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2017 RDE COMMUNIQUÉS

FEEDBACK TO REGIONAL RDE COMMITTEES

South African Sugarcane Research Institute
Mount Edgecombe

UNLOCKING THE POTENTIAL OF SUGARCANE

Website: http://www.sugar.org.za

PREFACE

Contained within these pages are informative communiqués from SASRI specialists on the issues raised in 2017 by representatives of the regional RDE Committees. In instances where essential knowledge is lacking, certain issues have led to proposals for new research projects, which are to be implemented in 2018/2019, subject to funding approval by the Industry leadership.

The 2017 RDE Committees Workshop was convened in Mount Edgecombe and hence, issues relevant to sugarcane cultivation under rain-fed conditions predominate in this document. As agreed by the RDE Committees, the annual workshops will alternate between the irrigated and rain-fed regions, with the next workshop planned for Pongola in March 2018.

NEW

*Included in this document for the first time are **Communication Action Plans** for each RDE issue. These plans indicate how knowledge exchange is to be conducted on each issue as a partnership amongst growers, SASRI Mount Edgecombe-based specialist staff and the regionally-based Extension Specialists.*

ACKNOWLEDGEMENT

SASRI would like to thank the representatives of the grower and miller communities who give of their time to serve on regional RDE Committees. Without this commitment and generosity, SASRI's delivery of meaningful research outcomes to the industry would be severely compromised.

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SMALL-SCALE GROWER RDE ISSUES

Parthenium hysterophorus (FAMINE WEED)
(SASRI Reference: Issue 21)

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RDE Issue Description

Is there any chemical Control of *Parthenium hysterophorus* or rather a chemical registered to chemically control of *Parthenium hysterophorus*? There exist high populations of this killer weed in the Zululand North area.

Desired End Result

Effective chemical control (registered chemical). Control methods.

SASRI COMMUNIQUÉ: *Parthenium hysterophorus* (FAMINE WEED)

1. INTRODUCTION

Parthenium is a biosecurity weed in the sugar industry, with health risks for humans and livestock. This weed is also a problem in other countries e.g. Australia. In South Africa, it is considered so serious a health risk that it has become the first weed with Provincial and National management strategies that are implemented by Working for Water. A major problem is the rapid growth and flowering of this weed, with a very high output of seed, around 15 000 per plant, especially under warm wet conditions. It is spread via water, and seeds can survive at least six years in soil. Approximately 85% of Mpumalanga is at threat of invasion and the only areas in southern Africa unlikely to be invaded are those with less than 400 mm of rain per annum.

At SASRI, an awareness campaign was initiated with the preparation a biosecurity poster for growers on *Parthenium*. In addition, SASRI research is not relying solely on chemical control but has adopted an integrated weed management (IWM) approach. This approach uses numerous alternative weed control measures, including cultural, mechanical, biological, and chemical options. In an IWM programme for *Parthenium*, appropriate combinations of control methods are selected for different weed and cane growth situations. The effects of different control methods are described below.

2. NON-CHEMICAL CONTROL METHODS USED ELSEWHERE

2.1. Lessons from Australia

Several lessons may be learned from the Australian experience on on-chemical control of *Parthenium*

2.1.1. Green manuring

Green manuring with sunflower was effective inhibiting growth of *Parthenium* in Australia.

2.1.2. Encouraging competition

Establish a robust vegetation community that minimises excess resource availability and that competes effectively with weeds that do establish. A grass cover on degraded land and roadsides outside sugarcane fields prevents establishment of *Parthenium* seeds.

Parthenium is a poor competitor and hence it fails to grow in the company of any aggressive species. Physical dominance and the ability of the competitive species to deprive *Parthenium* of light are responsible for its decline, rather than allelopathy.

2.1.3. Revegetating degraded and bare areas

Stabilize degraded and bare areas with non-invasive grasses e.g. along roadsides to form a cover and compete with *Parthenium*. Protect these areas from overgrazing.

2.1.4. Managing verges

Protection of verge grass cover from hot burns is important. Aim to apply a controlled and cooler burn. Burning accelerates the colonization of *Parthenium*. During harvest, burning can kill grass cover on verges and opens up the area for *Parthenium*. The effect of burning results in loss of diversity and gradual replacement of local species by obnoxious species of weeds such as *Lantana camara* and *Parthenium*.

2.1.5. Creating barriers

Parthenium seeds are spread into fields via rivers, irrigation water, canals and other water courses. In addition, washing vehicles that have driven through *Parthenium* will spread downhill into adjacent fields. Plant vetiver grass clumps or an extra line of cane to act as a physical barrier to prevent invasion of *Parthenium* seed into cane fields situated adjacent to rivers and floodplains.

2.1.6. Avoiding overgrazing

It is important to avoid overgrazing. Where areas are overgrazed and degraded, this will aggravate and accelerate invasion by *Parthenium*.

2.1.7. Implementing husbandry practices

A combination of hand hoeing twice and growing a smother crop e.g. cowpea, can suppress *Parthenium*. Sunflower crops also suppress the weed population through competition.

Light exposure of imbibed seeds (full of moisture) increased germination of freshly harvested *Parthenium* seeds to 68% from 8% in the dark. However, with time, germination in the dark increased to a maximum by 7 months. Thus exposing seeds to light during hoeing in irrigated fields will stimulate germination.

2.2. Lessons from India and Ethiopia

Indigenous farmer knowledge on *Parthenium* management exists amongst subsistence farmers in Ethiopia and India. This includes the careful choice of more competitive crop varieties and intercropping between rows with smother crops e.g. cowpea and mung bean and others. Proper management of *Parthenium* during fallow periods e.g. with repeated deep ploughing, the choice of appropriate sowing rate and date, and the selection of fertilizers are further options developed by these farmers to reduce the impact of the weed.

3. NON-CHEMICAL CONTROL METHODS USED IN SOUTH AFRICA

A SASRI vetiver grass barrier trial at Pongola showed that any seeds emerging between the planted grass and the cane would need to be killed before they started to flower e.g. with shielded glyphosate applications. An observation trial in Komatipoort showed that when a thick vetiver hedge was established, with good irrigation (dripline), it rapidly grew taller than *Parthenium* plants and effectively halted spread to the other side of the hedge. Further lessons learned from these studies include the following

3.1. Using physical methods

The weed should be ploughed under or removed manually before setting of flowers.

3.2. Cutting back

Stumps left after cutting back the plant sprout, producing a large number of shoots from latent crown buds. Flowers were produced on such shoots within 30 days. It was concluded that the rapid

regenerative ability of *Parthenium* was responsible for the dominance of this weed and the failure of manual control methods.

4. BIOLOGICAL CONTROL

Biological control efforts to control this weed are very strong, and an implementation program of biocontrol where it is a problem in South Africa is led by Ms Lorraine Strathie of the Weeds Unit of the ARC-PPRI in Cedara (StrathieL@arc.agric.za). Ms Strathie is acknowledged for the information that follows.

SASRI are mass rearing the stem-boring weevil *Listronotus setosipennis* (also reared by Plant Protection Research Unit of the Agricultural Research Council [ARC-PPRI] in Cedara): about 26 000 released since July 2013 at approximately 100 sites; and the seed-feeding weevil *Smicronyx lutulentus* (also reared by ARC-PPRI): about 25 000 released since January 2015 at approximately 50 sites. ARC-PPRI are mass rearing the leaf-feeding beetle *Zygogramma bicolorata*: about 39 000 (mostly adults) released since August 2013 at approximately 150 sites. So, there are about 300 release sites for insect agents against *Parthenium* in SA. They are all in Mpumalanga and KZN, where the most dense and extensive weed infestations occur.

A pathogenic fungus, *Puccinia xanthii*, has established, especially in Mpumalanga. Infected plants were taken from nurseries established in the ARC-PPRI labs in Stellenbosch, and also initially from laboratories established at SASRI and the SASRI Pest and Disease Office at Malelane, and transplanted in Mpumalanga and KZN to allow the fungus to spread.

All the above agents have established in both provinces in South Africa, but to varying degrees per agent. Sites have been monitored once or twice per growing season. *Zygogramma bicolorata*: low establishment (established at 10-20% of sites) but extensive and complete defoliation at a few sites under suitable conditions has been observed; *Listronotus setosipennis*: established better than *Zygogramma*, in at least 50% of release sites. Dispersal was slow. Good damage per plant at some sites; *Smicronyx lutulentus*: established at 30-50% of sites but it is too early to say much more; *Puccinia xanthii*: natural spread 50km or more in Mpumalanga and spread in Northern KZN.

Other agents under evaluation in quarantine at the ARC-PPRI laboratories at Cedara are two lepidoptera: *Carmenta* sp. nr. *Ithacae,* a moth with root boring larvae and *Epiblema strenuana*, a moth with stem galling larvae. These should be released from quarantine for mass rearing during 2018.

5. CHEMICAL CONTROL

5.1. Post-emergence

Controlling early stages of growth (rosette stage) is easier than older plants (bolted plants) and flowering plants. An additional advantage of early control is that seeds are not formed to enter the soil seedbank.

5.2. Late post-emergence growth stage

This is a crisis management situation and means yield is likely to have been lost. Where possible, slash plants before spraying herbicides on shorter regrowth. Options to control large *Parthenium* plants include:

- Glyphosate for *Parthenium* growing on verges and roadsides – Glyphosate has no residual action so will not affect seeds in soil. It will kill grass cover so sprays must be directed away from sugarcane. This is proving very successful at Makhathini Flats, where Mr Malu has got good results on verges.
- Forrester has been registered by Arysta for *Parthenium* control in areas outside cane fields – this is a generic of the unregistered product Brushoff (metsulfuron-methyl). This will not harm grass.
- SASRI has shown that if you are using Dinamic + MCPA + ametryn in ratoon cane for weed control, you will find it is also effective for *Parthenium* control and it is more residual than glyphosate. NB: it is not a registered treatment. This will not control grasses.

Two current SASRI trials in progress at Pongola involve five new product combinations for residual control in can fields.

- If growers are planting vegetables e.g. cabbages, they could consider using dribble bar application to the rosette stage at 21 days after planting vegetable seedlings. The dribble bar has proved effective for the rosette growth stage (Lowveld Highlights).

  NB: Make sure workers get training and experience before trying this method.

- Agro-chemical companies are also actively involved with their new product combinations.

5.3. Pre-emergence application

SASRI aims to compare efficacy of various active ingredients in a pot trial using local soils.

SASRI COMMUNICATION ACTION PLAN: *Parthenium hysterophorus* (FAMINE WEED)

COMMUNICATION PLAN REFERENCE NUMBER						17RD21
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COMMUNICATION PLAN OUTLINE						
Knowledge Exchange activities to be implemented (marked with 'X')						
Publications		Presentations		Discussions/Workshops		
The Link and/or Ingede	X	Staff Colloquium for ESs		Grower Day		
Extension Newsletters		SASTA		Grower Study Group		
Information Sheet update		Other (specifed below)	X	Short Course		
Information Sheet new		Training by Vincent Mbuyazi and Sifiso Hlela		Other (specified below)		
Other (specified below)	X					
Booklet in partnership with SASRI Knowledge Management Unit						

Objectives and desired dates of Knowledge Exchange activities				
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Link and Ingede	All growers, with translation into isiZulu	Inform growers about the availability of biological control agents, and where they can be obtained, and a brief discription of their mode of action.	September Link and Ingede publications	Growers requesting biological control agents from SASRI weed biocontrol centre, and ARC-Plant Protection Research Unit in Cedara
Training days for chemical control and IWM principles	All growers, with isiZulu translation	Train correct application methods and correct drum calibration,	October/November	Grower attendance, questions and visits to local co-ops

FLOOD PLAIN VARIETIES
(SASRI Reference: Issue 22)

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RDE Issue Description

KwaJobe, Mnqobokazi and KwaShukela in (Northern Zululand) have been practicing their sugarcane production on flood plains.

Background

They have been planting sugarcane for many years - this is their major source of income to sustain their livelihoods.

Desired End Result

Alternative varieties that will withstand periodic flooding.

SASRI COMMUNIQUÉ: FLOOD PLAIN VARIETIES

It is recommended that an Extension Demonstration Variety Trial be conducted to establish variety performance under flood plain conditions in KwaJobe, Mnqobokazi and KwaShukela. SASRI is able and willing to provide input in respect of: (a) recommending varieties to plant; (b) advising a suitable trial design; and (c) assisting to source suitable seedcane. It is further recommended that this be a local initiative i.e. led by the local Extension Specialist. Operations such as land preparation, fertilization and weed control must be co-ordinated by extension in collaboration with a grower co-operator. SASRI can provide supervision during planting and collect yield data as required.

Assessment of the KwaJobe, Mnqobokazi and KwaShukela conditions (M Adendorff and N Mkhabela)

The areas are situated in the greater Makhathini area, along the Pongola River and the Mkuze River and pans therein. The growth conditions are: extremely hot summers with hot to moderate winter temperatures, summer rainfall and dry winters. Most of the fields are on the floodplains of the two rivers. During a normal summer there is extensive flooding with prolonged water logged conditions and in the winter it is extremely dry. There is no irrigation and limited normal ratoon management (fertiliser and weed control). For many years the area was dominated by NCo310 and NCo376, with many fields still existing and all fields will have NCo volunteers. Some fields are planted to N41, N19 and N25 (and there may be some N33 or N35).

Challenges: (a) the alternating extremely wet and extremely dry conditions will make it difficult to choose suitable varieties; (b) smut is a major problem and will always be a threat; and (c) trial management has to be carried out by growers.

SASRI COMMUNICATION ACTION PLAN: FLOOD PLAIN VARIETIES

COMMUNICATION PLAN REFERENCE NUMBER		17RD22
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COMMUNICATION PLAN OUTLINE		
Knowledge Exchange activities to be implemented (marked with 'X')		
Publications	Presentations	Discussions/Workshops

The Link and/or Ingede	X	Staff Colloquium for ESs	X	Grower Day	X
Extension Newsletters		SASTA		Grower Study Group	X
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	X
Other (specified below)				One-on-one with growers	
				One-on-one with committee	

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
The Link/Ingede	The Link(English) LRG /SSG (Zulu)	Disseminate new knowledge about sugar varieties suitable for adoption under floodplain conditions	2017/2018	Questionaires Interviews

SUGARCANE ESTIMATES
(SASRI Reference: Issue 23)

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RDE Issue Description

Sugarcane estimate is a problem (varieties differences).

Background

For many years estimates have never been correct.

Desired End Result

We need a simple method of sugarcane estimating based on varieties.

SASRI COMMUNIQUÉ: SUGARCANE ESTIMATES

This issue, submitted by small-scale growers, stimulated much discussion amongst SASRI scientists. The general view is that the current method used to estimate the cane yield of fields, including those of small-scale growers, is very robust and reliable, if applied correctly. SASRI specialists are also of the general opinion that variety differences are not likely to contribute significant variation to cane yield estimates.

A preliminary analysis of data from SASA plant breeding trials conducted by Dr Marvellous Zhou (Senior Scientist: Plant Breeding) has revealed that varieties may indeed differ in weight per meter (see Dr Zhou's analysis below). Given this, SASRI believes that further investigation of this small-scale grower RDE issue may be warranted. Consequently, a project is being planned for implementation at SASRI in 2018/2019 to investigate this issue. The project pre-proposal has been approved for development into a full research proposal (SASRI Reference: 17TD04 *Development of a simple method to estimate sugarcane yields*) (see SASRI Communication Action Plan below).

