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In this issue...

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SUGARCANE BIOTECHNOLOGY

Where are we?

The question is often asked "What has biotechnology delivered to the sugarcane industry?". More often than not, growers are thinking longingly about the prospect of herbicide tolerant or eldana resistant cane when they ask this question. To answer this effectively, two aspects of SASRI biotechnology must be considered, one which deals with the status of GM cane research and another that looks at the several different ways in which biotechnology is being applied. This article will deal with the GM cane and, in the next issue, we will consider other very useful biotechnology applications.

GM Cane

During the 1990s, SASRI put together all the resources and expertise necessary to genetically engineer local varieties, with the first field testing of glufosinate-ammonium resistant cane over several ratoons being completed in 1998. Since those early days, glyphosate resistant and eldana resistant cane have been produced and successfully tested at SASRI and, more recently, research has been initiated to investigate engineering of complex characteristics, for example improved nitrogen-use efficiency and drought tolerance.

So, then, what's the hold-up? Unfortunately, there's no simple answer to this either, as several factors are involved. Firstly, there is still negative consumer perception and market resistance against sugar derived from GM cane, which are both potent forces acting against commercialisation. Secondly, but equally important, are issues surrounding ownership of intellectual property, particularly of the very valuable technologies that permit engineering of insect and herbicide

Continued on Page 2

resistance. Generally, these are owned by large multi-national agro-biotechnology companies and licences to use the technologies come at a considerable price. It's not just about the amount of money, though, as sugarcane, being a vegetatively propagated crop, presents many challenges in the calculation of licensing costs and payment of royalties to the owners of the technologies. Arguably, this could be one of the major reasons why the world hasn't yet seen the cultivation of GM cane on a commercial scale.

It's not all doom-and-gloom, though. A few countries, primarily Australia, Brazil and the USA, have declared that commercial cultivation of GM cane will occur within this decade. It is likely that the commercialisation by one of these major players on the international cane sugar market will help to alleviate market resistance and overcome negative perceptions of sugar derived from GM cane. In the meantime, SASRI continues to promote awareness of the advantages of GM technology and build relationships with the owners of desirable GM technologies. This is being done with an eye on the tremendous value that GM technologies could bring to the industry.

By Derek Watt (Research Manager) and Sandy Snyman (Senior Biotechnologist)

Message from the Director

Dr Carolyn Baker

When one of our growers recently said, 'We're in it for the long haul', it sparked off a series of thoughts regarding the nature of our business. Working with sugarcane is certainly no short-term haul – it not only takes longer to mature than many other crops, but once in the ground it can stay there for many, many years – provided of course it is well managed. The extent of the investment that each grower makes when replanting a field is not insignificant and the importance of securing good returns on that investment in the short, medium and long-term is not lost on SASRI researchers. It is for this very reason that SASRI's research is conducted in a rigorous fashion that meet strict scientific criteria to produce verifiable results that have the potential to add value to farming operations. This work takes time, and the plant breeding programme at SASRI amply demonstrates this point. It is well known that in the region of 12 to 15 years elapses in the production of a new variety. In recent months, a few of our discussions with growers have revealed concerns that we release new varieties too quickly, and that we should trial them a little longer before making them commercially available, to ensure that they are faultless. It is of course, impossible to produce a perfect variety – we are dealing with nature after all – and a plant that is resistant to all known diseases, that ratoons exceptionally well and that produces high RVs would require that we control every single possible combination of factors both within the plant and also in relation to the environment – simply out of the question. Nevertheless, the breeding programme is carefully conceived and generates sufficient pre-release data to inform debate regarding variety release, and to advise the industry of the variety characteristics. We are firmly of the view that on release a new variety, planted in the correct conditions, has the potential to perform better than existing ones.

The 'long haul' demands that not only varieties but all other aspects of sugarcane growing is extensively researched to enable productivity, and in this edition we focus on other significant foundations for good farming - soil structure and water. This together with the commentary on good weed management and attention to haulage practices, recognise that economical farming can only be achieved through attention to detail and good management.

BENEFITS OF MONITORING SOIL WATER CONTENT

More and more farmers are beginning to invest in soil water monitoring systems to improve the efficiency of their irrigation programmes. For example, in the Upington area, the percentage of irrigators who now use such systems has increased from less than 10% to 85% within the last few years.

In the past, farmers may have been reluctant to invest in soil water monitoring systems because of various inherent difficulties and high costs. Popular monitoring tools at the time, such as neutron probes and tensiometers, required irrigation consultants to walk into fields and manually measure the soil water content. The aid of the consultant was also necessary to assist with interpreting data.

Nowadays, however, there are numerous technologically advanced systems available. Most of these operate automatically, and many systems use cellphone technology to allow for remote access to data. Furthermore, various software programs are now available which will present the data in a user-friendly and visually meaningful format, thereby allowing for easy interpretation.

Because there are so many different systems commercially available, it can be quite challenging to select a system that best suits your needs. When choosing a system, you need to take into account, among other factors, system cost, ease of use, ease of data interpretation, potential risk of theft, system accuracy and robustness.

