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In this issue...

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GAZETTING & DE-GAZETTING OF VARIETIES

N51 has been approved for planting in the 2010/2011 season in the following areas: Felixton, Entumeni, Amatikulu, Darnall, Gledhow, Maidstone, Midlands North and South, Sezela and Umzimkulu. N26 has been approved for the Darnall area and N45 for the Maidstone area.

N44 will be de-gazetted in 2010. It was previously gazetted in the following areas: Entumeni, Darnall, Gledhow, Maidstone, Midlands North and South, Sezela and Umzimkulu, but may not be planted anymore. If N44 has already been planted, it must be removed by 2015.

All released varieties undergo an annual review by SASRI's Variety Selection Committee and Variety Release Committee for inclusion in the *Government Gazette* for the following year. Local Pest, Disease and Variety Control Committees can also request changes to the list of varieties for their area at the time of this annual review.

Varieties that are not listed for a specific control area in the *Government Gazette* are considered unsuitable for those particular agroclimatic conditions and/or management practices or carry a pest or disease threat and therefore growers are not permitted to plant those varieties in that area.

by Roy Parfitt (Plant Breeder) and Tracy Maritz (Assistant Research Officer: Plant Breeding)

LET A BREAK CROP PAY FOR PLOUGH-OUT & CYNODON CLEANUP

Warren Poste (UVS Farms), inspects sugarcane planted straight into soybean stubble. The field shows some broadleaf weeds but no sign of the cynodon that forced the plough-out.

For sugarcane, a standard recommendation is that at least 10% of the farm should be replanted every year. However, replanting sugarcane is expensive due to land preparation and planting costs and the field being out of production for a few months. This becomes compounded where grass (cynodon) becomes a problem, or when stool damage or soil compaction affects yields. Fortunately, there are ways to reduce the costs of replanting and controlling cynodon. This article highlights the benefits of soybeans in controlling cynodon and off-setting replant costs.

In early November 2008, UVS Farms (Empangeni) planted soybeans as a break crop. A field where cynodon became virtually uncontrollable was selected and a Roundup tolerant soybean cultivar (A5409RR) was planted. Farm Manager, Warren Poste, explains: "Soybeans paid for the plough-out, effective cynodon cleanup and saved us on nitrogen fertiliser". Cane was replanted straight into the soybean stubble and after a year there is still no sign of a cynodon comeback. The Roundup tolerant soybean cultivar - which allowed regular sprays of Roundup to control cynodon and other weeds - together with the dense canopy cover typical of soybeans made it possible to effectively control cynodon in the field.

Not only was the break from cane turned into a profitable event by harvesting and selling the soybean crop but the field is now free of cynodon. SASRI will be monitoring this field to see how long it remains cynodon-free.

Gavin Moore (Spencer Holley Agronomic Services), showing soybean pods from the break crop experiment on the UVS Farms during 2008/09.

In summarising their experience so far, UVS farms were able to transfer the cost of plough-out and cynodon cleanup to soybeans, to save on nitrogen fertiliser and to improve the health of the soil. This may be due to the fact that soybeans are known to fix and enable the transfer of nitrogen to the next crop.

by Michiel Smit (Crop Scientist) & Peta Campbell (Senior Agronomist)

DIRECTOR'S MESSAGE

Dr Carolyn Baker

We live in interesting times! The Australian and Brazilian industries have declared their intent to release a Genetically Modified (GM) variety in the next decade, and are working towards this goal. At SASRI we have been engaging in genetic engineering research for the past 15 years and have shown that we can successfully engineer our N varieties. Previous Link articles have described the GM process, reflecting the nuances and complexities of this technology.

There are many traits in our varieties that could be enhanced through genetic engineering, such as improved resistance to pests and diseases, enhanced nutrient use efficiencies, increased sucrose accumulation and herbicide resistance, to name just a few. Because of escalating input costs associated with sugarcane production and an increased focus on improving the cost-benefits of our farming practices, it is not surprising that we receive frequent enquiries from growers regarding whether or not we could employ genetic engineering to assist in enhancing variety performance.