Analysis of weight per metre of different cultivars from SASRI Plant Breeding trials

In Plant breeding, we use stalk numbers, height and diameter to estimate tons cane per hectare (TCH) in early stages of sugarcane breeding (Mini-lines and Single Lines). The first assumption is that the stalk density of sugarcane is approximately 1 g per cm^3 and this has been proved through experimentation and therefore density is assumed constant. The second assumption is that the sugarcane stalk is a perfect cylinder which is generally true on average when the diameter is measured at the centre of the stalk. The number of stalks, stalk height and stalk diameter are expected to vary across varieties. Generally, in commercial cultivars, the number of stalks per hectare remains the same for each cultivar that is a high stalk population variety remains high stalk population (assuming good establishment at planting). The stalk diameter also remains the same that is a thick stalk cultivar remains thick stalked all the time. Therefore, the most variable yield component is the stalk height which can change depending growing conditions as affected by weather, season, nutrition, droughts and other factors. The stalk height is expected to influence TCH more that stalk population and stalk diameter within an individual variety. Therefore, when estimating TCH, the height can be measured and a conversion factor to weight (kg per metre) can be used to estimate TCH when multiplied by the stalk population. Different cultivars will have different conversion factors (kg/metre) and this may need to be determined if not known. These values can be determined from Variety Evaluation and Plant Breeding trials data using yield and stalk height data that is routinely collected.

An example using some data from Plant Breeding trials (Table 1) shows that the weight per metre (WPM) can be different for the cultivars under different growing conditions. N16 has high WPM across environments while N31 had low values across environments. The WPM for N52 was higher in humic soils and lower in sandy soils.

Table 1

Weight per metre (WPM) of different cultivars from Midlands PB trials.

Humic soils	**TCH**	**Stalks/ha**	**Height**	**Diameter**	**WPM**
N12	92.0	187.3	1.30	2.35	0.38
N16	95.5	171.7	1.33	2.38	0.42
N31	102.7	177.4	1.83	2.13	0.32
N52	121.9	163.7	1.81	2.40	0.41
NCo376	92.5	180.3	1.34	2.33	0.38
Sandy soils	**TCH**	**Stalks/ha**	**Height**	**Diameter**	**WPM**
N12	57.7	159.9	1.03	2.28	0.35
N16	70.5	161.6	1.14	2.33	0.38
N31	68.1	167.7	1.39	2.08	0.29
N50	61.9	156.4	1.01	2.23	0.39
N52	79.0	158.4	1.55	2.23	0.32
NCo376	61.9	161.2	1.04	2.33	0.37

SASRI COMMUNICATION ACTION PLAN: SUGARCANE ESTIMATES

A project is being planned for implementation at SASRI in 2018/2019 to investigate this issue. The project pre-proposal has been approved for development into a full research proposal (SASRI Reference: 17TD04 *Development of a simple method to estimate sugarcane yields*).

SILICON DEFICIENCIES
(SASRI Reference: Issue 24)

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RDE Issue Description

- Sources of Si.
- Application in ratoon crops.
- Becoming worse every year.
- Long-term implications.

Background

- Difficult to replenish Si in crop.
- Soil and leaf samples indicate Si deficiency.
- Widespread.

Desired End Result

- Other Si sources.
- Application methods for ratoon crops, esp. on slopes.

SASRI COMMUNIQUÉ: SILICON DEFICIENCIES

SASRI has tested the efficacy of 17 different silicon (Si) sources in providing plant-available soil Si and its subsequent uptake from these sources. Calmasil® (calcium silicate slag) remains the most effective in terms of Si provision and uptake, product cost, and very importantly in its ability to correct soil acidity. Soil acidity is important because acid, sandy, low organic matter soils in the rainfed areas of the industry are also those that are depleted of natural reserves of plant-available Si (i.e. desilicated).

Although Calmasil has been very effective in pot trials, adequate uptake of Si from Calmasil (and other sources) in a field setting remains a challenge. The exact causes of poor Si uptake remain a matter of speculation. However, aluminium (Al) appears to be the most likely culprit, given the very strong association between low soil Si concentrations and high levels of exchangeable Al. In humic soils, the huge reserves of Al bound to organic matter may be reacting with and removing available Si from soil solution and thereby making it unavailable for plant uptake. Responses to Calmasil application on such soils have been very poor. In contrast, treatment of acid, sandy, low organic matter soils, or even straight river sand, with Calmasil in pot trials has produced significant increases in leaf and stalk Si content. This indicates that Calmasil is likely to be most effective in sandy, acid soils with low organic matter, and growers would be advised to restrict Calmasil use to these soils until further research has been completed. However, organic matter amendments and retention of crop residues can also serve to bind exchangeable Al and may therefore reduce its reaction with soluble Si (native and applied).

There is also abundant evidence in the literature that crop residues, such as sugarcane trash (which may contain up to 3% Si), are especially important sources of plant-available Si in highly weathered soils, such as those in the dryland regions of the sugar industry. Clays in these regions have typically been heavily leached of soluble forms of Si. Therefore, input of phytogenic (i.e. plant-derived) Si in such soils via retention of crop residues is a highly cost-effective and beneficial means of recycling Si extracted from the soil by the crop back into the soil. A rainfed crop that yields a total biomass of 80 t/ha at harvest could produce 16 t/ha of crop residue, potentially providing 480 kg Si/ha. This alone could provide much of the Si that would otherwise need to be provided in the form of silicate amendments, and highlights the substantial yearly removal of Si from sugarcane fields caused by the process of crop residue removal and burning. Silicon provision through retention of crop residues should therefore be viewed as one of many important benefits of crop residue retention.

In the interim, good soil management practices that include trashing, avoidance of soil compaction, and application of lime and gypsum where recommended, will improve soil health and moisture, and therefore root

growth. The latter will inevitably also improve Si uptake. Calmasil can correct soil acidity and reduce Al saturation as effectively, and frequently more effectively, than dolomitic lime when both are applied at the same rate to an acid soil. Therefore, for the purposes of correcting soil acidity and reducing Al toxicity, Calmasil can safely and confidently be applied at the same rates recommended for lime applications by FAS. However, it is essential that Calmasil is thoroughly incorporated before planting in order to maximise its reactivity and plant Si uptake, and to prevent lumps of the product from solidifying when they become wet. Calmasil will also provide ample supplies of available Ca and Mg, as with dolomitic lime, and uptake of Si from this source can be improved through simultaneous provision of ammoniacal N fertilizers, such as urea. Should ratoon applications be necessary, Calmasil could potentially be hoed in along the edges of the rows, taking care not to damage the roots.

Other Si sources tested, including potassium silicate, thermophosphate (fused Ca-Mg-Si-P) and liquid silicic acid, had no, or much reduced, liming capacity, even where they did provide adequate Si, so would be of no value in addressing soil acidity. Many of these products are also prohibitively expensive. Bagasse fly ash, although a low-cost source, does not provide appreciable amounts of plant-available Si and has no liming activity.

While desilicated acid soils dominate in the rainfed parts of the industry, the irrigated northern regions have clays that are replete in native, more available forms of Si. Silicon deficiencies (i.e. leaf Si values <0.75%) are therefore not of concern in these regions and application of Si fertilizers, whether for growth promotion or protection against stresses such as eldana, is unwarranted. Hence, it is essential that appropriate soils are targeted for application of silicate slag, as benefits of supplied Si will not be seen where native soil Si is already abundant. Furthermore, it is well established that Si benefits will generally only be evident under circumstances where the crop is subjected to some form of biotic (e.g. pest or disease) or abiotic (e.g. drought, metal toxicity, salinity) stress. With respect to management of eldana, Si should be viewed as only one component of an overall IPM strategy and will provide little if any benefit in varieties that are already resistant to eldana. Significant enhancements in resistance due to Si are generally only evident in susceptible or intermediate resistance varieties, and in particular when these are under drought stress.

SASRI COMMUNICATION ACTION PLAN: SILICON DEFICIENCIES

COMMUNICATION PLAN REFERENCE NUMBER					17RD24		
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COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations			Discussions/Workshops		
The Link and/or Ingede	X	Staff Colloquium for ESs			Grower Day		
Extension Newsletters		SASTA			Grower Study Group		
Information Sheet update		Other (specifed below)			Short Course		
Information Sheet new	X				Other (specified below)		
Other (specified below)							
Objectives and desired dates of Knowledge Exchange activities							
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*			
The Link	Growers – English	Latest update on Si sources, application, use as lime, trash as Si source.	Sept 2017	Feedback from ESs on use of Calmasil for liming and grower leaf			

				and/or soil analyses.

UMFOLOZI RDE COMMITTEE

DATA CAPTURE
(SASRI Reference: Issue 9)

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RDE Issue Description

Current databases are in silos - are not easy to mine for info (SASRI data + industry) - difficult to access for info.

Background

- e.g. cane estimates - many are not electronic - mill, MGB, etc data need to be more accessible or able to 'speak' to one another.
- Industry mandate.

Desired End Result

Streamlined, seamless data management system (industry-wide!).

SASRI COMMUNIQUÉ: DATA CAPTURE

1. CONTEXT

This issue was submitted from the Umfolozi region, and requests the development of a field-level database for data including spatial information (maps), P&D surveys, crop estimates, My Canesim and Pur*Est*™. It is noted that these datasets mostly already exist and are updated regularly, but the difficulty is in viewing/analysing the data across domains. The basic premise is that a single SASA or SASRI database of field-level information:

- will make it easier to analyse data across domains, e.g. linking P&D trends with crop estimates, and this information will assist grower decision-making;
- will permit more proactive biosecurity measures;
- may save growers time – e.g. biosecurity teams will be able to verify information without contacting growers; and
- will permit more accurate crop estimates if field information can be supplied to My Canesim.

2. INTRODUCTION

In principle, an up-to-date database containing field-level information on many aspects of cane production would be an incredibly valuable resource. In practice, a number of substantial institutional and technical challenges would need to be overcome to achieve this. Several efforts are, however, under way at SASRI that may yield a foundation for such a system in future.

3. CHALLENGES

3.1. Institutional challenges

Several institutional challenges face the implementation of such an industry database.

3.1.1. *Field Records System*

The development of a field-level industry database will need to include an exploration of the reasons for the termination of the SASRI Field Records System (FRS) in the mid-1990s. Seeking to develop a new system that amounts to the same thing will require careful justification.

3.1.2. *Protection of personal information*

A system that connects to mill delivery data exposes the system to concerns about access to personal information. There may be opposition to such a system on these grounds, and if implemented, would require careful elaboration of data aggregation levels and access controls.

3.1.3. *SASRI's scope*

An industry-level database of the scale envisaged exceeds the boundaries of SASRI's mandate. While SASRI is responsible for several separate databases that might feed into an industry-level database, data would be required from other SASA divisions and so ought to be a SASA, rather than SASRI, initiative.

3.2. Technical challenges

3.2.1. Possible vs feasible

It is important to differentiate between what is technically possible and what is actually feasible, given various constraints. SASRI has had the capability to combine separate databases into a coherent information system for decades, but this has not happened. The data analysis picture painted in the RD&E issue leans towards idealistic rather than realistic, although there is no doubt that a database capable of some degree of cross-domain analysis will be beneficial to a range of sugar industry stakeholders.

3.2.2. Finding a common data 'key'

In order to analyse data across domains (for example, linking crop estimates with P&D records), it is necessary to have a common variable that associates or links the two. This is termed a common 'key' in the database world. The suggestion in the RD&E issue was that a spatial dimension be used for this – and this certainly makes sense: if data were available at field level, then it would appear to be easy to associate dataset A for field x with dataset B for field x. In practice, however, this is not as simple as it seems: fields are not uniquely named, so would be associated with farm names, perhaps grower codes; but fields are sub-divided and merged, and farms change hands (and possibly change names). Such structural changes would make time-series analysis difficult, but not doing so would result in data going out of date. Linking on a geographical coordinate is also not feasible, because even two very proximate GPS readings will be unlikely to be exactly the same. Geographical coordinates represent points on the Earth's surface anyway, while most of the data applies to regions – fields, farms. There may be ways to address this, but this is a nevertheless a considerable challenge.

3.2.3. Translating between spatial scales

Data are collected at many – different – spatial scales in the SA sugar industry. Some examples:

- P&D records are probably associated with a farm and field number, and possibly a GPS reading.
- Pur*Est*™ data are currently routinely collected for the entire North Coast region, although provision is made to store grower code, farm name and field number (it is up to the user whether or not to enter this information).
- The SASRI Canesim Crop Forecasting System calculates forecasts at mill supply area and 'homogenous climate zone' scales.
- Weather data are collected at weather stations (individual point locations).

In order for cross-domain analysis to be possible, it is necessary to develop a mechanism for linking across these spatial systems. This spatial translation – so that, for example, Pur*Est*™ data, P&D data and crop forecast data could be combined to assist in developing a crop estimate – is, again, not a simple exercise.

3.2.4. *Translating between data formats and platforms*

Each of the databases envisaged to provide data to the common industry database described in the RD&E issue is extremely likely to have a unique design, set of operational procedures, set of variable names and units (for the same concepts), and platform (e.g. hard copy books, Excel spreadsheets, Access databases, Oracle databases, MySQL databases). Linking these databases together operationally will be enormously challenging; every single database will require the dedicated attention of a programmer and the development of a unique software solution for data synchronisation.

4. EFFORTS UNDERWAY

Several projects are already underway that, collectively, address many aspects of the RD&E issue. Rowan Stranack has requested 30 (GPS-enabled) tablets for P&D team data capture, and these will be linked to Oracle software already developed, allowing seamless, timeous and accurate data entry. Project 16TD06 (*Higher-resolution spatial framework*) is a new project that aims to develop a higher-resolution system of spatial units for more accurate yield simulations at regional and national scales. It is intended in this project that we will develop a software tool for querying several types of data at many spatial scales, in a transparent manner. In conjunction with Project 16TD04 (*Eldana Risk Index*), P&D data will be located within the spatial framework – perhaps not at field level, but probably at quinary catchment scale (these are substantially smaller than HCZs). FAS data will probably also be included, as we are exploring the possibility for mutual spatial gap-filling between P&D and FAS samples as part of an initiative by Jeff Smithers and Rian van Antwerpen. Additionally, within Project 11CM04 (*Modelling of chemical ripener responses*), we intend to geo-locate Pur*Est*™ data within HCZs (or a finer spatial scale) in order to develop ripener effectiveness indexes. Overall, the vision for 16TD06 is to provide a software tool where any variable (across a specific set of domains, most likely including weather data, simulation inputs, PurEst observations, P&D and FAS data) can be queried at any spatial scale (from quinary catchment scale up to industry scale, with many intermediate levels), permitting cross-domain analysis. The author believes that this will address much of what has been requested with the RD&E issue; and for this reason, and also given the described challenges facing a more ambitious system, it is not necessary or appropriate for a new project to be proposed to address this.

5. SUMMARY

In principle, an up-to-date database containing field-level information on many aspects of cane production would be an incredibly valuable resource. In practice, a number of substantial institutional and technical challenges would need to be overcome to achieve this. Several efforts are, however, under way at SASRI (brought together in project 16TD06 – “Higher-resolution spatial framework”) that may yield a foundation for such a system in future. Given the aims of 16TD06, and the identified challenges facing a more comprehensive system than that proposed in 16TD06, it is neither necessary, nor appropriate, to propose a new project to address this RD&E issue at this stage. The Umfolozi RD&E committee will be informed of stakeholder engagement events within 16TD06, in order that their needs can best be accommodated in the 16TD06 software, and project outcomes will be communicated to them as well.