Although selecting an appropriate system may seem fairly complex, it is unwise to agonise endlessly over this decision. Remember, it is considerably better to have some system in place than no system at all. Also, no matter which system you ultimately invest in, huge value is gained in using the system as a ***learning tool*** to better understand a particular soil's water-holding characteristics and soil water depletion by the crop, as this ultimately leads to better irrigation management decisions.

Optimal irrigation scheduling has become increasingly important as a result of rapidly escalating electricity prices and increased demand for scarce water resources in South Africa. Poor irrigation scheduling is likely to cost you far more than the price of a soil water content monitoring system. Irrigators are therefore advised not to consider only the cost of the tool, but more importantly, the benefits of more precise irrigation.

By Ashiel Jumman (Agricultural Engineer) and Michael van der Laan (Systems Modeller)

Examples of different soil water content monitoring systems that are currently available in South Africa.


Do you have a
Compaction Problem?
Should the soils be disturbed?

Soil disturbance should be avoided as far as possible. Frequent disturbance only has short-term gains which are not sustainable. However, in certain circumstances it might be necessary to break up the soil to alleviate growth limiting conditions such as a surface crust or a compacted layer.

Before embarking on any tillage operation, check the depth of your soil. If your soils are shallow (less than 30 cm deep) and if your yields have been consistently low, you should consider returning the field back to natural veld. Fields with a high water table should also be examined; it is possible that these fields were historically part of a wetland. If this is the case, the cane should be removed. As a last resort, consider installing subsurface drains.

You should confine any soil disturbance to the period when you are replanting the crop – see guidelines. Organic matter in the soil is required to create soil structure which is desirable for water infiltration and resistance to compaction and should preferably not be disturbed between ratoons.

You should only consider disturbing the soil outside the replant period if there are signs of a crust and runoff. If this is severe, it needs to be eliminated with a shallow cultivation (less than 10 cm). The surface must be then protected with a trash blanket to prevent future crusting. This is a strong recommendation for coastal fields. Growers in inland areas need to ask their Extension Specialists for advice regarding trashing.

Guidelines for soil disturbance when re-establishing fields to sugarcane.

- Kill the old ratoon with herbicide without disturbing the soil.
- Establish a green manure crop in the inter-row area with least disturbance and cut or kill when in peak flowering.
- Dig a pit and test the profile by chipping down the profile for the presence of a compacted layer. Note the depth. Note also root distribution to confirm that the suspected compaction layers are limiting the root penetration. This needs to be alleviated with a tine implement to a depth just below the restricting layer (30 cm is usually sufficient for sugarcane fields). If a one-operation system is favoured, then rip after the green manure crop.
- Have your top and subsoil samples analysed for acidity or other chemical imbalance and use the opportunity to incorporate lime/gypsum to alleviate the problem.
- Consider combining the ripping with other operations to reduce the number of passes. For example, consider combining rip, ridge for planting and fertiliser application all in one pass which will save not only land preparation costs but will also result in minimal soil disturbance.
- Growers on the coast should use trash to protect the surface from crusting.
- Avoid future compaction and stool damage by adopting an infield traffic control system which divides fields into production zones and traffic lanes which should never be mixed. (SASRI Information Sheet 14.4).

Rian van Antwerpen (Senior Soil Scientist) & Peter Lyne (Former SASRI Principal Agricultural Engineer)

CARBON SEQUESTRATION

and Sugarcane Farming

What is carbon sequestration?

Carbon (C) sequestration in agriculture refers to the removal of carbon dioxide (CO_2) from the atmosphere and subsequent storage by plants or the soil. Despite only being a thin layer covering the earth's surface, soil has an enormous potential and capacity to store C.

Large quantities of CO_2 are released into the atmosphere each year as result of sugarcane cultivation (e.g. through emissions from farm vehicles, enhanced organic matter mineralisation from excessive tillage, and the use of products/chemicals that were manufactured using fossil fuels). To counter this, growers can revert to practices which promote *C sequestration*.

What practices promote carbon sequestration?

Any management practice that aims to enhance and maintain organic matter levels in the soil will sequester C. A few examples are listed below:

Minimum tillage – soil disturbance increases soil aeration, organic matter exposure and microbial activity, all of which encourage the break-down of organic matter and the release of CO_2 and methane (CH_4). Minimum tillage reduces soil disturbance.

Trashing at harvest – choosing to trash at harvest allows for the accumulation of organic matter in the soil. Rainfed fields with a cane yield of 70 t/ha will produce a trash yield of about 13 t/ha. Approximately 45% (5.9 tons/ha) of this biomass is organic C, some of which can be sequestrated if trashed at harvest. In addition, a trash blanket prevents soil erosion (which causes the export of organic C from the land) and reduces evaporation, potentially resulting in significantly higher cane yields.

Planting a green manure crop during fallow periods – as plants capture C from CO_2 during photosynthesis, use of a green manure crop (as opposed to bare fallow) leads to increased C sequestration in the soil and prevents soil erosion (which promotes C losses).

Optimal use of Land use plans – these are unique to each farm and can be effectively used to minimise soil erosion and fuel usage of vehicles used to transport cane.

What practices counteract carbon sequestration?

Burning at harvest – When fields are burnt most of the crop residues are released into the atmosphere as CO_2, CH_4 and gaseous nitrogen (N), with very little return of organic material to the soil.