Of course this is not a simple matter, since the requisite genetic constructs (such as Bt - which would be the ultimate weapon in beating eldana) are mostly owned by wealthy multinationals and licensing arrangements are costly. Furthermore, the bigger issue associated with whether or not our South African industry is ready to consider release of an engineered variety for commercial production requires careful consideration of the social and environmental implications (both of which attract considerable public debate), adherence to requisite regulatory procedures and attention to the implications for South Africa's local and export markets.

Clearly the issue is an exceptionally complex one, and the decision makers in the industry are fully aware that, for South Africa to follow the emerging international trend such decisions can only be made following thorough debate once the full implications of the GM business case have been extensively explored. SASRI will continue in its role as the provider of the requisite technology and information that will assist in informing this debate and decision making.

FREDD PROJECT

WINS GOLD AT PRESTIGIOUS LOGISTICS ACHIEVER AWARDS

Key stakeholders in the southern African sugarcane-growing industry recently won the coveted Gold Award in the 21st Logistics Achiever Awards, the finals of which were held in Johannesburg on 15th October 2009.

The entry involved detailing the success of an ICT-based vehicle scheduling system, known as FREDD, which is now fully operational within the local sugar industry at four sugar mills owned by three of southern Africa's top sugar corporations.

Apart from impressive fuel savings due to reduced vehicle idling at the respective mills, FREDD has set new productivity benchmarks within the sugar industry, including cost savings for growers and hauliers from the reduced mill turn-around times in excess of R12.7 million at one mill alone. For the mill owner, savings associated with the reduction in mill stops are estimated to be in excess of R14.7 million per annum.

by Paul Collings (Freelance Journalist)
(Article shortened)

FREDD now ensures optimised scheduling of trucks from plantation to mill resulting in massive cost savings to the sugar industry.

NEW RUST ON N25

by Sharon McFarlane
(Senior Plant Pathologist)

A new, as yet undescribed rust species has been seen in young cane (3-6 months old) in fields of N25 in Swaziland and Umfolozi. The symptoms have been severe in some cases, but the variety appears to recover quickly. The symptoms are similar to brown rust, with long, narrow lesions (marks) on the leaf running parallel to the leaf veins (see table). Orange spores are usually visible on the under-surface of the leaf, but these spores are different from orange rust, the disease that caused substantial yield losses in Australia in the early 2000s. Growers are asked to report rust infections on N25 as well any unusual rust on other varieties to their Extension Specialist or LPD&VCC Officer.

Brown rust	Orange rust	'New' rust
Pustules (marks) on leaf • are longer than orange rust • tend to be towards leaf tip • are brown when fresh Spores tend to be brown Favoured by cool nights, warm days Tends to occur on young crops (2-6 months)	Pustules (marks) on leaf • are smaller, shorter than brown rust • tend to be clumped, towards leaf base • are orange when fresh Spores are orange Favoured by humid, warm conditions Tends to occur on mature crops	Pustules (marks) on leaf • are similar to brown rust Spores are orange Has occurred in cool, moist conditions, similar to brown rust Has been most severe on young crops (3-6 months)
	 SOURCE: Dr J Comstock (USDA)	

WEED CONTROL
DURING SUMMER

Good weed control planning pays dividends by increasing your yields and returns, whereas ineffective weed control wastes time and money and leads to reduced yields. It is therefore in your best interests to plan wisely and reap the benefits of clean, weed-free fields.

The SASRI 2010 wall calendar provides monthly recommendations on farm operations including weed control which is discussed below:

January

- Hand-weed large tufted grasses, like panicum (barbi grass) and sorghum. Failure to do this will lead to gaps in the cane canopy, contribute more seed to the soil seedbank and spread throughout the field.
- Conduct under-canopy spraying of creeping grasses with glyphosate until shading suppresses growth.
- Spot-spray creeping grass patches in cane and mark these areas for further attention.
- Identify alien plants and stop their spread, especially along valley bottoms, in water courses, and in areas with indigenous vegetation.

February and March

- Draw up a programme plan of weed control operations for the coming season e.g. according to your harvest schedule.
- Mow verges and breaks. Apply mechanical mowing or chemical mowing with Gramoxone + diuron alongside short cane, and glyphosate or imazapyr alongside tall cane. Direct the spray and avoid drift onto the crop.