SASRI COMMUNICATION ACTION PLAN: DATA CAPTURE

COMMUNICATION PLAN REFERENCE NUMBER	17RD09
RESPONSIBLE SASRI SPECIALISTS	
Name:	Matthew Jones (Systems Modeller) (Matthew Jones@sugar.org.za) Dr Derek Watt (Research Manager) (Derek.Watt@sugar.org.za) Alex Searle (Extension Specialist) (Alex.Searle@sugar.org.za)
COMMUNICATION PLAN OUTLINE	
Knowledge Exchange activities to be implemented (marked with ‘X’)	

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	
Extension Newsletters		SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	X
Other (specified below)				Discussion amongst Matthew Jones, Alex Searle, Rowan Stranack and Derek Watt	

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Discussion	Extension Manager and Umfolozi Extension Specialist Through Extension Specialist, Umfolozi Growers	To develop a mutual understanding of need for and challenges associated with the development of a unified, spatially-explicit industry-wide database.	Before Sep 2017; date to be mutually agreed	Mutual understanding declared by discussion participants

HARVESTING
(SASRI Reference: Issue 10)

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RDE Issue Description

Incorporate into PurEst a component whereby the optimum topping height for a stalk sample from a particular field can be determined.

SASRI COMMUNIQUÉ: HARVESTING

There is no doubt that more attention to detail regarding base-cutting and topping height can lead to significant improvements throughout the industry in the quality (RV%) of cane transported to the mill.

However, Pur*Est*™ *per se* is not needed to guide optimum topping height. Actual refractometer measurements of Brix% in the top third of the stalk below the natural breaking point will reveal the optimum topping height. The best approach would be to use a refractometer to determine the Brix% values in the individual internodes near the top of the stalk and to make a decision on topping height based on these measurements. The concept of using refractometers for this purpose will be discussed and practically demonstrated at grower days during 2018. Growers are also encouraged to consult their extension specialists for further advice.

SASRI COMMUNICATION ACTION PLAN: HARVESTING

COMMUNICATION PLAN REFERENCE NUMBER	17RD10
RESPONSIBLE SASRI SPECIALISTS	
Name:	Dr Riekert van Heerden (Senior Scientist: Sugarcane Physiology) (Riekert.vanHeerden@sugar.org.za)

COMMUNICATION PLAN OUTLINE					
Knowledge Exchange activities to be implemented (marked with 'X')					
Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	X
Extension Newsletters		SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities				
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Grower days	Growers and Millers (English and Afrikaans).	Item to be included in all chemical ripener grower day presentations: To make growers in Umfolozi (and other) regions aware of the potential use of refractometers to determine otimum topping height on a field-by-field basis.	Continious during 2018	Positive feedback obtained from stakeholders at grower days.

AMATIKULU RDE COMMITTEE

LONGHORN BEETLE
(SASRI Reference: RDE Issue 1)

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RDE Issue Description

- Devastating yield lost (~70%)
- Ratoon mortality
- 400 ha damaged but has capacity to spread (has been found in Mozambique, Mpumalanga, etc)

Background

- Indigenous beetle, jumped to cane in Entumeni (decaying root to sugarcane)
- 10 - 60 x increase in infestation in 1 year in Thailand, Indonesia.

Desired End Result

- Effective control
- Containment
- Eradication

SASRI COMMUNIQUÉ: LONGHORN BEETLE

1. INTRODUCTION

The serious negative consequences of the recent longhorn beetle infestation on the profitability of the sugarcane farming enterprises of affected Entumeni growers, as well as the significant biosecurity risk the insect poses to the entire industry, are recognised by all industry stakeholders. Consequently, the miller and grower leadership serving on SASA Council, the affected Entumeni growers, CANEGROWERS' specialists, SASRI specialists and agro-chemical company specialists are working in partnership to mitigate the broader biosecurity risks and current negative economic impacts associated with the host-switch of the longhorn beetle to sugarcane. These activities are occurring on two primary fronts: (a) containment; and (b) research and development.

2. CONTAINMENT

The industry is in the process of negotiating contractual containment agreements with affected growers that will enable the implementation of measures to prevent the potential spread of the longhorn beetle cane infestations beyond Entumeni. These measures include: (a) premature harvesting of affected fields; (b) plough-out of affected fields; (c) implementation of remedial measures, including stool lifting, disintegration and application of fumigant and pesticidal compounds; and (d) implementation of an extended fallow period with the planting of appropriate cover crops. To assist with the implementation of these measures, the industry has created a fund, which growers will access through specific individual contractual containment agreements. These measures are planned for implementation ahead of the period of beetle flight anticipated in summer 2017 but are subject to the finalisation of the contractual agreements.

3. RESEARCH AND DEVELOPMENT

The industry, through SASA Council, has approved funding that has enabled the fast-tracking of technology development and research projects for start-up in July 2017.

3.1. Technology Development

3.1.1. Approach

Technology development is to be conducted in-house by SASRI specialists in partnership with growers from the Entumeni region and relevant commercial product and service suppliers, as appropriate.

3.1.2. Team

- Mike Way (SASRI Entomologist) serves as Principal Investigator on the project team.
- Dr Des Conlong, Dr Malcolm Keeping and Dr Peter Tweddle provide additional technical expertise, while Dr Stuart Rutherford, the SASRI Crop Protection Programme Manager and Principal Scientist (Integrated Pest and Disease Management), provides tactical oversight and the necessary systems thinking.
- Staff of relevant external commercial entities.
- The activities of the team are to be supplemented by the services of an intern, the stipend for whom will be potentially off-set through an internship application to the National Research Foundation in 2018.

3.1.3. Objectives

The primary objectives of the technology development are to:

- determine active ingredient dose, timing of application and application tactics that result in optimum pesticide efficacy and to use such data, in partnership with relevant agrochemical companies, to obtain permanent registration of appropriate pesticides (Note: temporary emergency registrations are valid for twelve months and efficacy data are required for permanent registration);
- test the efficacy of the C17 strain of the entomopathogenic fungus *Beauveria brongniartii*, against the longhorn beetle and to test further microbes arising from section 3.2 (below) for potential use as biocidal compounds;
- determine mechanical interventions that result in maximum longhorn beetle larval and pupal mortality and which enhance pesticide efficacy, including the splitting, lifting and fragmentation of stools; and
- test the efficacy of commercially available traps and volatile compounds, known to attract other longhorn beetle species, as a means to monitor the population size of the longhorn beetle.

3.1.4. Intended Outcome

The intended outcomes from the technology development project are as follows.

- Permanent registration of at least two pesticides with different modes of action against the longhorn beetle, detailing effective active ingredient dose, timing of application and application tactics.
- At least one biocidal compound with demonstrated efficacy against the longhorn beetle.
- Mechanical practices that result in longhorn beetle mortality and which increase pesticide efficacy.
- A trap that enables longhorn beetle population size monitoring, based on commercially available products.

3.1.5. Strategic Benefit

It is envisaged that the technologies developed will enable the short-term containment of the Entumeni longhorn beetle outbreak.

3.2. Research

Although an agrochemical-reliant programme, with supplemental mechanical interventions, may be suitable as a short-term containment measure, it is inappropriate for the long-term sustainable management of longhorn beetle infestations, due to the risk of the insect developing resistance to registered active ingredients, as well as potential collateral environmental and agro-ecological negative impacts of pesticide use. A sustainable integrated pest management system for this new pest is

required; one that will rely on acquisition of knowledge of the biology and ecology of the longhorn beetle, which is currently lacking.

3.2.1. Approach

To develop the required information on the biology and ecology of the longhorn beetle (*Cacosceles newmannii*), SASRI has contracted-out aspects of the research to the Department of Conservation Ecology and Entomology of Stellenbosch University, a department with extensive expertise in the relevant discipline areas and the infrastructure required for the investigation of the biology and ecology of insect pests, such as the longhorn beetle as well as for the development of IPM tactics. Expertise residing at the University of KwaZulu-Natal (chemical ecology) and at the Forestry and Agricultural Biotechnology Institute, University of Pretoria (cerambycid microbiome) has also been harnessed.

3.2.2. Team

Under the terms of the research contract, the following research team has been constituted.

- Professor John Terblanche, an internationally-acclaimed entomologist from Stellenbosch University will serve as Principal Investigator in terms of components a), b) and c) of 3.2.4 (below).
- At Stellenbosch, Ms Marion Laval will be appointed as post-doctoral research associate to the project team. Ms Laval, a graduate of the University of Orléans, is currently finalising her doctoral thesis '*Invasion of the Asian longhorn beetle, Anoplophora glabripennis: Ecology, genetics and life history traits*' at her *alma mater* and will be an invaluable team member.
- At SASRI, Dr Des Conlong, Dr Malcolm Keeping and Mike Way provide the required scientific expertise and insights on behalf of the Industry, while Dr Stuart Rutherford, the SASRI Crop Protection Programme Manager and Principal Scientist (Integrated Pest and Disease Management), provides strategic oversight and the necessary systems thinking.

Additional expertise will be accessed as follows.

- The research team will be further complemented by the appointment of a SASRI-based PhD student, supervised by Dr Adam Shuttleworth of the University of KwaZulu-Natal, the bursary costs for whom are to be potentially off-set through a fellowship application to the National Research Foundation, which is in progress (component d) of 3.2.4 below); and
- a SASRI-based MSc student registered with the Forestry and Agricultural Biotechnology Institute, University of Pretoria (component e) of 3.2.4 below).

3.2.3. Objectives

The primary objectives of the research are to:

- characterise relevant biological and eco-physiological traits of *C. newmannii* to provide an understanding of the causes of the recent outbreak; and
- develop a proposal of management practices for sustainable pest control.

The host shift of *C. newmannii* reveals an ability of the insect to invade new ecosystems and highlights the pressing need to quantify the impact it could have on crops should the infestations spread.

3.2.4. Components

The research broadly comprises five component approaches.

a) Characterisation of host-plant related variations in the populations of *C. newmanii* in terms of biological traits (resistance to environmental stress such as temperature, desiccation or oxygen limitation; population phenology; population genetics).
b) Characterisation of how the species is integrated into its environment; studies which will have two different components.

- Measurement of the microclimate encountered by each life stage in their known host plants and determination of whether one of the microclimates is more amenable to the larvae than the others.
- Building food webs to determine precisely on what each life-stage feeds.

c) Characterisation of the dispersal potential of adults in field trials and laboratory studies, which will be complemented with indirect estimates of dispersal by determining the genetic structure of the populations.
d) Characterisation of the complete pheromone of the female adult and identification of additional semiochemicals (attractants and repellents).
e) Characterisation of the associated microbiome composition and isolation of potential biocidal agents.

3.2.5. Intended Outcome

The data obtained will serve as input into a mechanistic (biophysical) trait-based model that will allow further development of spatially-explicit risk maps to inform stakeholders in decision-making and prioritization of management actions for *C. newmannii*.

3.2.6. Strategic Benefit

The research will generate critical new knowledge in order to rapidly develop sustainable and effective pest control strategies for *C. newmannii*. Information on the recent niche shift and its impact on the species' biology are mandatory to address the management issues raised, and the model to be developed will help to inform management actions and pest control.

SASRI COMMUNICATION ACTION PLAN: LONGHORN BEETLE

COMMUNICATION PLAN REFERENCE NUMBER	17RD001

RESPONSIBLE SASRI SPECIALISTS

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COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede	X	Staff Colloquium for ESs	X	Grower Day	X
Extension Newsletters	X	SASTA	X	Grower Study Group	X
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Link and Ingede articles	Growers – English, isiZulu	Increase awareness of longhorn beetle biology and management options	Sept 2017	Increased stakeholder awareness and confidence in containment and research and technology development activities
Extension Newsletters	Zululand South Growers - English	Increase awareness of longhorn beetle research and containment progress through regular updates	Monthly throughout 2017, as required	
Staff Colloquium presentation	ESs	Increase awareness of longhorn beetle biology and management options, as well as research planning	July 2017	
SASTA	Specialists and participating growers	Increase awareness of longhorn beetle	August 2017	

		research and technology development	
Grower Day	Entumeni commercial, land reform and small-scale growers	Increase awareness of longhorn beetle biology and management options	To be determined by Zululand South Extension and Biosecurity services
Grower Study Groups	Entumeni commercial, land reform and small-scale growers	Increase awareness of longhorn beetle biology and management options through regular interaction with specialists	To be determined by Zululand South Extension and Biosecurity services

ELDANA - CORAGEN VS AMPLIGO
(SASRI Reference: RDE Issue 2)

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RDE Issue Description

- Confusion as to which diamide pesticide is most efficacious
- Coragen = diamide
- Ampligo = diamide + pyrethroid

Background

- Competing products, difficulties in recommending one due to pressure from product purveyors.
- Coragen and Ampligo have not been tested in the same trial.

Desired End Result

- Definitive result to say which is better when used as per label (if one is better).
- Trial the two products together

SASRI COMMUNIQUÉ: CORAGEN VS AMPLIGO

There is no evidence to suggest that any one of the recently registered chemistries, (chlorantraniliprole; chlorantraniliprole + L-cyhalothrin; and indoxacarb) is superior in efficacy against eldana than any of the others, when applied according to label instructions. All three are statistically significantly better than no action, otherwise they could not have been registered. Trials attempting to prove the superior cost efficacy of any one product would have to be conducted over several years in multiple locations, with low probability of finding statistically significant differences. It is not within SASRI's mandate to compare already registered products, as such activities might lead to perceptions that SASRI endorses particular products over others, leading to the potentially unfair competitive advantage of one commercial entity over another. Most importantly, reliance on one product/mode of action is highly undesirable considering the potential for eldana to develop resistance (to the diamide mode of action in particular). SASRI continues to promote insecticide programmes in line with the principles of the international Insecticide Resistance Action Committee (IRAC), taking into account expert knowledge of the crop and eldana risk factors. SASRI

has no vested interest in any one product, manufacturer or sale representation. Growers are advised to seek the advice of SASRI experts via, and including, SASRI Extension before commencing any chemical control programme.

SASRI COMMUNICATION ACTION PLAN: CORAGEN VS AMPLIGO

COMMUNICATION PLAN REFERENCE NUMBER	17RD02
RESPONSIBLE SASRI SPECIALISTS	
Name:	Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za)
COMMUNICATION PLAN OUTLINE	
Knowledge Exchange activities to be implemented (marked with 'X')	

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede	X	Staff Colloquium for ESs	X	Grower Day	X
Extension Newsletters		SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Link article	Growers - English	Increase awareness of SASRIs' rolere insecticides and IRAC principles	Sept 2017	Issue not re-submitted in 2018
Staff Colloquium presentation	ESs	Increase awareness of SASRIs' role re insecticides and IRAC principles	KMU to schedule	Issue not re-submitted in future

Heteronychus licas (WHITE GRUBS)

(SASRI Reference: RDE Issue 3)

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RDE Issue Description

- Serious yield reduction (< 50%) (especially in ratoons), plough-out currently the only feasible means of control.
- Nasty (unregistered) chemicals used but no other control means.

Background

Isolated outbreaks, severe in some cases (70 000 grubs / field).

Desired End Result

Effective control - register effective products (plant + ratoon) (dripper?).

SASRI COMMUNIQUÉ: *Heteronychus licas* (WHITE GRUBS)

Heteronychus licas is known to favour heavy soils, such as those occurring in valley bottoms and wetlands. The recent drought opened up many of these areas for *H. licas* colonisation and development, which caused the increased numbers found. In normal rainfall years, these habitats are not be available and hence, lower numbers of the beetles will be expected to invade sugarcane from such areas.