Leaving the soil surface uncovered – If one millimetre of soil with an organic matter content of 2 % and a bulk density of 1.55 ton m^{-3} is eroded per annum it will result in organic matter loss of 0.3 t/ha per year (0.18 t C/ha per year).

Excessive tillage of the soil – Soil disturbance leads to increased soil aeration which stimulates microbial activity to convert soil organic matter to CO_2 which is released into the atmosphere.

Burning fossil fuels – Generating energy from fuels originating from coal and oil to power tractors etc. releases large quantities of CO_2.

The effect of soil texture on carbon sequestration

A strong relationship between soil clay and organic matter has been observed in the South African sugar industry. The soil's clay and the initial organic matter content will therefore greatly influence the amount of organic matter (and sequestered organic C) a soil can hold. For example, a sandy loam soil with an organic matter content of 0.9% will typically contain about 20 tons C/ha, while a clay soil with 3.3% organic matter will contain around 65 tons C/ha. Clay soils therefore have a much higher capacity to sequester C compared to sandier soils (Figure 1).

Under a burning system, a soil with a higher clay and soil organic matter content will lose much more C and at an initially faster rate than a sandy soil. While there seems to be only a modest difference in

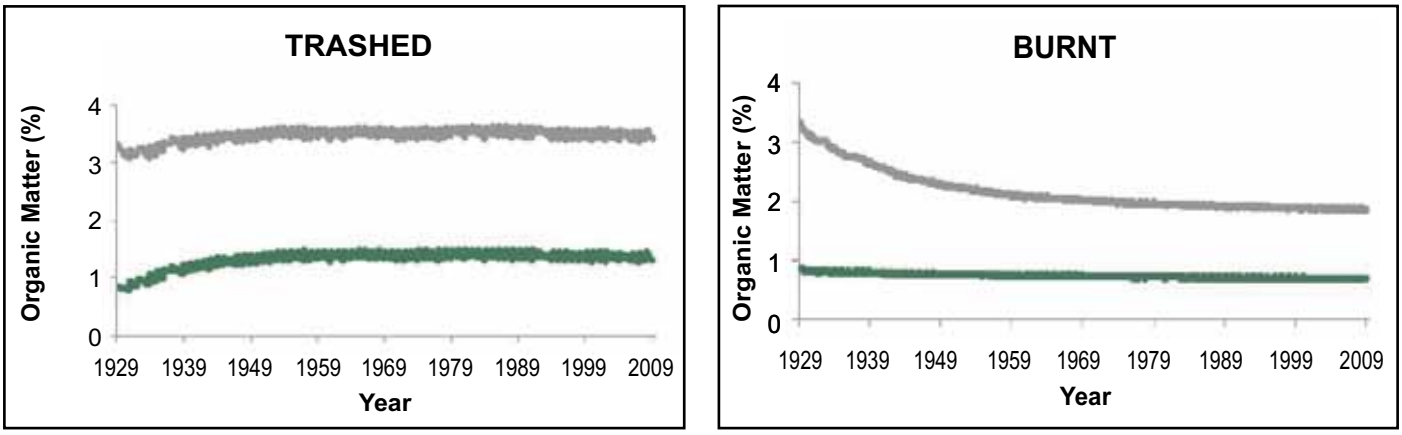


Figure 1. Effects of trashing and burning on carbon sequestration in a clay and sandy loam soil with different initial organic matter contents.

C sequestration for sandy soils in either the trashed or burning systems, we still strongly recommend trashing for benefits other than C sequestration, namely soil moisture retention and prevention of soil erosion.

Final comment

In addition to the C sequestration in the soil, the sugar industry has the potential to reduce our C footprint significantly by harnessing energy from renewable sources such as bagasse and trash at our mills. Both are C neutral, meaning the CO_2 released when burnt was taken from the air during the sugarcane growing period.

By Tarryn Eustice (Associate Scientist: Soils), Michael van der Laan (Systems Modeller) & Rian van Antwerpen (Senior Soil Scientist)

Winter Weed Control

Overall farm weed control is a necessary practice, even as we enter winter. Here are some guidelines for winter herbicide application.

Grass seedlings

Grass seedlings are generally not prominent when temperatures are too cold for germination. However, in the event of a relatively warm winter, certain grass species, for example uBabe grass (*Panicum maximum)* can germinate and these will require treatment (refer to Tables 4 - 6 in the SASRI Herbicide Guide 2010).

Creeping grasses

With warmer temperatures on the coast, creeping grasses may need the appropriate treatment during August to ensure the grass does not spread rapidly. Spotspray using glyphosate with shields, or in larger infestations, paraquat + diuron in short cane. In cooler regions, first treatment would usually occur later on.

Broadleaf seedlings

If there are winter rains, expect a flush of broadleaf seedlings. Treat broadleaf seedlings when they are small (less than 10 cm), with MCPA plus ametryn. Voloxytril can be added when better knockdown is required on slightly larger weeds. In the event of heavy rains, resulting in a moist soil, diuron could be added to MCPA instead of ametryn (Refer to Table 6 in the SASRI Herbicide Guide). Escaped weeds (i.e. weeds that survive a herbicide treatment) When there are low densities of escaped broadleaf weeds and tillered grasses such as *Panicum maximum*, spotspraying with a knockdown control can be carried out, for example, paraquat plus diuron. It must be noted that MSMA is not commonly used in winter. An alternative option is hand-weeding but this is expensive; chemical control is usually more cost-effective (Refer to Table 7 in the SASRI Herbicide Guide).