NB: Arsenal can be harmful to cane in dry seasons.

- Continue spot-spray applications of creeping grass patches in cane.

April

- Start crop eradication on conventionally-tilled fields. Consider changing to minimum tillage in fields where there is a creeping grass problem.
- Plant green manure winter crops e.g. oats in replant fields.

by Peta Campbell (Senior Agronomist)

IRRIGATION SCHEDULING TOOLS

PREPARING FOR INCREASING ELECTRICITY COSTS

by Francois Olivier (Irrigation Scientist) and
Ashiel Jumman (Contract Assistant Research Officer)

Skyrocketing electricity prices are expected to force irrigators to pay more attention to irrigation scheduling. Recent electricity tariff increases have included 14.2% effective from 1st April 2008, 34.4% effective from 1st July 2008 and 33.6% effective from 1st July 2009. In addition, Eskom have requested a further 35% tariff increase per annum for the next three years (www.eskom.co.za). With the rapidly increasing energy costs associated with applying irrigation water, the timing and effective application of water is now paramount. Irrigation scheduling is an easy to implement and cost-effective way to combat increasing electricity bills.

By scheduling irrigation and making effective use of rainfall, unnecessary irrigation applications and costs are reduced. Furthermore, preventing over-irrigation reduces erosion and very importantly the leaching of expensive nutrients such as nitrogen. Over-irrigation often occurs during the early crop growth stages before full canopy when a field is particularly prone to losing nitrogen through leaching. With irrigation scheduling, crop stress either through over- or under-irrigation is avoided and cane yields and profits can be maximised.

The benefits of irrigation scheduling were substantiated in a recent field trial at Komatipoort. In the trial, scheduling irrigation using various methods resulted in reduced water applications when compared to typical farm practices. Savings, for both water and electricity costs, were therefore achieved without any negative effect on cane yield and quality. Furthermore, the water saved could be used to increase irrigated production areas if land is available. The table opposite provides a brief description of the scheduling methods/tools which have been used in the field trial. We encourage growers to use one or more of these useful tools thereby reducing some of the burden of heavy electricity tariffs.

Scheduling Tools	Advantages	Disadvantages
Wetting front detectors (WFD)	Wetting front detectors (WFD) are locally manufactured under licence and are relatively cheap (R120 for a set of two sensors).	Careful consideration has to be given to the installation depth and the exact position of the WFD in relation to the sprinkler and row. WFD's have been found to occasionally malfunction in older cane due to preferential stem flow of irrigation water, and possibly from root intrusion. The instruments have to be removed at the end of the growing season or some attempts made to protect them against damage from infield loading equipment and burning.
Irrigation calendars	Easy to use scheduling charts or calendars that show the average number of days between successive irrigation water applications for cane cut at different times during the harvest season, based on long term temperature and evaporation. Printouts of these irrigation calendars, can be provided to growers who do not have access to computers. When rainfall occurs, adjustments need to be made to the irrigation cycle times. A hand-held rain delay calculator (made of laminated cardboard) shows the appropriate rain delay period, depending on the month and amount of rainfall.	The calendars are based on long-term average weather data and average conditions. Sometimes the advice needs to be tailored to conditions during a particular season.
SASched water budget spreadsheet	SASched is a daily time step, water budget spreadsheet similar to the Canesim crop model. Initially the spreadsheet has to be set up for the grower's specific soil and crop, but thereafter a small amount of time is required to update daily weather data. Irrigation recommendations are easy to understand and results are presented in various graphs that can be customised depending on each grower's needs. Spreadsheets are familiar to many growers.	Ideally a grower should have access to daily temperature, evaporation and rainfall data (obtainable from the SASA web site), but the tool can be used using long-term means of temperature and evaporation, provided daily rainfall and irrigation is recorded.
Tensiometers	Tensiometers are popular amongst growers mainly due to the fact that the user can immediately see if the soil is wet or dry just by looking at the gauge reading. Furthermore, tensiometers were found to be reliable as long as the correct installation and maintenance procedures were followed.	They are relatively expensive and prices range from R1 065 for the imported 300 mm tensiometers to R400 for a locally manufactured 300 mm tensiometer. Taking readings can be time-consuming, especially if a large number of stations have to be monitored each day. Careful attention must be given to placement as the area sampled is relatively small. A user should be able to interpret trends.
SQR-Canesim crop model	The SQR-Canesim crop model is a desktop version of the well known Canesim crop model which is a daily time step irrigation scheduling tool. Similarly to SASched, the program has to be set up initially for the grower's specific soil and crop, but thereafter a small amount of time is required to update daily weather data (obtainable from the SASA web site). Irrigation recommendations are easy to understand and results are presented in various graphs.	The program relies on the availability of reliable weather data and requires time to get familiar with it.
Stalk extension	Manual measurements of stalk extension have been applied with success in the Australian sugar industry to determine a relationship between evaporation from mini-pans and irrigation intervals. Automation and commercialisation of the measurement of stalk extension in the form of a growth station could make this an attractive scheduling method in future as stalk extension is a very sensitive measure of water stress.	The manual measurement of stalk extension is a labour intensive and time-consuming exercise. Use of stalk extension alone is, therefore, not yet recommended for irrigation scheduling.