An indigenous entomopathogenic nematode (EPN), *Heterorhabditis bacteriophora* found in forestry plantations, in 2016 laboratory trials conducted by a PhD student at Pretoria University, caused high mortality of *H. licas* field collected larvae (85% mortality after 6 days, 93% mortality after 12 days, with a median time to mortality of 4.7 days). SASRI scientists, Drs Des Conlong and Stuart Rutherford are to meet with the project leader, Dr B. Hurley, at the 2017 Entomological Congress of Southern Africa to discuss the testing of this EPN under field conditions.

Local isolates of *Beauveria brongniartii* (C17 for adults, and HHWG1 for larvae) which are effective against white grub adults and larvae of the species *Schyzonycha affinis*, *Pegylis sommeri*, *Temnorhynchus clypeatus*, *Heteronychus tristis* and *Schyzonycha neglecta*, were not as effective against larvae of *H. licas*. However, C17 did cause 90% mortality of *H. licas* adults exposed in laboratory trials to this entomopathogenic fungus (EPF). This now needs to be tested in adult traps, but formulation of the EPF is problematic. This will be discussed with a company in South Africa specialising in the production of entomopathogens, especially for the Citrus industry, at the 2017 Entomological Congress of Southern Africa. Should they be able to mass produce a stable product for us, then the trap development work can be progressed through a new research project.

It is well known that *H. licas* adults are attracted to lights, and in a sugarcane estate in Zambia, it was clearly evident that they are attracted to certain light sources above others. The use of LED lights of different wavelengths will be tested in an MSc project being completed at the estate, in order to maximise trap attraction to the adults. Once these are established, they can also be tested under South African conditions. It is advised that sugarcane growing near bright light sources (e.g. around farm buildings) be > 5 months of age in early summer, given the following.

The adult beetles fly during early summer and are particularly attracted to young cane (< 5 months old) where they feed on the meristem (See September 2015 Link article). It is important to maximise harvest age on the coast in order to minimise the area of cane < 5 months old at this time. This implies that effective eldana IPM must also be implemented.

Basic ploughing and harrowing techniques, as outlined in the SASTA papers of Conlong and Mugalula (2003), and Mugalula *et al*. (2006), to destroy larvae of a white grub species infesting sugarcane in Uganda has been successfully used in a badly infested *H. licas* sugarcane field on heavy soil in the Tugela area, to destroy the population of larvae harboured there, and should also be considered a control option.

No insecticides are registered for *H. licas* control in sugarcane. However, cane planted during early summer should be protected from thrips by application of imidacloprid to the furrow. It is likely that there will be collateral protection against *H. licas* infestation for up to 6 weeks post application.

A number of candidate insecticides are being considered for emergency registration against the quarantined Long Horn Beetle pest in the Entumeni area. Those effectively targeting the below ground larvae of this beetle could be considered for registration against *H. licas*.

SASRI COMMUNICATION ACTION PLAN: *Heteronychus licas* (WHITE GRUBS)

COMMUNICATION PLAN REFERENCE NUMBER	17RD03
RESPONSIBLE SASRI SPECIALISTS	
Name:	• Dr Des Conlong (Senior Scientist: Entomology) (Des.Conlong@sugar.org.za) • Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede	X	Staff Colloquium for ESs		Grower Day	
Extension Newsletters		SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Link/Ingede article	All cane growers	Inform growers of biological controls, especially entomopathogenic fungi and nematodes in the pipeline, their mode of action and availability. Increasing age at harvest, the use of plough-outs and insecticides.	September issue of link/ingede	Requests from growers to provide study sites, use the products

FALL ARMY WORM
(SASRI Reference: RDE Issue 5)

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RDE Issue Description

We do not have control measures should it infest cane.

Background

No infestation in cane yet in SA but it's here (maize, etc).

Desired End Result

Incursion + control plan - communique.

SASRI COMMUNIQUÉ: Fall Army Worm

Even though sugarcane appears on the Centre for Agriculture and Biosciences International (CABI) list of plants attacked by the fall army worm (FAW), sugarcane entomologists in the USA, part of the home range of FAW, find that even though it attacks maize, pastures and other crops, it is not a major pest of sugarcane. Similarly in Brazil, FAW is a major pest in maize, but not in sugarcane. In addition, SASRI scientists are in regular contact with agronomists and agricultural managers of African sugarcane estates in all countries where FAW has been found. In many cases, as in South Africa, FAW has been found infesting maize, sweetcorn, sorghum, wheat etc in close proximity to sugarcane, but has not been recorded as feeding on the close by sugarcane.

Nevertheless, growers are advised to monitor sugarcane growing in proximity to maize. Small-scale growers should be particularly vigilant if non-Bt maize is being grown near to their sugarcane. As a precautionary measure, three insecticides (Coragen, Steward and AVI-Merkaptothion) have received emergency registration against FAW in sugarcane. Several additional products are registered for use in maize.

Correct identification of FAW is essential. An identification guide developed by Dr D. Visser of the Vegetable and Ornamental Plant Institute (VOPI) of the ARC, which shows how FAW differs from other commonly occurring Lepidoptera occupying the same niche as FAW in South Africa is available. SASRI will need to add the trash caterpillars found in sugarcane to this document to make it more complete. In the cooler regions of the South African sugarcane belt, where maize is grown, FAW will be entering diapause at the time maize is harvested, so will not be a major threat when the maize is gone.

SASRI COMMUNICATION ACTION PLAN: FALL ARMY WORM

COMMUNICATION PLAN REFERENCE NUMBER	17RD05
RESPONSIBLE SASRI SPECIALISTS	
Name:	• Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za) • Dr Des Conlong (Senior Scientist: Entomology) (Des.Conlong@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	
Extension Newsletters		SASTA	X	Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)	X				
Contact producer of FAW identification powerpoint to include trash caterpillar and similar sugarcane moth species to the identification key, for use in sugarcane.					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
SASTA paper	All growers	Inform growers about FAW and its differences to African army worm, Control options available, and incursion plan to prevent its invasion into sugarcane	SASTA 2018	No incursions of FAW into SA sugarcane

RD&E REPORT-BACK TO GROWERS

(SASRI Reference: Issue 25)

Click here to return to index

RDE Issue Description

RD&E report-back to growers not as effective as it could be.

Desired End Result

Interrogate and formalize "better" methods of feeding back results from RD&E meetings to growers.

SASRI COMMUNIQUÉ: RD&E REPORT-BACK TO GROWERS

The intention of the communiqués is to provide feedback to the relevant RDE Committees on the outcomes of the deliberations of SASRI technical experts on the submitted issues, more specifically, whether new projects are to be implemented by SASRI to investigate issues for which relevant information is unavailable. The communiqués are thus intended to serve as a resource from which Extension Specialists are able to extract relevant information for communication to their growers, whether it be via grower days, newsletters or grower study groups. In some instances, Extension Specialists schedule formal feedback on issues during RDE Committee meetings and, where these occur, they have proven successful.

Considerable information exists on many of the issues raised via the RDE process and, as a result, the communiqués have evolved in many instances into comprehensive treatises on particular subjects. Once again, the information within these communiqués is intended to serve as a resource from which Extension Specialists may extract information for their regional communication strategies. Of note is that the Knowledge Management Unit also uses these communiqués as a source of information for articles in the *The Link* and *Ingede* magazines. The inclusion of the 'SASRI COMMUNICATION ACTION PLAN' for each issue in the 2017 edition of the RDE Communiqués booklet is intended to make this planning more explicit.

However, given the issue 'RD&E REPORT-BACK TO GROWERS' raised by the Amatikulu RDE Committee it appears that this role of the communiqués booklet is either unclear or unsuitable to the needs of the Committee. As a result, the issue will be discussed at the 2017 SASRI Staff Colloquium with a view to either: (a) finding consensus on the intended role of the RDE Communiqués booklet; or (b) developing a plan that will maximise the value of the communiqués by improving feedback processes directly to growers.

SASRI COMMUNICATION ACTION PLAN: RD&E REPORT-BACK TO GROWERS

COMMUNICATION PLAN REFERENCE NUMBER	17RD25
RESPONSIBLE SASRI SPECIALISTS	
Name:	• Mrs Michelle Binedell (Knowledge Manager) (Michelle.Binedell@sugar.org.za) • Rowan Stranack (Extension and Biosecurity Manager) (Rowan.Stranack@sugar.org.za) • Gary Lagerwall (Extension Specialist) (Gary.Lagerwall@siagr.org.za) • Dr Derek Watt (Research Manager) (Derek.Watt@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs	X	Grower Day	
Extension Newsletters		SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Discussion at 2017 SASRI Staff Colloquium	Extension Specialists and Researchers	a) to find consensus on the intended role of the RDE Communiqués booklet; or (b) to develop a plan to maximise the value of the communiqués by improving feedback processes directly to growers.	July 2017	Consensus achieved or new communication plan developed.

LUCERNE AS A GREEN MANURE

(SASRI Reference: Issue 26)

Click here to return to index

RDE Issue Description

Lucerne is promising as a GrM-potential returns from baling.

Desired End Result

Guidelines for use of Lucerne, potential risks and benefits, where it can be used, etc.

SASRI COMMUNIQUÉ: LUCERNE AS A GREEN MANURE

1. SUMMARY

1.1. Lucerne Production Conditions

- Irrigation is typically required.
- Acid soils are unsuitable.
- Humid environments are unfavourable due to fungal diseases.

1.2. Lucerne Husbandry

- Good seedbed preparation and stringent weed control programmes are essential.
- Water availability, ambient temperature and cultivar choice greatly influence crop survival and productivity.
- Cutting schedules must be guided by active growth-stage monitoring.
- Hay production must be guided by precise quality monitoring.

2. RESOURCES AVAILABLE

2.1. National Lucerne Trust

www.lusern.org/

2.2. Seeds and production guides

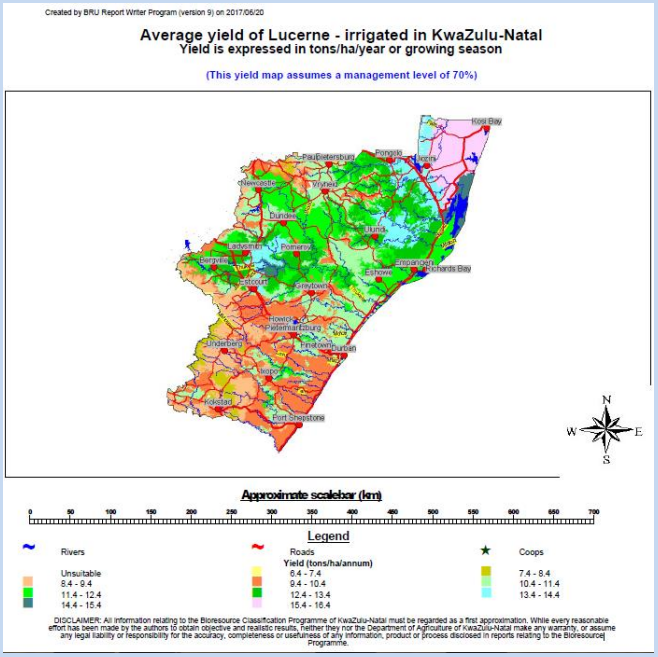
Advance seeds: http://www.advanceseed.com/site/page?view=lucerne
Agricol: http://www.agricol.co.za/agricol-products/lucerne/
Klein Karoo Seeds: http://www.seedmarketing.co.za/index.php?p=3
Pannar seeds: www.pannar.com
Hygrotech Seeds: www.hygrotech.co.za
Seed inoculation is typically required.

2.3. Cedara

The grassland science section at Cedara have/are conducting various trials on Lucerne production in KwaZulu-Natal and are able to provide specialist advice as required. The contact person is Mrs Derran Nash on 033 3559256;

The Cedara trials in their 3rd year of production. The crop typically requires irrigation. Lucerne is not tolerant of acid soils and cannot grow in humid environments due to fungal diseases. Cedara during the last 3 years (drought/dry conditions) are achieving 12-14 t/ha under irrigation. Trials are ongoing and data can be made available on request.

The Cedara BRU programme estimates typical yields of Lucerne under irrigated conditions throughout KwaZulu-Natal.



A presentation on lucerne production and associated economics is available. This was developed by Ntokozo Mdlalose (Ag econonmist) Contact details:

Ntokozo Mdlalose (UThungulu Agricultural Advisor) 076 935 1695; 035 473 0429 ntokozo.mdlalose@kzndae.gov.za

The presentation is available at:
http://www.kzndard.gov.za/images/Documents/researchandtechnologydevelopment/publications/technicalinformation/Lucerne%20-%20Production%20and%20Marketing/Lucerne%20Production%20and%20Marketing.pptx

2.4. Grootfontein Agricultural Development Institute

http://gadi.agric.za/articles/Agric/lucerne.php

2.5. The National Lucerne Trust

All information and photographs are excerpts from the National Lucerne Trust (www.lusern.org). Accessed: 15/05/2017.

3. OVERVIEW OF LUCERNE PRODUCTION

3.1. Tillage Before Planting

Preparation of lands for the planting of lucerne should preferably be started during the spring before the expected autumn planting date. In the case of a cash crop being fitted in beforehand, at least two months must be allowed after harvesting it, before the lucerne is planted, in order to allow complete breakdown of the crop residue. Lands which have been in use for several seasons must be deep ploughed to break up hardpan areas. The most important considerations when ploughing are to improve root penetration, drainage and aeration of the soil and to reduce soil compaction. Furthermore, it helps to control weeds, breaks down and works into the soil any harvest residue, and breaks up large clods. Fertilizer can be added at the same time. Early preparation of lands is recommended if there is a problem with weeds. It is necessary to work the lands in the spring and then allow them to lie fallow for the summer, then to work them again in late summer and/or before planting in the autumn.

The advantages of soil tillage are temporary, and a heavy rainstorm can undo them. If the pH of the soil is correct, then a fallow period (spray instead with herbicide) may be considered as an alternative. This may keep input costs under control. Exposure of the soil stimulates the activity of micro-organisms which use organic material as a food source. This can result in a poor carbon-oxygen ratio in the soil, which leads to soil compaction. Another possible disadvantage of soil preparation is the increased costs. There is the cost of petrol / diesel, as well as maintenance costs due to wear-and-tear on implements. Moreover, as ploughing leads to structural damage of the soil, so more powerful tractors must be used.

More failures of lucerne establishment can be attributed to poor seedbed preparation, than to any other one factor. Weed control should have already been begun the year before by using a disc or harrow. Perennial weeds should be eradicated before beginning with planting. If the seedbed is rolled after liming, weed seed will germinate well, and this strategy can be used to combat weeds. If lime is necessary, it should be well ploughed in three to four months before sowing, so that the lime can react with the soil and correct the pH. If an autumn planting is planned, soil preparation should begin no later than January. Soil moisture should be conserved, especially on dryland plantings. NB: the more the soil is tilled, the more moisture it loses.

Precise methods of planting will vary with the farm, but the following broad guidelines should be followed:

- Use deep ploughing to loosen the soil and combat perennial weeds.
- This is the case when harvest residue makes tillage difficult.
- P, K, Zn and B should be disked in just before planting.
- A cultivator or harrow should be used for the final preparation of the seedbed.
- Correct tillage should ensure a fine-textured and weed-free seedbed.
- The seedbed must be fine-textured and grainy, not powdery, to ensure good contact between the seed and the soil.
- Compact or roll the land to ensure a firm seedbed.
- A Cambridge roller can be used before seeding, while the soil is still dry, and after seeding, before the land is irrigated.
- Before planting, the land should ideally be even, without clods and firm-textured. A normal-sized person walking on the land should not sink in deeper than the tops of his soles.
- The ideal seedbed should be fine, with soil clods not more than 10 mm in diameter.
- The seed should be preferably be planted with an implement that will cover the seed shallowly and compact the covering soil, to make sure of good contact between seed and soil, and also to conserve soil moisture

3.2. The Process

3.2.1. Land preparation

3.2.1.1. Ploughs

- **Ripper**: Breaking up of compaction layers in the soil profile.