Clean (weed free) fields

Where there are clean fields, consider spraying in winter with a pre-emergence application of, for example, Merlin + Velpar. This has a dual benefit. After a slight rain Merlin will be activated and this will control any emerging weeds. It also lasts long enough to provide protection for the field against weed germination after spring rains. This is a huge advantage as a management tool, alleviating pressure to complete all required spraying operations timeously after the first rains. **Note:** Growers need to take into consideration the phytotoxicity risks of both Merlin and hexazinone. Only apply these products under the soil and crop growth conditions specified on the product labels. The application of either a short or long-term herbicide treatment will be effective against weeds in winter and will 'buy' time for when weed pressure really begins in spring.

by Peta Campbell
(Senior Agronomist: Weed Control)

TOPICA

Soil Conservation Structures

- Conservation structures and waterways will work only if properly maintained. Check these structures so that you can face the rainy season with confidence. It's also the 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 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.

Land Preparation and Replant

- 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 percent kill, and you need to return at least twice to remove regrowth.

- You need to plan your seedcane requirements far in advance. For example, fields to be replanted in 2013 require their nucleus or first-stage hot-water treated seedcane to be planted this spring. This will enable the seedcane to grow and be planted into a farm nursery and from there, into commercial fields the following year. So, if you have a seedcane scheme in your area from which you need to order seedcane later this year, start looking at your replant programme for two years hence.

Nutrition

- Soil sample fields as soon as possible after harvest in order to plan your liming and fertiliser programme. In plant fields take samples of both the topsoil AND subsoil layers 0-200; 200-400; 400-600 mm in order to determine if subsoil acidity problems exist.

- Starting the application of fertiliser too early could result in unnecessary losses of nitrogen on certain soils. FAS samples will identify those at greatest risk.

- Also, plan for split applications of nitrogen fertiliser on soils that are either very sandy or poorly drained.

AL TIPS

Pests and Diseases

- Begin to identify and survey potential carry-over fields that could benefit from applications of FASTAC to control eldana. Consult with your local LPD&VCC Officer.
- Remember to take RSD samples in all fields to be re-established this year – before they are harvested. If found to be positive for RSD, fields need to be fallowed for at least six months.

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) which are aimed at ensuring the irrigation system hardware is performing according to design specifications and accepted standards. Speak to your local Extension Specialist to arrange these courses.

Harvesting

- In the midlands check for signs of early frost damage.
- The best RV yields are obtained by harvesting cane that is the most **mature**, cane that is **clean**; free from extraneous matter such as tops, trash and soil and cane that is **fresh**; having the least possible harvest-to-crush delay.
- Also at harvest, don't neglect the basics. Sadly, the standard of base cutting and topping on many farms is robbing growers of valuable income. For example, a ten centimetre length of stick left undelivered over a hectare equates to five tons of cane, or approximately R1 500 of lost income. Topping too high and including stick that has zero Recoverable Value is simply incurring transport costs for no return AS WELL AS reducing the RV% for that consignment by including more non-sucrose.
- Still on harvesting, varieties can be loosely classified as either early, mid- or late-season varieties, being an indication of the time of the season when they have the greatest advantage in sucrose/ERC/RV yield. In some cases, harvesting at the right time can result in as much as a 20% improvement when compared with yields of standard varieties. In regions where farms are harvested on a 12 month cycle, it therefore makes good economic sense to exploit this by planting a range of varieties, provided soils and growing conditions are suitable.
- It has been dry recently in many parts of the coastal belt, and eldana numbers have increased as a result. It is important to harvest those fields with the highest level of damage first in order to prevent further losses. Do your own surveys if necessary.

By Rowan Stranack (SASRI Biorisk Manager)

Biosecurity Update

Chilo

Lauren Martin, Microbiologist at SASRI using the latest molecular techniques to identify maize borer (*Chilo partellus*) among insect samples sent from Mpumalanga.

The sugar industry takes all biosecurity threats very seriously. Several steps have been taken to ensure that we are able to respond to any possible incursion in an appropriate manner.

Awareness campaigns are conducted to ensure that all stakeholders are equipped with the necessary knowledge so that they can make informed decisions and take appropriate action. Mechanisms have been put in place to channel information (and material) to SASRI when exploring and investigating potential threats.

A key aspect is a high level of vigilance so that timely and appropriate action to any biosecurity threat to our sugar industry is properly and rapidly implemented.

An example of our biosecurity strategy is evident in our response to *Chilo sacchariphagus*, where the awareness campaigns and the surveillance systems for this threat are operating well.

Chilo sacchariphagus Awareness campaign

A thorough awareness campaign has been rolled out in the SA industry and further afield. As a result, there is an abundance of relevant material (e.g. chilo posters) which have been displayed in relevant offices and public places. People in sugarcane growing areas, and the public at large, are now fully aware of the potential threat posed by this pest.