In light of the information above, all growers who irrigate their crop are encouraged to re-examine their scheduling practices and discuss options with their local extension specialist as a means to potentially improve yields as well as control costs.

BIOSECURITY UPDATE

THE CHILO PROGRAMME

Chilo sacchariphagus, the spotted sugarcane borer, is a serious pest of sugarcane in many parts of the world. It originally comes from South-East Asia. The pest is presently a major problem in sugarcane in Mozambique on Senna and Mafambisse sugar estates. Damage from chilo can be extreme, especially in N25 and N26, and substantial losses might be incurred.

Natural spread of the borer from Mozambique into other industries is unlikely. However, moving infested sugarcane poses a serious threat, an activity that is on the increase with recent expansions of land under cane and associated traffic between the sugar estates in Mozambique. Predictions show that the pest will be able to survive in the South African climate, making chilo a real and imminent threat to our industry.

Workshops to raise awareness

Recently SASRI collaborated with the Local Pest, Disease and Variety Control Committee in Mpumalanga and staff from the Swaziland Sugar Association to convene workshops to discuss the chilo threat.

An important objective of these workshops was to maintain awareness about this pest in these critical regions by sharing information about the biology, distribution and damage symptoms, and to review skills and tools (scouting and trapping) to monitor its presence.

Chilo surveillance extended into Swaziland

A further development in the Swaziland sugarcane industry has involved the installation of a grid of chilo pheromone-baited traps in strategic sites to monitor for the possible presence of this pest in that country. (See The Link, September 2009 for more information about this monitoring technique). This is a critical development given the maxim "pests don't recognise borders".

The above workshops form part of SASRI's Biosecurity Programme which aims to:

Crop protection co-operators from Swaziland at one of the biosecurity workshops.

Raise awareness among stakeholders about any potential sugarcane biosecurity threats in the southern African region;

Reduce the risk of invasion into the sugarcane crop by any pest or disease; and

Respond appropriately to any invasion.

Further workshops are envisaged to promote awareness and extend monitoring for this pest in southern Africa.

Growers are advised not to bring in plant material across the border. If you are aware of the trafficking of plant material, please contact SASRI.

by Mike Way (Entomologist) and Stuart Rutherford (Senior Pathologist)

Delegates attending the recent Biosecurity workshop held in the Lowveld.

TOPICAL TIPS

Creeping grasses are still a major problem throughout the industry. There are alternatives to the current practice of glyphosate and paraquat applications. These involve the use of long-term products such as Arsenal® which is registered for use in servitudes and may be used for verge control of creeping grasses alongside tall cane (as is glyphosate). Please note, that SASRI is currently researching in-field use of persistent herbicides for better creeping grass control during a long fallow period.

This summer planting season has seen good successes against thrips when the insecticide Bandit (a.i. imidacloprid) was applied in the planting furrow. However, with thrips numbers now on the decline in autumn there is less urgency to protect plant cane against this pest. Consult your Extension Specialist or agrochemical advisor.