- **Mouldboard Plough:** Mixes organic material, fertiliser and weed seed deep into the soil.

- **Reversible Plough:** Facilitates above-mentioned cultivation. The action is the same.

3.2.1.2. Harrows

- **Disc Harrow:** Weed control and breaking up of clods.

- **Cultivator:** Breaking up of compaction layer at soil surface, and control of weeds.

- **Spike-tooth Harrow:** Final seedbed preparation.

- **Harrow:** Final seedbed preparation.

3.2.1.3. Spreaders

- **Lime Spreader:Spreads lime evenly on the soil surface.**

- **Fertiliser Spreader:** Facilitates even broadcasting of fertliser, before as well as after planting.

- **Manure Spreader:** Broadcasting of large quantities of organic material.

3.2.2. Planting methods

Broadcast sowing by hand:

With this method it is very important to cover the seed as soon as possible with soil. A chain can be used for this or a upside down harrow with the front raised 5 cm above the soil surface. A roller must also be used to compact the soil. To obtain an even stand, it is extremely important to spread the seed evenly over the soil surface.

Broadcast sowing with an implement:

The procedure after sowing is the same as for hand-sowing.

In rows with a planter:

If a planter is used, care must be taken that the seed is evenly deposited. A vegetable planter usually works well.

3.2.2.1. Planters

- **Wheat Planter**: Ensures all seed is sown at a given depth.

- **Vegetable Planter:** Alternative method

If a pressure wheel is mounted on the planter it is not necessary to roll the land; otherwise this must be done after planting. Wheat planters with a pressure wheel may also be used successfully – care must be taken, though, that the seed is not planted deeper than 15 mm. Advantages of row-planting a.o.t. broadcast sowing:

- Better utilisation of soil moisture
- Less trampling and damage to crowns if used for grazing
- Secondary working of the land for, e.g. weed control, and penetration of water, is feasible.
- Quicker regrowth at start of growing season
- Longer lifespan of the lucerne
- Better utilisation of fertiliser applied in rows
- Lower seed requirement/ha
- Cost-effective

3.2.2.2. Rollers

- **Cambridge Roller:** Ensures good contact between seed and soil.

3.2.3. Harvesting

Lucerne hay is cut with a rotary mower or sickle bar mower, usually at the early flowering stage.

3.2.3.1. Mowers

- **Cutter Bar Mower:** Cuts lucerne at a given height. Problems may be experienced if the lucerne has lodged.

- **Rotary Mower:** A vacuum is created which lifts the lucerne and then cuts it evenly. Very little wastage.

- **Crimper:** Bruises the lucerne stalks and so shortens the drying time.

3.2.3.2. Rakes

- **Hay Rake:** Lucerne is raked into windrows, to speed up drying and at the same time retain a desirable green colour.

- **Tedder:** By turning the lucerne over it ensures that wet lucerne is quickly dried.

The cut material is left on the lands for 3-4 hours to wilt, after which it is raked into windrows to dry. This limits the processes of respiration and the growth of fungus. After 2-4 days the lucerne can be baled, and it must be removed from the lands as soon as possible after this.

By using a crimper, water loss is speeded up, and risks reduced. It also reduces leaf drop.

Water availability and temperature, as well as the dormancy of the cultivar, greatly influence the productivity and survival of lucerne, as does the choice of a cutting schedule suitable for the region. The potential number of cuts under irrigation can vary from 2-12 per season, depending on dormancy. Cutting schedules are based on the growth stage, fixed cutting intervals, or development of regrowth on the crown. These different criteria lead to differences in yield and quality but, when cutting is determined by the growth stage, the plant itself is used as the indicator and in general a more constant yield and quality is obtained within each cultivar and over several seasons and in different localities.

Producers often use a combination of factors in scheduling hay making.
The yield of stems increases linearly between the early vegetative and the late flowering stages, while leaf yields increase until the early flowering period. The quantity of stems and leaves is equal at early flowering stage, but by late flowering 60% of the total yield consists of stems and only 40% of leaves.

3.2.3.3. Balers

- **Small Conventional Baler (rectangular baler):** Facilitates handling of the hay.

- **Round Baler:** Ideal where the farm is mechanised and where labour problems are experienced.

3.2.3.4. Wrappers

- **Wrappers:** For making high-quality silage: facilitate preservation and reduce losses.

The utilisation of fresh chopped lucerne which has been harvested with a forage harvester is very labour intensive and is rarely used. It is, however, used in feeding-pens and in this way the loss of leaves, and hence of quality, is kept to a minimum.

4. QUALITY

It is generally known that the quality of lucerne hay drops as the plant matures. This drop is largely due to the increasing stem:leaf ratio and to an increase in the fibre content of the stems. Protection of the leaves during hay making is necessary, as leaves contain more nutrition than stems. During the early flowering stage, the leaves contain a greater concentration of digestible nutrients, proteins, fats, potassium, fibre, total non-structural carbohydrates, P, Ca, Mg, Al, Fe, Sr, B, Cu, Zn and Mn, than the stems. Stems have more sugars, fibre, K and Cl. The digestibility and protein concentration of stems drops more rapidly with maturation than that of the leaves. The highest concentration of nutrients is usually obtained when lucerne is harvested at an immature stage, with the highest concentration per leaf area at 10% flowering. In moist areas, the amount of digestible nutrients, protein and minerals, drops after early flowering because of leaf loss due to shade, age and diseases. In drier areas, where leaf diseases are fewer, the maximum amount of nutrients is still available up till 50% flowering. The use of desiccants to dry hay more quickly, is a promising new method. However, it will only become economical when hay is priced according to quality. Losses due to overheating, mould and breakdown of carbohydrates in lucerne hay that has been baled too damp (more than 20% moisture content) can be reduced by reducing plant and microbial metabolism. NH or organic acids are used to gain control of these and to preserve the hay. Unless these losses are controlled, they will begin at 22% moisture and by 35-45% moisture one can expect total loss. Hay with 18% moisture can still be protected by adding small quantities of propionic acid.

4.1. Quality of Lucerne

The effective utilisation of lucerne depends on the purpose for which it is grown, the method of preservation and the quality of the product. To understand quality, it is necessary that certain quality terms be understood. Acid detergent fibre (ADF) represents the percentage of indigestible or slowly-digestible material in feeds. This fraction includes lignin, pectin, cellulose and ash. The lower the ADF, the more digestible the feed and the nearer to the ideal. Neutral

detergent fibre (NDF) represents the percentage of cell walls or fibre in the feed. This includes the ADF (except for the pectin) and hemicellulose. NDF is inversely related to an animal's intake potential. Thus a lower NDF percentage leads to higher intake by the animal. A low percentage NDF is thus desirable as long as a minimum fibre level is present in the feed. Relative feed value (RFV) is an index that is used to compare feeds with each other, with regard to their potential intake of digestible dry material. This index ranks forages against the standard of full-flower lucerne dry material, which is assumed to have 41% ADF and 53% NDF.

The RFV is calculated as follows:

Calculate the digestible dry matter of feed (% dry material)
Digestibility of dry material (DDM) = 88.9 - (0.779 x ADF)
Calculate the dry material intake of forage (% of body weight)
Dry material intake (DMI) = 120 ÷ NDF
Calculate the relative feed value
Relative feed value = (DDM x DMI) ÷ 1.29

Crude protein (CP) is a mixture of protein and non-proteinaceous nitrogen. It is calculated by first determining the total nitrogen and then multiplying this by 6.25. CP content indicates the capacity of the feed to provide for the animal's needs.

In general, moderately high CP is desirable, in that it lowers the need for protein supplements. Lucerne that is cut early and has many leaves is usually high in CP.

4.2. Quality Evaluation of Lucerne Hay

Presently (2001) there was no standard method in South Africa for determining the quality of lucerne hay. Most buyers used a subjective grading system where hay was judged according to colour and the relative amount of leaves. As indicated by research, this is not always a good evaluation of the relative feed value of the hay, and there is need to make use of a more scientifically based grading system. Until (2001) the University of the Free State is engaged in investigations into such a system and the ARC-Range and Forage Institute already uses an NIR-based quality assessment. The ARC-RFI's analyses use an internationally-recognised formula to indicate the RFV (Relative Feed Value) of lucerne hay, which compares the energy content of the hay with that of lucerne in full bloom, which is reckoned to have a value of 100%. It is necessary that a standardised system for quality assessment be developed or adapted so that lucerne hay can be priced uniformly.

4.3. Carbohydrate reserves

The energy necessary for regrowth of lucerne after cutting is stored in the form of non-structural carbohydrates in the roots and crown or in the remaining leaves and stems. There is generally a cyclic pattern in the storage and use of non-structural carbohydrate reserves in the roots. These are used during the early stages of regrowth after winter rest or cutting, then build up again in roots and crowns when the plant is mature and in full bloom, but generally reach a maximum at early flowering stage. Carbohydrates accumulate in autumn in those cultivars which undergo dormancy. This is a reaction to the reduction in daylength and temperature. These stored non-structural carbohydrates are the main source of energy during winter. Frequent harvesting of immature lucerne (vegetative or bud stage) or harvesting in the autumn, prevents sufficient vegetative regrowth to replace the reserves of non-structural carbohydrates and leads to their depletion in the roots. This leads to a decline of the stand and loss of productivity. It is a good practice to allow the last growth of the autumn to develop to full flowering to restore reserves, and only cut again in the spring. High levels of carbohydrate allow rapid recovery after harvesting or after winter. Regrowth after the second and later cuts may have already begun when the lucerne begins flowering. If harvesting is then delayed, the growing points needed to produce the next harvest are cut off, and the regrowth retarded.

5. MANAGEMENT

Yield, quality and persistence of the stand are important factors to be taken into account in the development of a profitable harvest-management program. Increasing appreciation of the value of high-quality lucerne in terms of potential savings in energy and protein supplementation, have resulted in reconsideration of harvest-strategies.

6. CUTTING SCHEDULE

The choice of harvesting schedule begins with the decision as to what quality feed is required. Producers who want only high quality lucerne will prefer a shorter stand and lower yield. The number of cuts, cutting date, stage of maturity, interval between cuts and cutting height are factors to be taken into account in a harvest schedule. The relation between the stage of maturity and yield, quality and sustainability makes it clear why the growth stage is often used to decide when to cut.

7. REFERENCES

http://www.lusern.org/

SASRI COMMUNICATION ACTION PLAN: LUCERNE AS A GREEN MANURE

COMMUNICATION PLAN REFERENCE NUMBER						17RD26	
RESPONSIBLE SASRI SPECIALISTS							
Name:	Dr Peter Tweddle (Agricultural Engineer) (Peter.Tweddle@sugar.org.za)						
COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations		Discussions/Workshops			
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day			
Extension Newsletters		SASTA		Grower Study Group			
Information Sheet update		Other (specifed below)		Short Course			
Information Sheet new				Other (specified below)	X		
Other (specified below)				Discussion amongst SASRI Extension Specialist, SASRI Agricultural Engineer and interested grower(s).			
Objectives and desired dates of Knowledge Exchange activities							
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*			
Discussion	Amatikulu grower(s) interested in growing lucerne as a green manure and cash grop.	To share and discuss published materials relating to the cultivation of lucerne.	To be decided and arranged by Extension Specialist in consultation with grower(s).	(a) Statement by grower(s) on useful of information provided; (b) Recognition by grower(s) of the delineation of SASRI involvement in lucerne cultivation.			

THRIPS
(SASRI Reference: Issues 4 and 8)

Click here to return to index

RDE Issue Description

- Bandit used at planting - controls for a couple of numbers.
- Alice = aerial application - only ± 3 weeks of control (re-infestation).
- Current scouting finds adults, not nymphs - too late? --> different from chem rep's advice.
- (How much yield loss from thrips??).

Background

Recurring issue - still no clarity on yield loss %.

Desired End Result

- Effective, longer-term thrips control.
- Determine threshold levels for spraying.

SASRI COMMUNIQUÉ: THRIPS

SASRI advocates the use of an integrated pest management (IPM) approach to managing sugarcane thrips, rather than relying on insecticides alone. At present, this includes use of more 'resistant' varieties (i.e. varieties that show lower levels of leaf damage from thrips feeding), planting or ratooning cane several months before or after the peak in thrips population numbers over summer, and the use of insecticides when necessary. A recently completed project has generated thrips leaf damage categories for all the commercial varieties and these will be provided to growers and Extension Specialists in an updated Information Sheet, along with details on the use of other management measures for thrips.

In the interim, where growers are concerned about the impact of thrips they are encouraged to use one or preferably a combination of the above management tactics. Varieties in the more 'susceptible' categories (higher leaf damage) could be planted or ratooned in late summer (February/March) or autumn, or in early August, to ensure that young crops (1-3 months) are not present over the thrips peak from November to January. Young plant crops of susceptible varieties are especially vulnerable during this period.

Where young crops will be growing over summer, an insecticide (imidacloprid, at planting in the furrow, or acetamiprid on ratoon crop canopies) can be applied at recommended rates to protect the crop. This is especially relevant to the more susceptible varieties. Varieties that suffer less leaf damage can also be planted if the crop will be in the early growth stages over summer. It is extremely important after applying imidacloprid in the furrow that the latter is closed immediately to prevent the very rapid (i.e. within minutes) breakdown of the active ingredient by ultraviolet light. If this is not done, the insecticide will lose its effectiveness and its application will be wasted. Acetamiprid (registered for ratoon crops) is much more UV tolerant and will also be most effective on a young crop due to the more targeted spray that can applied to the leaf spindle and youngest leaves where the thrips reside. New, longer-lasting chemical formulations for thrips control on both plant and ratoon crops are awaiting registration or are approaching submission for registration.

Yield increases attributable to insecticide application of between 18.0 and 26.8% in tons cane/ha, and between 16.2 and 24.0% in tons sucrose/ha have been determined in rainfed field trials. However, due to the plant physiological growth promoting properties of imidacloprid, in the absence of pests, the actual impact of thrips is probably overestimated. The impact of thrips alone cannot be accurately quantified due to the difficulty of excluding thrips from controls plots in field trials without using a systemic growth promoting insecticide.

SASRI COMMUNICATION ACTION PLAN: THRIPS

COMMUNICATION PLAN REFERENCE NUMBER						17RD08	
RESPONSIBLE SASRI SPECIALISTS							
Name:	Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za)						
COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations		Discussions/Workshops			
The Link and/or Ingede	X	Staff Colloquium for ESs		Grower Day			
Extension Newsletters	X	SASTA		Grower Study Group	X		
Information Sheet update	X	Other (specifed below)		Short Course			
Information Sheet new				Other (specified below)			
Other (specified below)							
Objectives and desired dates of Knowledge Exchange activities							
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*			
Link article	Growers - English	Update on thrips, variety differences, new chemicals if registered, advice on Bandit.	Sept 2017	Feedback from ESs on management tactics, new chemistries.			
Extension newsletter	Growers - English	As for Link article.	Sept 2017				
Info sheet	Growers - English	Update, including new info on varieties & chemicals.	2018 Info pack				

FELIXTON RDE COMMITTEE

RIPENER AND PESTICIDE MIXES
(SASRI Reference: Issue 6)

Click here to return to index

RDE Issue Description

Can we mix ripener + Ampl / Coragen in one spray? May reduce applic costs

Background

(Researchers suggest that this is not a good idea)... but? maybe merit in certain instances.