Several successful workshops have been conducted which have helped to identify the way forward in terms of future biosecurity planning. The photo on page 11 shows the group of delegates who attended the bios-

ecurity workshop held in Mozambique as part of the *C. sacchariphagus* awareness campaign. This year, another biosecurity workshop will be held in southern Mozambique. All interested people are invited to attend this meeting and additional information can be obtained from SASRI.

Surveillance systems for *Chilo sacchariphagus*

Scouting

Stakeholders in our sugar industry (especially field staff) who are fully informed about what damage symptoms to look for have taken the opportunity during normal field operations to look for the possible presence of *C. sacchariphagus*.

A recent example illustrates the success of these developments. In February, material was sent to SASRI to verify the identity of an insect found in the field on crops near sugarcane. SASRI then used the latest molecular technology to confirm the identity of this pest as the maize borer (*Chilo partellus*). This sophisticated technology involved extracting DNA from the fresh material (insect larva) and comparing it with the results in a DNA "library" of insect pests. This technology is critical to the programme because it is the only positive way to distinguish between Chilo species whilst still larvae due to a similar physical appearance of black spots on a cream background. This method can be compared in principle with the method used by crime detectives to identify individuals based on comparing unknown fingerprints with a database of known fingerprint records.

Delegates attending the recent biosecurity workshop held in Mozambique.

A further development in the *C. sacchariphagus* programme is that formal scouting programs have been carried out along the borders between Mozambique and its neighbours (South Africa, Swaziland and Zimbabwe) to look for the possible incursion by this pest. To date, no Chilo has been seen in sugarcane stalks in that strategically important region.

This work is vital in terms of being proactive in determining the possible expansion of the distribution of this pest within the southern African region. It is critical that the pest be discovered as soon as possible after incursion, so that timely steps can be taken to prevent its further spread.

Trapping

Chilo pheromone traps have been set up along the border between Mpumalanga and Mozambique as well as in Swaziland. So far no moths have been trapped which in this case is clearly an encouraging result. Given that the threat remains, traps will be consistently deployed for the foreseeable future.

By Mike Way (Entomologist), Rowan Stranack (Biorisk Manager), Geoff Maher (Extension Resource Manager) & Stuart Rutherford (Senior Pathologist)

Temik Update

In the January 2011 issue of The Link we reported that Temik was to be withdrawn and that it would not be available beyond 2016. We have recently been informed that Temik supplies will run out sooner than anticipated. The reasons for this are related to the closure of a Bayer plant in the USA which manufactures methyl isocyanate, a precursor for the production of Temik. For more detailed information on this, please follow the link http://www.bayercropscience.com/bcsweb/cropprotection.nsf/id/EN_20110318?open&l=EN&ccm=500020.

The withdrawal of Temik poses a significant problem, but as pointed out in the last issue of the Link (January 2011) there are alternative nematicides available. However all nematicides registered for use in sugarcane production are in hazard Group 1 (very toxic) and the Registrar is reviewing all Group 1 pesticides. With this in mind, SASRI is developing a project to identify alternative, safe and effective products that may be used to control nematodes in sugarcane.

By Shaun Berry (Nematologist) & Graeme Leslie (Principal Entomologist)

An approach to controlling eldana

Let's 'push-pull' it!

SASRI has always recommended an integrated approach to eldana control, i.e. the simultaneous application of several different control measures. These include, among others, correct choice of variety, good soil and crop management practices, such as careful fertiliser applications, cutting cane at the correct age and good field hygiene. For many years now, SASRI has been exploring habitat manipulation (or the "push-pull" method, as it is more popularly known) as an additional measure for the integrated approach to eldana control.

Push-pull works by managing the behaviour of the female moth so that less eldana eggs are laid in cane and so damage to cane is reduced. 'Push' plants give off volatile chemicals which discourage the moth from laying eggs in the sugarcane (they also attract parasitoids), and eggs are laid in 'pull' plants, which are more attractive to the moth, instead. When eldana eggs are laid in indigenous 'pull' plants in wetlands, they are more accessible to their natural enemies and the population can be controlled naturally. Bt maize is also used as a 'pull' plant. It is referred to as a 'dead-end' trap crop as it is toxic to moth caterpillars and kills them within the first two days of feeding. You do not need to sacrifice any land used for sugarcane to plant push-pull: push and pull plants are planted in contours, waterways, watercourses and wetlands.

In one trial conducted at SASRI, push-pull (when used in conjunction with the other measures listed above) reduced damage from eldana by over 50%. This work is now being explored further as part of an MSc project, jointly funded by North-West University and National Research Foundation. The project involves a team of researchers and Extension Specialists working closely with the Pest & Disease office in the Wartburg area to implement push-pull in the Midlands North area. They are working with both small-scale and commercial growers and are trying to encourage farmers to plant push-pull plants on their farms to reduce the risk of infestation by eldana.

