the aim of introgression breeding is to incorporate important genetic traits such as excellent vigour, high fibre content, great ratooning ability, good drought tolerance and resistance to pests (eldana, various nematodes) and diseases (smut, rust, mosaic) into the existing South African sugarcane gene pool. To achieve this, elite *Saccharum* species from the SASRI variety collection will be crossed with the more diverse *Saccharum spontaneum* (wild) species and, in separate crosses, with the related sugarcane genus *Erianthus arundinaceus*. The resulting hybrids will then be crossed back repeatedly with elite *Saccharum* parents in order to eliminate undesirable components stemming from the wild and related species, while ensuring that desirable traits are retained. The resulting new and better germplasm will then be used as parents during the establishment of commercial sugarcane varieties. This in turn will allow South African sugarcane growers access to more productive varieties, thereby contributing to long-term industry sustainability.

Tasmien Horsley
(SASRI Introgression Breeder)

A new nematicide for the sugar industry

An article in The Link, May 2012, titled 'More nematicide trials: Looking for a replacement for Temik' detailed the plan of action developed by SASRI to find a suitable replacement for the commonly used Temik. While the strip trials placed throughout the industry did not yield definitive results, screening trials were very successful.

The first stage of screening tested fifteen products using pot trials. These were chemical and biological products and varied from those currently registered in other crops to completely new products or active ingredients, not yet registered for use. From these initial screenings, four products were identified as being effective and were chosen for use in field trials. Preliminary results from these trials were encouraging with all four products providing nematode control. Of particular interest was one product which is a combination of an insecticide and a nematicide. It exhibited nematode control, good growth measurements and control of thrips as well.

Based on the encouraging preliminary results, the agrochemical company responsible for this product was contacted to discuss registration for the sugar industry. SASRI is conducting the registration trials for the company via the Specialist Advisory Request (SAR) system. These trials commenced in September 2013 in Umfolozi, Darnall, Port Edward and Amatikulu.

While it has been quite an intensive year of screening and a lot more has to be done in the years to come, SASRI is definitely well on their way to registering a new nematicide for the sugar industry within the next few years.

by **Prabashnie Ramouthar** & **Uvendri Pillay** *(SASRI Nematologists)*

Weather

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

Review

Dry winter conditions persisted into spring with rainfall in September 2013 being well below normal across the industry. However, the situation improved with the onset of the summer rainfall in October, which saw above normal rainfall for all regions (Figure 1). Although November rainfall totals were below average, a very favourable distribution of rainfall events maintained the good soil water status achieved in October. This augurs well for 2014 rainfed crops. Irrigation water supply in the irrigated areas should also remain exceptionally good.

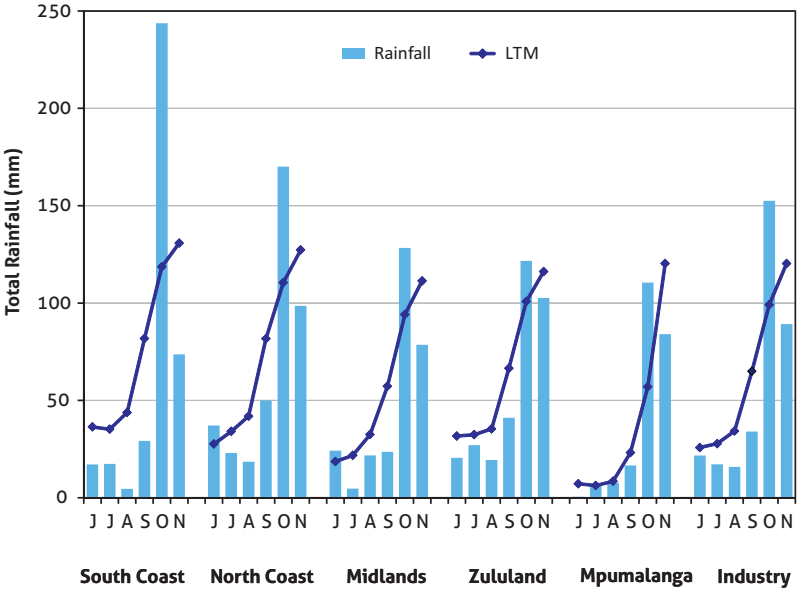


Figure 1: Regional and industry average monthly total rainfall and the monthly long term means (LTM) for June to November, 2013.

Outlook

The ENSO phenomenon is currently in the neutral phase and is projected to stay in this phase throughout the 2013/14 summer season. The South African Weather Service (SAWS) predicted that the wet early summer conditions over the eastern half of South Africa could revert to near-normal rainfall from January onwards, although there is not a lot of confidence in this prediction. The European Center for Medium-Range Weather Forecasts and the International Research Institute for Climate Society both also predict near normal rainfall for January to March 2014. Normal temperatures are expected.

Please visit the SASRI weather web http://portal.sasa.org.za/weatherweb/ for links to up-to-date seasonal climate forecasts and also for the latest rainfall and other weather data.

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