Desired End Result

Advice as to whether this works or not - can the chemicals be mixed? Are they compatible?

SASRI COMMUNIQUÉ: RIPENER AND PESTICIDE MIXES

Currently it is off-label (illegal) to mix any insecticides with ripeners. Chemical ripening of Eldana-infested fields (above 5e/100) is strongly discouraged, due to the fact that Eldana infestation could be aggravated in the process.

However, there are many cases where Eldana control strategies are implemented proactively by growers, which raises the question of whether a chemical ripener could be added to the final insecticide spray around 10 - 12 weeks before harvest. This will lead to savings in aerial application costs, which could be in the region of R500 - R600/ha.

SASRI have raised this possibility with chemical companies. Syngenta are currently planning to commence Ampligo tank mix with Moddus registration trials during 2017/2018. Their product biologists in Brazil have advised that there will be no problem with mixing, compatibility and efficacy of the two products. Syngenta will support the practice for both their products, Ampligo and Moddus.

However, until the labels of both products are amended it remains illegal to mix these chemicals.

SASRI COMMUNICATION ACTION PLAN: RIPENER AND PESTICIDE MIXES

COMMUNICATION PLAN REFERENCE NUMBER						17RD06	
RESPONSIBLE SASRI SPECIALISTS							
Name:	Dr Riekert van Heerden (Senior Scientist: Sugarcane Physiology) (Riekert.vanHeerden@sugar.org.za)						
COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations		Discussions/Workshops			
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	X		
Extension Newsletters	X	SASTA		Grower Study Group			
Information Sheet update		Other (specifed below)		Short Course			
Information Sheet new				Other (specified below)			
Other (specified below)							

Objectives and desired dates of Knowledge Exchange activities				
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Extension Newsletters	Growers and Millers (English).	To inform growers in Felixton (and other) regions about the plans of Syngenta to register an Ampligo - Moddus tank mixture.	As and when deemed appropriate by ESs.	Positive feedback obtained by ESs from stakeholders.
Grower days	Growers and Millers (English and Afrikaans).	Item to be included in all chemical ripener grower day presentations: To inform growers in Felixton (and other) regions about the plans of Syngenta to register an Ampligo - Moddus tank mixture.	Continious during 2018	Positive feedback obtained from stakeholders at grower days.

PESTICIDES
(SASRI Reference: Issue 7)

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RDE Issue Description

Both Coragen and Ampligo contain diamide but in varying quantities/concentrations, with the Ampligo containing a pyrethroid. There appears to be a lot of confusion as to which of these products would render the most effective control of Eldana. SASRI has not yet trialled both products within the same trial and until this comparison is done, we as extension agents have difficulty in promoting one or the other.

SASRI COMMUNIQUÉ: PESTICIDES

There is no evidence to suggest that any one of the recently registered chemistries, (chlorantraniliprole; chlorantraniliprole + L-cyhalothrin; and indoxacarb) is superior in efficacy against eldana than any of the others, when applied according to label instructions. All three are statistically significantly better than no action, otherwise they could not have been registered. Trials attempting to prove the superior cost efficacy of any one product would have to be conducted over several years in multiple locations, with low probability of finding statistically significant differences. It is not within SASRI's mandate to compare already registered products, as such activities might lead to perceptions that SASRI endorses particular products over others, leading to the potentially unfair competitive advantage of one commercial entity over another. Most importantly, reliance on one product/mode of action is highly undesirable considering the potential for eldana to develop resistance (to the diamide mode of action in particular). SASRI continues to promote insecticide programmes in line with the principles of the international Insecticide Resistance Action Committee (IRAC), taking into account expert knowledge of the crop and eldana risk factors. SASRI has no vested interest in any one product, manufacturer or sale representation. Growers are advised to seek the advice of SASRI experts via, and including, SASRI Extension before commencing any chemical control programme.

SASRI COMMUNICATION ACTION PLAN: PESTICIDES

COMMUNICATION PLAN REFERENCE NUMBER					17RD07		
RESPONSIBLE SASRI SPECIALISTS							
Name:	Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za)						
COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations			Discussions/Workshops		
The Link and/or Ingede	X	Staff Colloquium for ESs	X		Grower Day		
Extension Newsletters		SASTA			Grower Study Group		
Information Sheet update		Other (specifed below)			Short Course		
Information Sheet new					Other (specified below)		
Other (specified below)							

Objectives and desired dates of Knowledge Exchange activities				
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Link article	Growers - English	Increase awareness of SASRIs' rolere insecticides and IRAC principles	Sept 2017	Issue not re-submitted in 2018
Staff Colloquium presentation	ESs	Increase awareness of SASRIs' role re insecticides and IRAC principles	KMU to schedule	Issue not re-submitted in future

DARNALL, GLEDHOW, MAIDSTONE RDE COMMITTEE

YELLOW SUGARCANE APHID
(SASRI Reference: Issue 13)

Click here to return to index

RDE Issue Description

Affecting many growers.

Background

- How to stop spread from small patch to rest of field / farm.
- Cane dying.
- Losing yield.

Desired End Result

- Timing of application.
- Early identification of peak periods e.g. modeling.

SASRI COMMUNIQUÉ: YELLOW SUGARCANE APHID

SASRI strongly advocates the use of an IPM approach to managing yellow sugarcane aphid (YSA). Early scouting for YSA, looking for the presence of aphids on the underside of (usually lower) green leaves is essential if infestations are to be treated before they cause significant damage. Looking only for symptoms of YSA leaf damage (i.e. yellowing, reddening and dying of leaves) is not sufficient, as aphid numbers build up rapidly before symptoms become clearly visible. Therefore, by the time symptoms are obvious the damage has been done and the aphids may even have disappeared or moved on to other fields. Growers should firstly focus scouting on areas of stressed cane, which may be caused by water stress or soil factors such as high acidity and poor root growth. YSA will be attracted to stressed cane and measures can be taken to determine why the cane is stressed (e.g. leaf samples to determine if there is nutrient stress or soil samples to test for aluminium toxicity or presence of pathogenic nematodes) and to treat accordingly. Varieties that are susceptible to rust (e.g. N42) will also become stressed and may attract aphids, therefore presence of disease symptoms should also be scouted for. Such measures will treat the cause of the stress and assist in reducing the risk of YSA infestations, as well as improving cane growth. Treating with insecticides under such circumstances is wasteful and ineffective, and will impact negatively on the natural enemies (i.e. predators such as ladybird beetles) of YSA. Insecticides should therefore only be used where absolutely necessary.

A method for scouting for YSA has been developed in Colombia for making decisions on controlling the pest in that country and should be used in South African sugarcane for determining the need for and timing of insecticide application. The method will be provided to growers and Extension Specialists in an updated Information Sheet, along with details on the use of other management measures for YSA, as well as via The Link. A new method being investigated by the University of Stellenbosch (Centre for Invasion Biology) could ultimately be used to predict YSA population numbers in relation to temperature based on work done on YSA in Zambia.

When insecticides are applied, imidacloprid should be used at planting and acetamiprid on ratoon cane at the rates provided on the label. When applying imidacloprid in the furrow it is extremely important that the furrow is closed immediately after application to prevent the very rapid (i.e. within minutes) breakdown of the active ingredient by ultraviolet light. If this is not done, the insecticide will lose its effectiveness and its application will be wasted. Acetamiprid (registered for ratoon crops) is much more UV tolerant and will also be most effective on a young crop due to the more targeted spray that can applied full cover to all green leaves. A combination product (L-cyhalothrin + chlorantraniliprole) is also registered for the knock-down effect of the pyrethroid

component. New, longer-lasting chemical formulations for YSA control on both plant and ratoon crops are awaiting registration or are approaching submission for registration. Early scouting and YSA detection can be used to treat patchy infestations where they start and prevent the aphids from spreading to neighbouring rows or fields, thereby avoiding costly and harmful blanket spraying of entire fields. New chemicals for use against YSA are being tested at SASRI as they become available.

A recently completed project has generated YSA leaf damage categories for all commercial varieties, which will allow growers to choose more 'resistant' varieties (i.e. varieties that suffer lower levels of leaf damage) where they are concerned about damaging infestations and wish to include this as an IPM tactic. These YSA damage categories will be provided in the Information Sheet and The Link article mentioned above.
In summary, growers are strongly encouraged to adopt the above IPM approach in managing YSA, with scouting being essential to early detection and control.

SASRI COMMUNICATION ACTION PLAN: YELLOW SUGARCANE APHID

COMMUNICATION PLAN REFERENCE NUMBER	17RD13
RESPONSIBLE SASRI SPECIALISTS	
Name:	• Dr Malcolm Keeping (Senior Scientist: Entomology) (Malcolm.Keeping@sugar.org.za) • Dr Des Conlong (Senior Scientist: Entomology) (Des.Conlong@sugar.org.za) • Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za) • Sharon McFarlane ((Senior Scientist: Plant Pathology) (Sharon.McFarlane@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede	X	Staff Colloquium for ESs		Grower Day	
Extension Newsletters	X	SASTA		Grower Study Group	X
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new	X			Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
The Link	Growers - English	Update on YSA, including scouting method	Sept 2017	ES to report on progress and practical implications and implementation of recommended management strategy – June 2018
Extension newsletter	Growers - English	Highlight importance of scouting as part of management strategy	Sept 2017	
Info sheet	Growers - English	Overview of YSA, variety information and pest management	2018 Info Pack	

WHITE GRUBS
(SASRI Reference: Issue 14)

Click here to return to index

RDE Issue Description

- No management methods.
- Yield loss.
-

Background

Many on one farm but seems to be spreading (initially north of Tugela, now south).

Desired End Result

Stop spread.

SASRI COMMUNIQUÉ: WHITE GRUBS

Heteronychus licas is known to favour heavy soils, such as those occurring in valley bottoms and wetlands. The recent drought opened up many of these areas for *H. licas* colonisation and development, which caused the increased numbers found. In normal rainfall years, these habitats are not be available and hence, lower numbers of the beetles will be expected to invade sugarcane from such areas.

An indigenous entomopathogenic nematode (EPN), *Heterorhabditis bacteriophora* found in forestry plantations, in 2016 laboratory trials conducted by a PhD student at Pretoria University, caused high mortality of *H. licas* field collected larvae (85% mortality after 6 days, 93% mortality after 12 days, with a median time to mortality of 4.7 days). SASRI scientists, Drs Des Conlong and Stuart Rutherford are to meet with the project leader, Dr B. Hurley, at the 2017 Entomological Congress of Southern Africa to discuss the testing of this EPN under field conditions.

Local isolates of *Beauveria brongniartii* (C17 for adults, and HHWG1 for larvae) which are effective against white grub adults and larvae of the species *Schyzonycha affinis*, *Pegylis sommeri*, *Temnorhynchus clypeatus*, *Heteronychus tristis* and *Schyzonycha neglecta*, were not as effective against larvae of *H. licas*. However, C17 did cause 90% mortality of *H. licas* adults exposed in laboratory trials to this entomopathogenic fungus (EPF). This now needs to be tested in adult traps, but formulation of the EPF is problematic. This will be discussed with a company in South Africa specialising in the production of entomopathogens, especially for the Citrus industry, at the 2017 Entomological Congress of Southern Africa. Should they be able to mass produce a stable product for us, then the trap development work can be progressed through a new research project.

It is well known that *H. licas* adults are attracted to lights, and in a sugarcane estate in Zambia, it was clearly evident that they are attracted to certain light sources above others. The use of LED lights of different wavelengths will be tested in an MSc project being completed at the estate, in order to maximise trap attraction to the adults. Once these are established, they can also be tested under South African conditions. It is advised that sugarcane growing near bright light sources (e.g. around farm buildings) be > 5 months of age in early summer, given the following.

The adult beetles fly during early summer and are particularly attracted to young cane (< 5 months old) where they feed on the meristem (See September 2015 Link article). It is important to maximise harvest age on the coast in order to minimise the area of cane < 5 months old at this time. This implies that effective eldana IPM must also be implemented.

Basic ploughing and harrowing techniques, as outlined in the SASTA papers of Conlong and Mugalula (2003), and Mugalula *et al*. (2006), to destroy larvae of a white grub species infesting sugarcane in Uganda has been successfully used in a badly infested *H. licas* sugarcane field on heavy soil in the Tugela area, to destroy the population of larvae harboured there, and should also be considered a control option.

No insecticides are registered for *H. licas* control in sugarcane. However, cane planted during early summer should be protected from thrips by application of imidacloprid to the furrow. It is likely that there will be collateral protection against *H. licas* infestation for up to 6 weeks post application.

A number of candidate insecticides are being considered for emergency registration against the quarantined Long Horn Beetle pest in the Entumeni area. Those effectively targeting the below ground larvae of this beetle could be considered for registration against *H. licas*.

SASRI COMMUNICATION ACTION PLAN: WHITE GRUBS

COMMUNICATION PLAN REFERENCE NUMBER	17RD14
RESPONSIBLE SASRI SPECIALISTS	
Name:	• Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za) • Dr Des Conlong (Senior Scientist: Entomology) (Des.Conlong@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede	X	Staff Colloquium for ESs		Grower Day	
Extension Newsletters		SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Link/Ingede article	All cane growers	Inform growers of biological controls, especially entomopathogenic fungi and nematodes in the pipeline, their mode of action and availability. Increasing age at harvest, the use of plough-outs and insecticides.	September issue of link/ingede	Requests from growers to provide study sites, use the products

SEZELA RDE COMMITTEE

YELLOW LEAF SYNDROME
(SASRI Reference: Issue 15)

Click here to return to index

RDE Issue Description

- Effect on N12.
- Management (pesticide?).

Background

- Even on plant cane.
- N12 important variety.
- N12 seedcane likely source of SCYLV.

Desired End Result

Clean seed (NovaCane).

SASRI COMMUNIQUÉ: YELLOW LEAF SYNDROME

1. EFFECT OF SCYLV ON THE YIELD OF N12

In a trial planted at Mount Edgecombe, yield loss in infected N12 increased from -8% in the plant crop to -25% in the second ratoon and there was fairly rapid spread into the healthy plots of this variety.

2. SCYLV INCIDENCE

An industry-wide survey of 50 randomly selected fields in each mill supply area (MSA) was conducted in 2012/2013. This survey indicated an increase in SCYLV prevalence in the Sezela MSA, with 45% of the fields testing positive compared to 9% in 2003. Incidence within the infected fields was low with 4.5% of the leaves testing positive for the virus.

N12 was the most commonly sampled variety in the industry in 2012-13. SCYLV prevalence was relatively low compared to most other varieties with 24% of the 132 samples testing positive. However, 41% of the N12 fields surveyed in Sezela tested positive for the virus although incidence was low at 2.5%.

Reference: Ramouthar PV, Berry SD, Rutherford RS and McFarlane SA (2013). Yield loss due to sugarcane yellow leaf virus and its prevalence in the South African sugar industry. *Proc S Afr Sug Technol Ass* 86: 244-254.

3. PROPOSED STRATEGY

3.1. Survey

A further SCYLV survey will be conducted in young cane in Sezela from October 2017 through February 2018 to determine the extent of infection. The Biosecurity inspectorate will record field co-ordinates. The focus will be on N12 but other varieties will be included in the survey. Aim to sample 50 fields per month.

3.2. Alternative varieties

Growers should consider planting the following suitable replacements for N12:

- Short cutting cycle: N36, N39, N41, N59 (did very well in two recent trials harvested around 14 months).
- Long cutting cycle – N39, N47, N51, N55, N58, N59

3.3. Seedcane

NovaCane® is the best option for cleaning up material that is infected with virus. Commercial laboratories Dube AgriLab and Du Roi Laboratories have virus-free, true-to-type parent material from SASRI and growers can place orders directly with those facilities. The application of Bandit is recommended at planting to protect the plantlets from insect feeding during the early stages of growth.