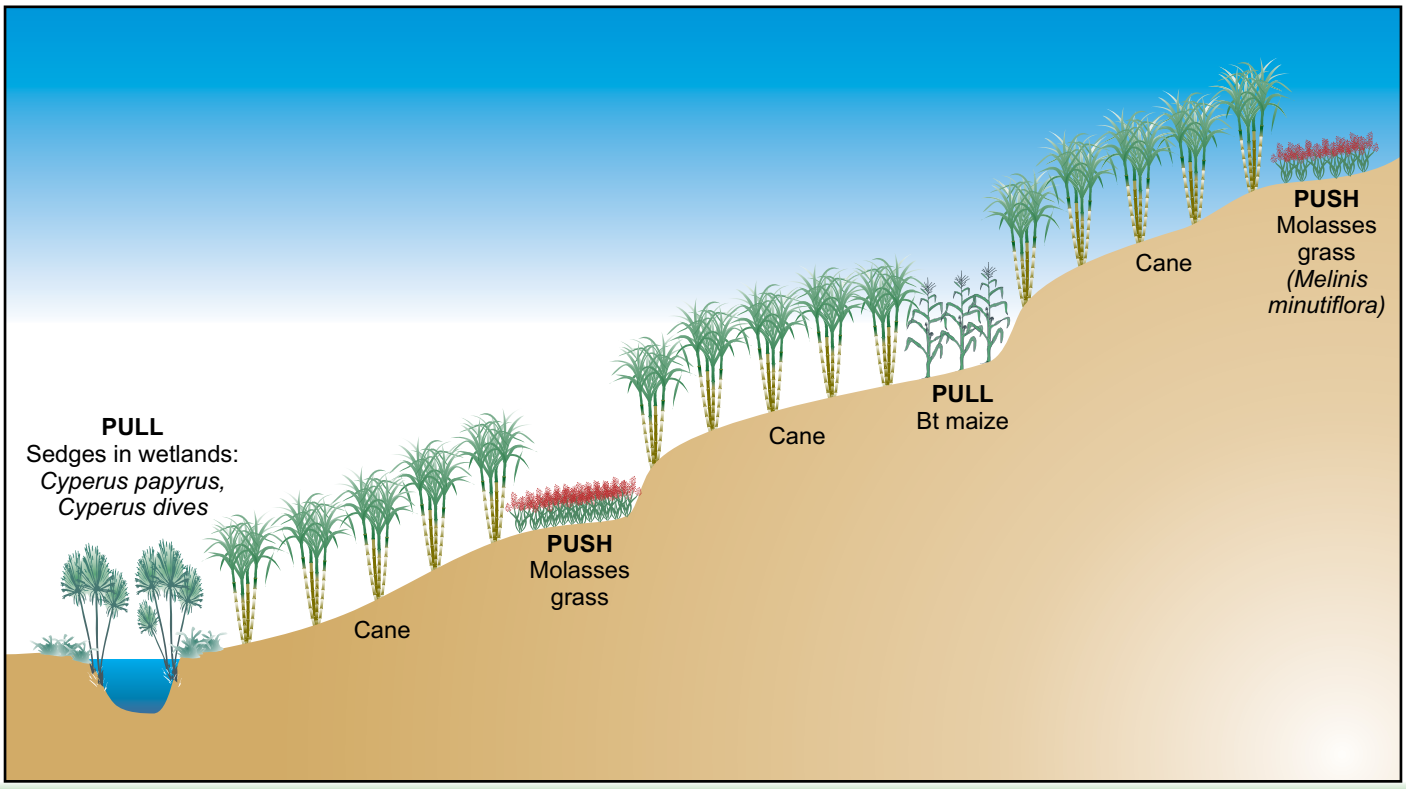
For the control of eldana in sugarcane, Molasses grass (*Melinis minutiflora*) is being used as a "push plant" to repel female moths from the cane. The Molasses grass is planted along the contours approximately 20 rows apart, and at least 20 rows away from any wetland or watercourse. Generally contours, drainage lines and/or irrigation paths are around this distance apart, and form good places to plant the push and pull plants.

The "pull plants" used are Bt maize and various species of sedges. Bt maize should be planted along every 4th contour bank / terrace bank or along the outer borders of the cane field. Sedges are planted in wetlands bordering the cane fields. To mitigate the risk of mosaic, maize should be planted at the correct time of year (January) and only insecticide-treated seed should be used.

Sedges used as pull plants include *Cyperus dives* and *Cyperus papyrus*. For push-pull to be effective it is important that farmers work actively to keep their wetlands healthy and to promote the growth of natural 'pull' plants for eldana such as these sedges.

The push and pull plants also have additional uses over and above controlling eldana. Molasses grass can be cut and used as a good cattle fodder. Bt maize, which is resistant to damage by stemborers such as eldana, can be used for human consumption or as a cattle feed. The sedges, if managed well, can be used for weaving and basketry and also have medicinal properties.