The recent heavy rains have highlighted areas where infield and road drainage needs attention. Plan to rectify these problems, particularly the roads, before the start of the next season. Infield drainage problems are best dealt with at replant, and during the dry times of the year.

Planting during autumn is sometimes problematic, particularly if conditions are dry. Gap planting is both costly and time-consuming so consider protecting the setts with a fungicide if you have to plant now or perhaps consider delaying planting until spring.

Recent unforeseen disease problems with varieties like N29 (rust), N27 (YLS) and N32 (smut), have highlighted the need to maintain a spread of varieties on your farm. Try to focus on at least four varieties, thereby reducing your exposure to potential disease problems.

Rogueing of both commercial fields and seedbeds for diseases should be in full swing. Should your staff require training in disease identification, consult either your Local P&D Committee or book a course with the Shukela Training Centre (STC). The STC also offers a wide range of other training courses and the off-crop is an ideal time to plan your training needs for the coming season.

It is still not too late to take leaf samples. Recent seasons have seen fairly widespread cutbacks in fertiliser applications. Leaf analysis is the most effective way to evaluate the full impact of lower applications.

Your ripener programme for the coming season should have been planned.

Accurate estimating is a problem for some growers. Inaccurate estimating has an impact, not only on mill performance, but also at an industry level where uncertainty regarding the size of the crop poses difficulties for those entrusted with selling our sugar. Inaccurate estimating will also create unrealistic expectations of your income for the season and this could have serious implications. There are many people as well as many handy hints available to assist you to estimate properly. Ask your Extension Specialist or Mill Group Board for assistance.

You should be drawing up a harvesting and replanting schedule and combining these to draw up a programme plan of operations for the coming season. Plans will inevitably change, but having a basic schedule of operations will enable a budget to be compiled as well as give you an idea when to order chemicals/fertiliser/lime etc. and will give an idea of how much and when labour and mechanised resources will be required.

by Rowan Stranack (Regional Extension Manager - North Coast)

CHEMICAL RIPENING

REVISED RECOMMENDATIONS FOR USE OF FUSILADE® FORTE

It is now the time for cane growers to plan their chemical ripener spraying programmes for crops that are due for early-season harvesting. For those growers that will be applying Fusilade® Forte this article contains important information on the correct application of this ripener.

Syngenta South Africa (Pty) Ltd received a new registration with reduced rates for sugarcane ripening with Fusilade® Forte. The previous registered rates (250 ml/ha for ground application and 275 ml/ha for aerial application for all varieties excluding N14) have been replaced by more flexible reduced rates, shown in Table 1.

The new flexible reduced rates were necessitated because of cases where application of Fusilade® Forte at higher rates resulted in severe leaf scorching in some areas (Figure 1).

In areas where severe leaf scorching has been observed, the lower limit of the registered rates would be advisable, in other words 200 and 225 ml/ha for ground and aerial application respectively. Research at SASRI has shown that Fusilade® Forte applied at a rate of 200 ml/ha produced responses in terms of RV yield (t/ha) that were the same as those obtained at higher application rates.

The severe leaf scorching in cane following application of Fusilade® Forte is a potentially serious problem that can compromise optimal ripener responses.

The sugarcane plant can be compared to a factory, which relies heavily on electricity (energy) to produce some value product. In the case of sugarcane, solar radiation is this energy source, which enables the production of a value product (sucrose) by the factory (green leaves!) for storage in the stalk. Just as lower electricity supply will have severe consequences on factory production, lower absorption of solar radiation by sugarcane leaves will impact negatively on sucrose production. It is therefore important that growers ensure that Fusilade® Forte is applied at the correct rates.

In contrast to the severe scorching of mature leaves sometimes observed at higher application rates (Figure 1), the lower rate of 200 ml/ha only results in drying of the leaf spindle as well as the youngest of the immature leaves (Figure 2). This is the typical visual symptom for optimal ripener responses with Fusilade® Forte. However, of importance is that the growing tip of the sugarcane stalk is still killed at the lower rate, which is the main objective of using Fusilade® Forte as a ripener.