Certified or approved seedcane sources in Amatikulu (low mosaic risk) that test negative for SCYLV may provide an alternative source of N12. A request for 1-2 tons could be placed through Biosecurity. The seedcane would need to be HWT at 50°C for 30 mins to eliminate the risk of eldana and LHB transfer. The application of Bandit is recommended at planting to protect the cane from insect feeding during the early stages of growth.

SASRI COMMUNICATION ACTION PLAN: YELLOW LEAF SYNDROME

COMMUNICATION PLAN REFERENCE NUMBER					17RD15		
RESPONSIBLE SASRI SPECIALISTS							
Name:	Sharon McFarlane (Senior Scientist: Plant Pathology) (Sharon.McFarlane@sugar.org.za)						
COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations			Discussions/Workshops		
The Link and/or Ingede		Staff Colloquium for ESs			Grower Day		
Extension Newsletters	X	SASTA			Grower Study Group	X	
Information Sheet update		Other (specifed below)			Short Course		
Information Sheet new					Other (specified below)		
Other (specified below)							
Objectives and desired dates of Knowledge Exchange activities							
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*			
Extension newsletter	Grower	Report on survey results and outline management strategy	May 2018	Extension Specialist to follow up on interest in new sources of seedcane and alternative varieties			
Grower study group	Grower	Report on survey results and outline management strategy	July 2018				

NEW N12 SEEDCANE
(SASRI Reference: Issue 16)

Click here to return to index

RDE Issue Description

- Bulk up N12.
- N12 - picking up SCYLV.

Background

Growers still like N12.

Desired End Result

- Alternative but similar varieties.
- Less susceptible (reduce N12%).
- Re-bulk N12 from clean source (NovaCane).

1. EFFECT OF SCYLV ON THE YIELD OF N12

In a trial planted at Mount Edgecombe, yield loss in infected N12 increased from -8% in the plant crop to -25% in the second ratoon and there was fairly rapid spread into the healthy plots of this variety.

2. SCYLV INCIDENCE

An industry-wide survey of 50 randomly selected fields in each MSA was conducted in 2012-13. This survey indicated an increase in SCYLV prevalence in the Sezela MSA, with 45% of the fields testing positive compared to 9% in 2003. Incidence within the infected fields was low with 4.5% of the leaves testing positive for the virus.

N12 was the most commonly sampled variety in the industry in 2012/2013. SCYLV prevalence was relatively low compared to most other varieties with 24% of the 132 samples testing positive. However, 41% of the N12 fields surveyed in Sezela tested positive for the virus although incidence was low at 2.5%.

Reference: Ramouthar PV, Berry SD, Rutherford RS and McFarlane SA (2013). Yield loss due to sugarcane yellow leaf virus and its prevalence in the South African sugar industry. *Proc S Afr Sug Technol Ass* 86: 244-254.

3. PROPOSED STRATEGY

3.1. Survey

A further SCYLV survey will be conducted in young cane in Sezela from October 2017 through February 2018 to determine the extent of infection. The Biosecurity inspectorate will record field co-ordinates. The focus will be on N12 but other varieties will be included in the survey. Aim to sample 50 fields per month.

3.2. Alternative varieties

Growers should consider planting the following suitable replacements for N12:

- Short cutting cycle: N36, N39, N41, N59 (did very well in two recent trials harvested around 14 months).
- Long cutting cycle – N39, N47, N51, N55, N58, N59

3.3. Seedcane

NovaCane® is the best option for cleaning up material that is infected with virus. Commercial laboratories Dube AgriLab and Du Roi Laboratories have virus-free, true-to-type parent material from SASRI and growers can place orders directly with those facilities. The application of Bandit is recommended at planting to protect the plantlets from insect feeding during the early stages of growth.

Certified or approved seedcane sources in Amatikulu (low mosaic risk) that test negative for SCYLV may provide an alternative source of N12. A request for 1-2 tons could be placed through Biosecurity. The seedcane would need to be HWT at 50°C for 30 mins to eliminate the risk of eldana and LHB transfer. The application of Bandit is recommended at planting to protect the cane from insect feeding during the early stages of growth.

SASRI COMMUNICATION ACTION PLAN: NEW N12 SEEDCANE

COMMUNICATION PLAN REFERENCE NUMBER					17RD16		
RESPONSIBLE SASRI SPECIALISTS							
Name:	Sharon McFarlane (Senior Scientist: Plant Pathology) (Sharon.McFarlane@sugar.org.za)						
COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations			Discussions/Workshops		
The Link and/or Ingede		Staff Colloquium for ESs			Grower Day		
Extension Newsletters	X	SASTA			Grower Study Group	X	
Information Sheet update		Other (specifed below)			Short Course		
Information Sheet new					Other (specified below)		
Other (specified below)							
Objectives and desired dates of Knowledge Exchange activities							
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*			
Extension newsletter	Grower	Report on survey results and outline management strategy	May 2018	Extension Specialist to follow up on interest in new sources of seedcane and alternative varieties			
Grower study group	Grower	Report on survey results and outline management strategy	July 2018				

UMZIMKULU RDE COMMITTEE

ELDANA CONTROL
(SASRI Reference: Issue 11)

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RDE Issue Description

Major problem in Umzimkulu:

- moving inland
- need to monitor (moth peaks)
- advice on management.

Background

Fairly new in hinterland and inland.

Desired End Result

- Effective control of eldana
- Increased awareness.

SASRI COMMUNIQUÉ: ELDANA CONTROL

In the early 1980s, eldana was restricted to a narrow coastal belt coinciding with the 16°C isotherm for the winter month of July. At the time, it was thought that this represented a thermal barrier to the inland and southern spread and infestation potential of the insect. However, since 1998 eldana has invaded upland areas and continues to spread. This may in part be due to increasing winter temperatures, but a more significant driver appears to be the adaptive evolution of the insect to tolerate colder conditions. Recent research has shown that the Midlands eldana population has tolerance to temperatures 4^{o}C lower than that of the coastal Umfolozi population.

Additionally, eldana is associated with sandier soils and soil acidity where silicon deficiency becomes a limiting factor in terms of plant resistance to eldana. Silicon deficiency and soil acidity are common on the lower south coast and its' hinterland.

These and other contributing factors promoting eldana infestation are examined in the SASRI publication 'IPM for Eldana Control: An Integrated Pest Management approach for the control of the stalk borer *Eldana saccharina* Walker (Lepidoptera: Pyralidae)'. This book focuses on best management practices which reduce plant stress – thereby reducing the potential for eldana damage. The various sections describe and explain how these best management practices can be integrated into IPM programmes. When applied as an entire package, in an area-wide approach, eldana infestation can be reduced to such an extent that the need for additional insecticidal control can be minimised.

SASRI continues to investigate the sterile insect technique (SIT), while the production of genetically-modified borer resistant sugarcane for future commercial release has recently been approved by the industry. The latter could become available commercially in approximately 15 years from now.

It is suggested that the Lower South Coast Extension - Biosecurity partnership enlist the assistance of their compatriots from the Midlands-North and Midlands-South in terms of learning from their experience with interventions such as Habitat Management and the use of insecticides in long-cycle sugarcane crops.

SASRI COMMUNICATION ACTION PLAN: ELDANA CONTROL

COMMUNICATION PLAN REFERENCE NUMBER	17RD11
RESPONSIBLE SASRI SPECIALISTS	
Name:	• Dr Malcolm.Keeping@sugar.org.za (Senior Scientist: Entomology) (Malcolm.Keeping@sugar.org.za) • Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) • Vacant (Extension Specialist: Lower South Coast) • Joe Nkala (Extension Specialist: South Coast) • Paul Botha (Extension Specialist: Midlands South) (Paul.Botha@sugar.org.za) • David Wilkinson (Extension Specialist: Midlands North) (David.Wilkinson@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	
Extension Newsletters	X	SASTA		Grower Study Group	X
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Extension newsletter	Growers - English	Increase awareness and high-light IPM	Extension Specialists to to determine	Extension Specialists to determine
Grower Study Group	Affected Upland Growers	The Midlands Experience		

APPLICATION VOLUME FOR RIPENERS
(SASRI Reference: Issue 12)

Click here to return to index

RDE Issue Description

- Low volume spraying.
- Mostly by helicopter (10 litre water / ha) - illegal (currently).
- Needs to be registered.

Background

Labels need to be changed by chemical companies.

Desired End Result

Labels of all ripeners need to be changed by chemical companies.

SASRI COMMUNIQUÉ: APPLICATION VOLUME FOR RIPENERS

Currently, the water volume registrations for the chemical ripeners Moddus and Fusilade Forte (and generics) are 30 - 35 l/ha. Only Ethephon (and generics) is currently registered for low water volume application.

SASRI recognises the need for registering the other chemical ripeners for low water volume (5 - 10 l/ha) application, which will facilitate the wider use of aircraft, other than fixed-wing (e.g. microlites and helicopters), for the application of ripeners. Low water volume registration will also unlock future opportunities to use drone technology for ripener application.

The need for low water volume registration of ripeners has been communicated to the respective chemical companies. In response, Syngenta decided to contract SASRI to conduct aerial application trials aimed at obtaining low water volume registration for Fusilade Forte and Moddus.

With a decrease in water volume, the spray droplet diameter decreases, which markedly lowers the actual volume and weight of the individual droplets. This may lead to problems such as excessive product drift or droplets evaporating before hitting the leaf surface. Hence, the trials conducted by SASRI will have to demonstrate adequate product efficacy at water volumes lower than 30 - 35 l/ha, whilst maintaining low product drift hazard at the same time. Only then will the Registrar of Act No. 36 of 1947 consider label amendments to cater for low water volume application of these chemicals. These trials are scheduled to start at the beginning of 2018.

SASRI COMMUNICATION ACTION PLAN: APPLICATION VOLUME FOR RIPENERS

COMMUNICATION PLAN REFERENCE NUMBER	17RD12
RESPONSIBLE SASRI SPECIALISTS	
Name:	Dr Riekert van Heerden (Senior Scientist: Sugarcane Physiology) (Riekert.vanHeerden@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	X
Extension Newsletters	X	SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Extension Newsletters	Growers and Millers (English and Afrikaans).	To inform growers in Umzimkulu (and other) regions about low water volume aerial application trials with Fusilade Forte and Moddus that will take place during 2018.	As and when deemed appropriate by ESs.	Positive feedback obtained by ESs from stakeholders.
Grower days	Growers and Millers (English and Afrikaans).	Item to be included in all chemical ripener grower day presentations: To inform growers in Umzimkulu (and other) regions about low water volume aerial application trials with Fusilade Forte and Moddus that will take place during 2018.	Continious during 2018	Positive feedback obtained from stakeholders at grower days.

MIDLANDS RDE COMMITTEES

HERBICIDE RESIDUE AFFECTING COVER CROPS
(SASRI Reference: Issue 17)

Click here to return to index

RDE Issue Description

Residual herbicide activities - negative effect on cover crops (e.g. soybean and maize).

Background

Observation of negative effects on cash + cover crops in the fallow - possible herbicide soil residual activity.

Desired End Result

- Guidelines / info on herbicides and residual soil activities with respect to growing cover crops in a fallow.
- List of herbicides - least effect on cover crops.

SASRI COMMUNIQUÉ: HERBICIDE RESIDUE AFFECTING COVER CROPS

To further clarify the context and details of this RDE issue, a meeting, subsequent to the 2017 RDE Committees' Workshop, was convened amongst Lothar Schulz (Midlands North grower), David Wilkinson (Midlands North SASRI Extension Specialist) and Dr Peta Campbell (SASRI Scientist: Weed Management).

Mr Schulz had noted some poor cover crop growth in certain fallow fields, and was concerned that this was probably due to residual herbicides. He also requested information on suitable cover crops, (especially legumes) that could be planted after herbicide application in the wide inter-row between tramline fields being established on his family farm. This communiqué addresses two issues: (1) common reasons for herbicide damage, and (2) selecting suitable cover crops after herbicide application.

1. HERBICIDE DAMAGE TO COVER CROPS

Reasons for herbicide damage to cover crops on certain fields include the following:

- Broadleaf herbicides can harm broadleaf crops whereas grass killers harm monocotyledon crops like maize, especially if these are planted too soon after herbicide application.
- An impermeable layer can prevent normal leaching of product, and during dry conditions some products can actually rise upwards again due to capilliary action and reach crop roots.
- Water-logging or poor drainage in some areas of fields can be low in oxygen. This will slow down or halt normal aerobic microbial degradation of the product. In addition, if soil is waterlogged there may be an abnormal or uneven distribution of pre-emergent products.
- Herbicides can persist in a drought year when compared with wet years, delaying the potential planting date of crops.
- Over-application. Some herbicide labels stipulate no overlapping spray swaths. The spray operator might have over-sprayed after refilling the knapsack, resulting in localised double dosage and crop damage.
- If used recently, do not re-apply pre-emergence products like hexazinone, tebuthiuron, isoxaflutole, amicarbazone, Dropzone or diuron. Re-application too soon under some conditions might result in an over-dosage, especially in clay soils where the first application has not leached or undergone normal microbial degradation.
- Product is lost when there is surface soil loss – erosion carrying the product away from the target site. Where it settles acquires an over-dosage that can affect the crop.
- Recent liming can desorb some products from soil particles and product can become more available for root uptake by the crop.

- Soil crusting can lead to areas of herbicide accumulation.

2. SUITABLE COVER CROPS

Mr Schulz is establishing tramlines of sugarcane and plans to plant appropriate cover crops (especially legumes with short growth to allow easy access) in the wide inter-rows. He needs to know which herbicides affect legume cover crops. Recommended waiting periods required before planting legumes are presented in Table 1 (information summarised from van Zyl K [2015]. A Guide for the control of weeds in South Africa. Published by AVCASA).

- Benefits of planting legumes include the following: plants will contribute nitrogen and organic matter to the soil to improve soil health by increasing soil microbe populations, earthworm activity, and water holding capacity, suppressing weeds, allowing selective grass killing products to be used and reducing the amount of required inorganic fertilizer (which will save costs).
- It should be noted that
- Legumes are highly sensitive to soil acidity so remedial treatment with gypsum and lime are highly beneficial to their growth. This has been addressed on the farm.
- Not all legumes are equally tolerant to herbicide.
- The legumes selected must be short for easy access for a boom sprayer and for fertilizer application.
- Any selected summer and winter crops should be non-invasive for the following crop.
- Available SASRI resources include the SASRI Green Manures manual.
- Simon Hodgson (AGT Foods) can advise cover crop suitability and growth in different soils and bioclimatic zones in the Midlands North, and specifically for tramline wide inter-rows on this farm.

Table 1

Waiting time (months) after last herbicide application and before growing legumes (e.g. beans).