By Jessica Cockburn (MSc student) and Des Conlong (Senior Entomologist)



POOR ROADS

increase transport costs

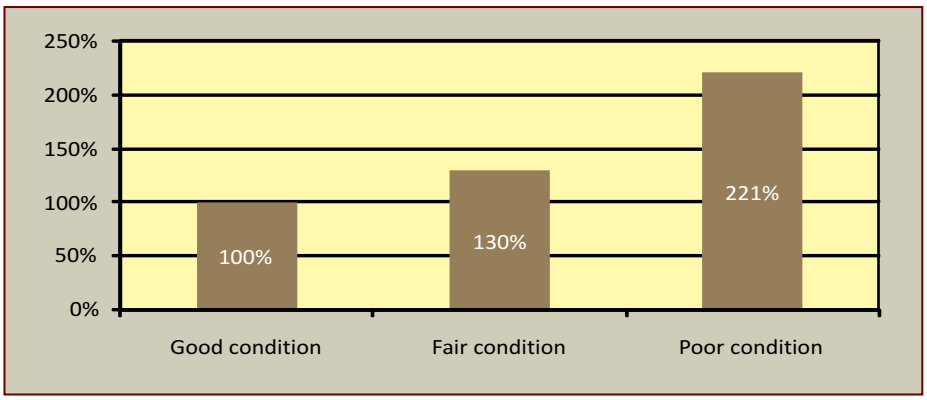
Road network deterioration has a huge impact on vehicle operating costs. It is estimated that approximately 70% of South Africa's roads are in need of repairs. A lack of road maintenance, higher road freight volumes and the overloading of freight vehicles has made the situation worse. Overloading alone is estimated to cost South Africa R650 million per year in road damage.

What exactly are the cost implications of operating vehicles on poorly maintained roads? A study conducted by the CSIR and University of Pretoria, together with a large logistics service provider, compared the vehicle repair and maintenance costs of fleets operating under various road conditions. Results from the study indicate an increase in vehicle repair and maintenance costs of as much as 30% when operating on fair (compared to good) condition roads. When operating on "poor" roads, repair and maintenance costs can be more than double that of good roads. All road categories were included in this study i.e. national, primary and secondary roads.

Secondary roads

When one looks only at secondary roads, where most of the sugarcane transport takes place, the situation is of even greater concern. The secondary road network in South Africa has been deteriorating steadily. Roads in 'bad' or 'very bad' condition increased from 8% to 20% in the last 10 years. Roads in KwaZulu-Natal are some of the worst in the country with approximately 50% of the road network being in a 'bad' or 'very bad' condition and less than 20% being in a 'good' or 'very good' condition.

Average repair and maintenance costs versus road condition.



Cost increases

Typical associated cost increases would be due to:

- Poorer fuel consumption,
- Increased wear and tear of vehicle components such as: body and trailer components, suspension, tyres, etc.
- Poorer vehicle productivity due to slower average speeds, longer trip cycle times etc.
- Poorer ride quality and vehicle handling,
- Higher fatigue as higher levels of driving concentration is required,
- Higher risk of accidents, breakdowns and downtime,
- Higher risk of damage or spillage of the transported products.

What can you do?

While it is the responsibility of the Roads Department to maintain the roads in a good condition, all road users can reduce their operating costs and help reduce road deterioration by:

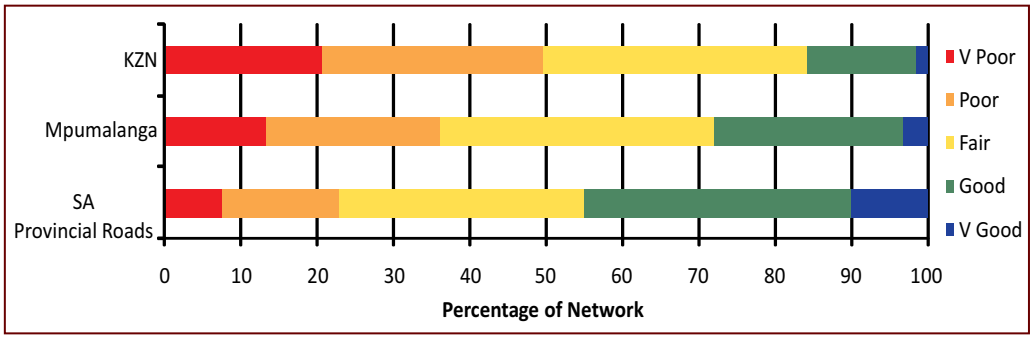
- Complying with vehicle loading regulations as overloaded vehicles accelerate

road deterioration and road design life,

- Minimising under-loading to help this reduce unnecessary trip cycles and maintain high vehicle productivity,
- Inspecting and maintaining vehicles and equipment regularly to prevent premature failures and downtime,
- Investing in driver education and incentive programmes to promote driver wellness, prevent fatigue and improve driving behaviour.

By Peter Tweddle
(Agricultural Engineer)

Condition of the paved secondary road network in South Africa.



Information from this article has been obtained from the following reports:

1. The South Africa Infrastructure report compiled by Swiss Business Hub South Africa, February 2009. Source:http://www.osec.ch/internet/osec/de/home/export/countries/za/export/economic_report.-RelatedBoxSlot-15131-ItemList-83882-File.File.pdf/0903_E_Infrastructure.pdf

2. 6th annual State of Logistics survey report (2009) conducted and compiled by the CSIR, Imperial logistics and Stellenbosch University in a report titled "Cost of bad roads to the economy".

3.Source:http://www.csir.co.za/Built_environment/Infrastructure_engineering/rpf/18RPF/4%20L%20Kannemeyer.pdf

Congratulations to the Farm Manager and staff at the SASRI Komati farm on receiving the award for BEST IN THE CATEGORY OF "GROWERS DELIVERING UNDER 5000 TONS" at the TSB Annual Grower Awards ceremony. The farm was also identified as having the best tons RV/ha/annum for the whole of Mpumalanga!