The risk of drift onto neighbouring fields is a potential problem when aerially applying ripeners. The weather conditions suitable for applying Fusilade® Forte is clearly stipulated inside the product label.

Figure 1. Picture showing severe leaf scorching in a field that was sprayed with Fusilade® Forte at the registered application rate. The picture was taken during the 2009 season.

Table 1. New flexible rates for Fusilade® Forte (excluding N14)

Application method	Dosage	Remarks
Ground application	200 to 250 mL/ha	Apply in 50 to 200 L water/ha
Aerial application	225 to 275 ml/ha	Apply in 30 to 35 L water/ha

Figure 2. Picture taken at harvest showing typical symptoms in sugarcane that was sprayed with Fusilade® Forte at the lower application rate of 200 mL/ha. Note the dark green colour of the mature leaves that contributed towards optimal ripening of the stalk through maximal absorption of solar radiation for sucrose production during the spray-to-harvest period.

Growers must also ensure that the product is not aerially applied in volumes less than 30 L water/ha, which could increase drift and poor uptake of the chemical by the sugarcane leaves. For sugarcane ripening no additional adjuvant should be used together with Fusilade® Forte.

For further information on chemical ripening, consult the revised SASRI Information Sheet 12.1. It contains new information about the basic principles underlying the use of chemical ripeners as well as a decision tree to help growers identify crop growth conditions suitable for chemical ripening. For detailed information on the correct use of Fusilade® Forte refer to the product label.

by Riekert van Heerden
(Senior Scientist – Sugarcane Physiologist)

WEATHER

Review

Most of the South African sugar industry received above average rainfall from October to December 2009 (see Table 1). The exceptions were Zululand in November/December and Mpumalanga in December. These wet conditions were somewhat against expectations as most climate forecasts indicated below normal rainfall from November onwards, mainly due to the presence of a moderately strong *El Niño* in the equatorial Pacific.

Although the abundant rains alleviated any water stress in growing sugarcane, the other climatic factors that are important for high yields were not that favourable in November and December. Temperature and solar radiation were below average in these months in all regions except in Mpumalanga.

Outlook

The moderately strong *El Niño* that exists in the equatorial Pacific is likely to persist until April 2010. During *El Niño* events it is more likely to receive below-normal rainfall (rather than above-normal rainfall) and above-normal temperature (rather than below normal temperature) in the sugar industry for the period December to the following March. Although conditions so far this season did not follow these expectations, the majority of current forecasts for the second half of summer (February to April - a very important period for sugarcane growth) indicate below normal rainfall. As an example, the forecast of International Research Institute for Climate and Society (IRI) (http://iri.columbia.edu/climate/forecast/net_asmt/) for the South African sugar growing regions are illustrated in the chart below and compared to the long term mean.

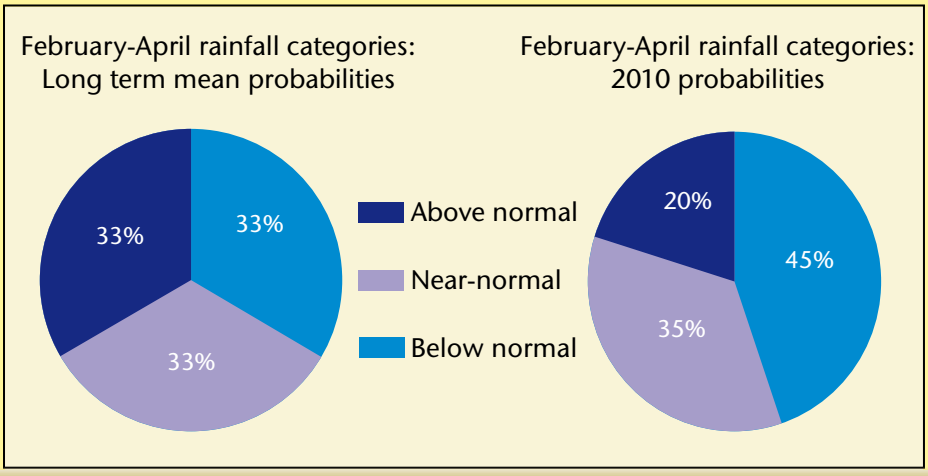
Seasonal climate forecasts also available at:

- UK MetOffice (http://www.metoffice.gov.uk/weather/world/seasonal/)
- European Centre for Medium Range Forecasts (http://www.ecmwf.int/)
- Climate Systems Analysis Group (CSAG), University of Cape Town (http://www.gfcsa.net/csag.html)
- South African Weather Service (http://old.weathersa.co.za/Menus/WXandClimate.jsp)

by Abraham Singels (Principal Agronomist)

Table 1. Rainfall expressed as a percentage of the long-term mean for different regions.

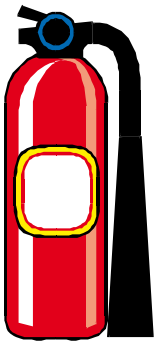
Region	Sep	Oct	Nov	Dec
South Coast	101	155	120	123
North Coast	88	127	100	180
Midlands	79	149	98	117
Zululand	70	141	77	84
Mpumalanga	31	314	196	87
Kwazulu-Natal	83	146	108	122



CHEMICAL STEWARDSHIP

TRANSPORT

In previous issues of the LINK, the storage of agrochemicals (May 2009) and the disposal of agrochemical waste (September 2009) have been discussed. Here we discuss safe procedures for transporting agrochemicals.



- When transporting agrochemicals the vehicle should carry a Tremcard (Transport Emergency Card) which contains information on the type and nature of the risk of the contents that is being transported. It includes emergency response procedures in case of spillages and fires as well as first aid responses.

- Avoid damaging containers while loading - if damaged DO NOT load. Load only labeled containers. Load as instructed e.g. "This way up". Avoid wet areas and sharp objects when loading and unloading. Avoid stacking liquids on top of dry goods and always stow with lids secure.

- In the event of an accident, first switch off the engine, assess the situation and call the emergency services. Small spills can be contained by covering with sand while larger spills need to have a mini dam created around them. Use the necessary equipment to contain the leakage or spillage by following advice stated on the Tremcard. Establish the name and possible hazards of the spilled products, stay upwind and inform others to stay upwind to avoid contamination and try to keep other people away from the area.

- Keep agrochemicals separate from other cargo (e.g. foodstuff, feeds, humans and animals).

- If First Aid is required, remove contaminated clothing immediately and consult the Tremcard to establish the correct procedure to be followed in the case where the material/chemical has been splashed into the eyes, inhaled, ingested or if there has been skin absorption.

- Training of drivers is important especially when an accident has occurred. Certain procedures must be carried out during training. These include:

  - interpreting and implementing the Tremcard,
  - doing pre-trip inspections of the goods and the vehicle,
  - keeping relevant documentation in the vehicle at all times including the Tremcard,
  - disseminating the relevant information of the planned details of the journey to the emergency services,
  - the correct Personal Protective Equipment (PPE) to be worn.

Peta Campbell (Senior Agronomist), Graeme Leslie (Principal Entomologist) and Keith Collings (Resource Manager: Diagnostic and Analytical Resource Unit)

IN CASES OF SPILLAGE

- *Avoid contact and inhalation of any fumes.*
- *Put on protective clothing.*
- *Use sand or soil to contain liquid spills.*
- *Stop spillage from flowing into any water course, dam or drain. If this happens advise the authorities.*
- *Dusts and powders should be covered by soil or a "sheet" and anchored.*
- *The type of packaging required depends on the container that the substance is contained in (e.g. glass bottle or plastic container) and the hazard of the substance (e.g. explosive, toxic, corrosive or flammable). It is therefore critical to seal leaking or damaged containers in the container that has been stipulated by the Tremcard to avoid any reactions between the container and the material/chemical.*
- *Destroy any contaminated foodstuffs and clothing.*
- *In the event of a fire, avoid inhaling any smoke or fumes, and put on breathing apparatus before tackling it. If you cannot easily extinguish it, call the emergency services. Remember that chemical fires require the use of powder or foam extinguishers.*