CEO of TSB Sugar, Mr John du Plessis said "it is the first time that I have seen such an RV result..." and congratulated SASRI for setting a good example in the area.

According to SASRI's Farm Manager, Willem Robbertse the main factor which contributed to winning this award was the adoption of the best management practice with regard to irrigation scheduling. This was done in conjunction with input from Francois Olivier, SASRI's Irrigation Scientist. Francois provided useful information concerning the evapotranspiration ratios in the area during the various months of the year which also takes into account the stage of canopy of the crop in the trial. The farm irrigates strictly according to these figures and also takes into account the evaporation data recorded by the SASRI weather station on the farm for the previous week.

The Fertiliser Advisory Service (FAS) recommendation regarding which fertiliser should be applied is also strictly adhered to. The recommendation is split into two applications, half the recommendation just after harvesting and the other half just as the cane canopies. The farm has on average a 60 cm deep Glenrosa soil with a TAM content of 70 mm. Due to the size of the trials, cane is naturally ripened by drying it off prior to harvesting according to the recommendations contained in SASRI Information Sheets.

Apart from irrigation scheduling and correct fertiliser application, the main reason for these exceptional results is detailed and attentive management of the crop. This was also pointed out by SASRI's Varieties Agronomist, Sanesh Ramburan, at a Komati grower day in April this year when he released his results on the high performance of various varieties on the farm.

By Mirash Royan (SASRI Publications Officer)

WEATHER

Review

Most sugarcane producing areas of South Africa received average to above average rainfall from October 2010 to January 2011 (Figure 1). This saw a huge improvement in soil water status, which initiated recovery in cane growth in the rainfed regions following the drought of 2010. However, in February, rainfed regions received below average rainfall. Worst affected were the coastal areas where rainfall was about 10% of the long-term mean. The industry rainfall situation improved in March, but again most coastal areas received below average rainfall.

Outlook

The ENSO (El Niño - Southern Oscillation) phenomenon in the tropical Pacific Ocean is associated with changes in weather patterns worldwide, including Southern Africa. The cold phase of this phenomenon (known as La Niña) has been in existence since August 2010 but is now weakening. Its main effect in South Africa is enhanced probabilities of above normal rainfall from December to March, which has been the case for this summer with the exception of February and, for coastal areas, March 2011. Oceanic and atmospheric conditions in the Indian and Atlantic oceans also affect weather patterns in Southern Africa. Information about the phenomena are used to produce seasonal (three-month) climate forecasts.

At the time of printing, the International Research Institute for Climate Society predicted a higher chance of above-normal rainfall for April to June than normal to below-normal rainfall. The European Centre for Medium Range Weather Forecasts and the South African Weather Services also believed that above-normal rainfall for this period is more likely than below-normal rainfall, while temperatures are expected to be below normal.

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

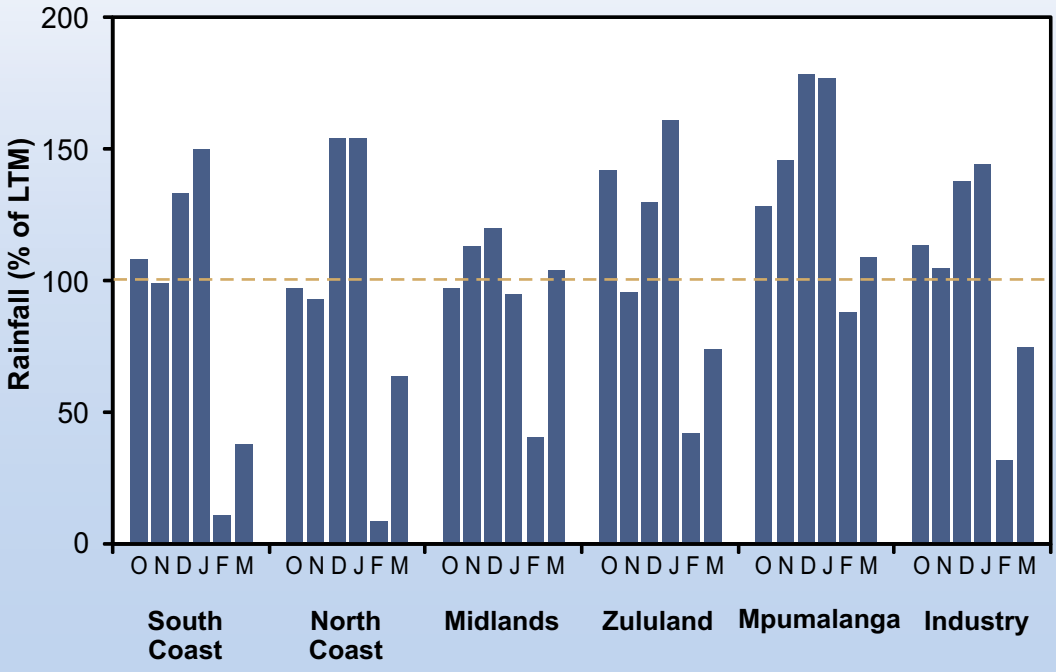


Figure 1. Regional and industry monthly rainfall totals expressed as a percentage of their long-term means. The broken line represents the long term mean (LTM).