Waiting time (months) after last herbicide application and before growing legumes					
Information Source	**Herbicide**	**all other crops**	**Beans**		
			Dry	**sugar**	**soya**
Acetochlor 900 EC (Villa)	Acetochlor 900		0	0	0
Lasso EC (Monsanto)	Alachlor		0	0	0
AVCASA 2015	Ametryn 500	3			
Direction 700 WDG	Amicarbazone	12			
Atrazine 500 SC (GAP)	Atrazine	18	18		18
Elegance Super	Chlorimuron-ethyl	9-18			0
AVCASA 2015	chlorimuron-ethyl/metribuzin	18			
Various labels	Diuron		Legumes not listed. Look at partner product		
EPTC S EC (Meridian)	EPTC		Initial retardation may occur but plants will develop normally.		
Fusilade Forte	Fluazifpop-butyl		0	0	0
Bound (Villa)	Glufosinate ammonium		0	0	0
AVCASA 2015	Glyphosate (e.g. Roundup)		3-21 days transplants and seedlings		
AVCASA 2015	Halosulfuron		3	3	3
AVCASA 2015	Hexazinone (e.g. Velpar)		12	12	12
Dropzone	Hexazinone + clomazone		12	12	12
BOBCAT COMBI 600 WG	Hexazinone + diuron		at least 12 months		
SASRI	Imazapyr		under investigation by SASRI		
AVCASA 2015	Isoxaflutole	12			
SASRI Herbicide Guide	MCPA		Beware drift. A non-residual broadleaf killer (5-6 weeks). Look at partner product		
AVCASA 2015	Mesotrione		9		9
AVCASA 2015	Mesotrione+S-metolachlor+terbuthylazine		9		
Claw	Metazachlor		Used for pre-emergence weed control in dry beans,		
Platinum (Villa)	Metolachlor		Damages dry beans in some soils and weather conditions		
AVCASA 2015	Metribuzin		12	12	6
Metrad (Arysta)	Metribuzin + diuron		12	12	12
SASRI Herbicide Guide	MSMA		Beware drift. Non-residual post-emergence grass killer (5-6 weeks). Look at partner product		
SASRI Herbicide Guide	Paraquat		Beware health and safety. Non-residual post-emergence product (5-6 weeks). Look at partner product		
Farmuron	PARAQUAT + DIURON		Beware health and safety. Legumes not listed		
AVCASA 2015	Pendimethalin				0
Armadillo	Sulcotrione + atrazine		3		3
AVCASA 2015	Sulfentrazone		12		0
Avon 750 WDG	Sulfentrazone	24			
AVCASA 2015	Tebuthiuron	24			
Garlon 480 EC	Triclopyr		Do not apply to areas that may be rotated to any broadleaf crop.		

This table was derived from Appendix E, pages 130-138 in van Zyl K (2015). A Guide for the control of weeds in South Africa. Published by AVCASA. E mail: info@croplife.co.za and from stated herbicide labels.

SASRI COMMUNICATION ACTION PLAN: HERBICIDE RESIDUE AFFECTING COVER CROPS

COMMUNICATION PLAN REFERENCE NUMBER		17RD17
RESPONSIBLE SASRI SPECIALISTS		
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COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	
Extension Newsletters	X	SASTA		Grower Study Group	X
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
Herbicides residues and legume cover crops	English Study group using IWM with crop rotation	Benefits of IWM Simon Hodgeson present on suitable selections	Early next year	Attendance register and questions asked

BENEFICIAL COVER CROPS FOR INTERCROPPING

(SASRI Reference: Issue 18)

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RDE Issue Description

- Cover crops - info on additional benefits e.g. soil health & P&D control options.
- New options available? (with focus on intercropping with cane).

Background

Increase in cover crop options in cane.

Desired End Result

Info on cover crops for improved soil health and P&D info. (Review previous SASRI study). Note that this issue has a national imperative as well (SSG + food security).

SASRI COMMUNIQUÉ: BENEFICIAL COVER CROPS FOR INTERCROPPING

SASRI has researched the role and benefits of using break crops in a sugarcane production system for many years. The crops included in this work can be sub-divided as follows: winter vs summer crops and legumes vs non-legumes. The crops used in SASRI trials and those adopted in the sugarcane industry to

be used as cover crops, break crops and green manures are listed below. Information regarding other crops can be obtained from seed companies, the internet and scientific papers.

All the crops listed and following a sugarcane crop had a beneficial effect on the soil (in terms of increase microbial diversity and numbers) and some producing large amounts of biomass also increased the organic matter content of soils. The increased in soil health generally result in a yield increase, a result that often lasted for about two crops.

The benefits of a number of crops to the sugarcane industry has been tested since 1998 to 2011 when SASRI's last project on alternative crops closed out. The knowledge gained have been shared with stakeholders via a number of forums available in the sugarcane industry. Our experience has been that varieties within a species are similar in its agricultural properties. A discussion with Simon Hodgson, a leading expert on crops to be used with sugarcane, confirmed that the popular crops have already been adopted and that further major enhances is unlikely to occur by exploiting varietal differences between species. By dealing with crops on a global scale he will alert SASRI should a crop with exceptional benefits to the sugarcane industry be discovered.

A summary of crops used in SASRI field trials are listed below. The contents of these lists was mainly accumulated via personal experience and close contact with experts sharing information.

1. VELVET BEANS

Velvet beans, also known as mucuna beans, is a summer annual legume that is established using 50 kg seed/ha. For optimum performance seeds should be inoculated using a sticker. Plant before Christmas as thereafter heat units becomes insufficient to produce a successful crop. Plant date is less important if it is to be used as a green manure crop. Velvet beans don't like cold weather and will die back in cold snaps. Late planting in cooler areas is, therefore, not recommended. Seeds can be in short supply. It is however considered to be the best crop in Brazil to reduce yield decline in sugarcane.

Velvet beans is an attractive legume with unusual royal purple flowers that grows runners 3-18 m in length. The flowers hang in long clusters. The plant also produces clusters of pods which contain seeds known as mucuna beans. The seed pods are covered with reddish-orange hairs that are readily dislodged and can cause intense irritation to the skin. The species name "*pruriens*" (from the Latin, "itching sensation") refers to this irritating sensation from having contact with seed pod hairs. If planted at a high density velvet beans will form a dense canopy that will smother most weeds and reduce root-knot nematodes. Black mucuna grows well on poor sandy soils and readily recycle phosphates (60-80 kg P/ha) and nitrogen (90-100 kg N/ha). Grey mucuna grows faster than black but is not as tough. It will kill *Meloidogyne javanica* (a plant-pathogenic nematode) and has strong allelopathic effects (even on *Cynodon dactylon*). Allelopathic effects also suppresses *Imperata cylindrica* (cogon grass).

2. BUCKWHEAT

Buckwheat is a non-legume that can be grown in winter and summer. It is an extremely fast grower and, therefore, useful if time is an issue. It is a good source of nectar for the natural enemies of arthropods. It was shown to reduce root rot (*Phytophthora*) in alfalfa. Rumoured to cause white grub numbers to decrease (Japanese beetles) and is a good extractor of P from the soil.

3. CABBAGE

Cabbage is a non-legume winter crop with very good anti-nematode properties.

4. CLOVER

Clover is a winter legume. Several types are available i.e. arrow leaf, berseem, bur, crimson, persian, red, rose, sweet, sweet yellow and white. Most clovers are rumoured to decrease white grub numbers (Japanese beetles).

5. COWPEAS

Cowpeas (akkerbone) is a summer annual legume sowed at 20 to 25 kg/ha. Its rapid establishment and growth is ideal for situations where time is a problem. Cowpeas is tolerant of soils with a wide pH range (4.3-7.9) and is thus well suited for the general acid soils found in the rainfed regions of the sugarcane industry. It is however less tolerant to soils with a saline problem (pH >8). Fertilizer requirement at plant is more than 80 mg/kg K in soil sample. At plant apply 40 kg P/ha if necessary. Apply small amounts of N at plant as cowpeas, being a legume, is sensitive to excessive amounts of N. Is also particularly sensitive to excessive levels of Boron. Cowpeas is an accumulator of P and is known to recycle substantial amounts of P and K. With is dense canopy characteristic cowpeas has good weed suppression properties but has a poor ability to suppress nematodes and diseases. Due to its tap root system it is known to loosen topsoil and subsoil. Cowpeas has a low C:N ratio of 25 and 38 for aerial and roots respectively and will therefore decompose relatively quickly.

6. CABBAGE

Cabbage is a non-legume winter crop. It is a very good anti-nematode crop. This means that nematodes are deterred where cabbage had been grown.

7. WHITE OATS

White oats is a non-legume winter crop sowed at 50 kg/ha. If planted it too early it will produce seed before the winter is over. It has a fibrous root system that produces a lot of biomass underground. Above ground it produces about 6 tons of dry matter per hectare. It is highly rated for its allelopathic effect on other crops. In the midlands it was noticed to suppress the growth of *Digitaria abyssinica* growing on sandy soils. White oats is also known to control phytophthora on citrus in the Cape, is resistant to root-knot nematodes and combats *Phytophthora* (root fungus). It has a high C:N ratio and therefore decomposes slowly. Oats is a good catch crop to recycle substantial amounts of N, P and K. Can also be used as grazing for cattle.

8. BLACK OATS

Black oats (name is derived from the blackish colour of the seed and is also called Saia oats) is a non-legume winter crop sowed at 50 kg/ha. Seeds are however not widely available. If no-till is not an option then broadcast the seeds and pass over with a light disk harrow. It tolerates acidity by complexing Al and Mn. If planted with lime (creating more neutral pH conditions) it will promote deep rooting and will yield similar to white oats (about 6 tons dry matter/ha). Can grow to 30-40 cm tall (6-8 t wet matter, 2 t DM/ha) in 8 weeks. It is also very effective to recycle Ca. Grass and grain crops are good catch crops as they establish fast and grow a fast fibrous root system, which catches nitrate sooner than legumes. Black oats has the same allelopathic effect to eliminate *Digitaria abyssinica* in the Midlands (especially on sandy soils) as white oats. It is also good against *Fusarium* diseases.

Black oats is known to improve aggregate stability of soils. It has a high C:N ratio (63 and 81 for aerial and roots respectively) and therefore decomposes slowly. Oats can be a problem in cane if allowed to seed. They grow faster than sugarcane and might lead to cane yield loss. Oats should therefore be killed when waist-high using a knife-roller or chemicals. Oats problems in cane fields can be sorted out with sencor+diuron+gramoxone, or diuron+metribuzin+gramoxone (both Pre - Early Post Emergence). Can get smut - seed head becomes rounded and covered with black fungus - but different strain to cane smut, so not transferrable. This is generally not a big problem.

9. SOYBEAN

Soybean is a summer legume established with about 70 kg seed/ha. For optimal performance inoculated the seed with a recommended inoculant, apply about 50 kg N/ha at plant and establish at the end Oct/Nov planting for optimum yield but Dec/Jan planting will only be good for green manuring. Soil temp should be >15 ^{O}C to ensure good germination. Can produce good biomass and lots of N (high N% in plant parts). Varietal choice is important as soybean is region specific. Seeds of vegetable soybean is not freely available. Grain soybean can be grown on the south coast (with correct cultivar). The right planting equipment (seed drill) and harvesting (combine) equipment are required to produce soybean economically. Only small amounts can be planted by hand. Difficult to establish on steep slopes where machinery can't go. Soybeans is sensitive to nematodes and should

not be grown on sandy soils with a known nematode risk. Soybeans should not be grown on soils where Atrazine type herbicides have been used before the waiting period has past. Soybeans have many medicinal cures for humans.

10. SUNN HEMP

Sunn Hemp is a summer crop and tropical legume that can also be grown in winter in KZN as green manure crop. Possible inoculants (not usually necessary) are soybean Rhizobia (normal soybean inoculant) or *Asperillium brasilensis* yeast. Establish using about 50 kg seed/ha. Seeds need 15-18 ^{O}C soil temp Sunn to germinate. Hemp is photoperiod sensitive and will start to flower when the day length is shortening. Sunn hemp has a C:N ratio of 45 and 50 for aerial parts and roots respectively at flowering. Under the right conditions Sunn Hemp will grow to more than 2 m tall (i.e. Mount Edgecombe without irrigation) containing about 250 kg N/ha (about 40 – 60% is available in the first year). It performs also very impressively under irrigated conditions. It takes 60-90 days to flower. To prevent the crop from becoming too woody it must be killed at the latest when in peak flowering. A slasher or knife roller are both efficient to stop growth. Crops that has a poor growth (<750 mm tall at peak flowering) don't have to be cut down or killed, instead go straight in with a minimum till planter. Sunn Hemp is a popular nematode-suppressive cover crop.

11. GRAZING VETCH

Grazing vetch is a winter annual legume established with about 20 kg seed/ha. This crop must not be allowed to produce seed and great care should be taken to avoid building a seed bank as it can easily become a difficult to control weed. Should it happen at least 6 L/ha of glyphosate will be required to kill this crop. However, vetch has the ability to improve soil structure and when used with oats the effect is enhanced.

SASRI COMMUNICATION ACTION PLAN: BENEFICIAL COVER CROPS FOR INTERCROPPING

COMMUNICATION PLAN REFERENCE NUMBER				17RD18	
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COMMUNICATION PLAN OUTLINE					
Knowledge Exchange activities to be implemented (marked with 'X')					
Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	
Extension Newsletters		SASTA		Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)					
Objectives and desired dates of Knowledge Exchange activities					
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*	

ULTRA-LOW VOLUME RATES FOR HERBICIDES AND PESTICIDES
(SASRI Reference: Issue 19)

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RDE Issue Description

Ultra-low volume application of chemicals.

Background

Drone technology for application of chemicals is an up and coming technology. Plus existing constraints with current aerial applications.

Desired End Result

- Engagement with chemical companies and possible sub-contracting with trials.
- Amendment of chemical labels to include ultra-low volumes.

SASRI COMMUNIQUÉ: ULTRA-LOW VOLUME RATES FOR HERBICIDES AND PESTICIDES

1. SOUTH AFRICAN NATIONAL STANDARDS

1.1. Unmanned aerial vehicle technology for agro-chemical application

The SANS document, SANS 10118:2009 (Aerial Application of Pesticides), which is published by the South African Bureau of Standards, makes no mention of unmanned aerial vehicle **(**UAV) applications. It would appear that the entire regulation requires amendment before growers will be able to legally apply agro-chemicals by means of UAVs. In addition, the feasibility of developing this technology in the future would be assessed and driven by the agro-chemical industry. To access the SANS document, click on the following: https://law.resource.org/pub/za/ibr/za.sans.10118.2011.html

1.2. Current legislation

Currently, aerial application may only be conducted legally by a registered aerial application operator, using a correctly calibrated, registered aircraft, according to the instructions of SANS Code 10118 (Aerial Application of Agricultural Pesticides).

2. CURRENT RECOMMENDATIONS

2.1. Introduction

Agro-chemicals in the sugar industry include ripeners, nematicides, fungicides, insecticides and herbicides. Of these, ripeners are being dealt with under a separate RDE issue (Issue 12; click here to access), whereas none of the nematicides are registered for aerial application.

In this communication, two fungicides and four insecticides are considered. Also considered are the herbicides. Of the 34 herbicide active ingredients for pre-emergence weed control, 15 have registration for aerial application, and these are normally applied soon after harvest.

Aerial application of ripeners, fungicides and insecticides is a more common practice in some areas of the sugar industry than for most herbicide active ingredients.

2.2. Low volume agrochemical application

An essential aim is for the spray mixture be evenly distributed over the target area, together with any loss of spray material during application restricted to a minimum. To achieve this it is therefore essential that the following criteria be met:

2.2.1. *Spray volume*

A range of aerial application volumes are seen on product labels in the sugarcane industry (Table 1). On such labels is normally stated: "*As this product has not been evaluated at a reduced volume rate, the registration holder cannot guarantee efficacy, or be held responsible for any adverse effects if this product is applied aerially at a lower volume rate than recommended*."

Table 1

The application volumes registered for aerial application of agro-chemicals in the sugar industry. For herbicides, brackets indicate the proportion of active ingredients (/34).

Agro-chemical	Product	Company	Action	Application voliume (L/ha)
Fungicide	Abacus	BASF	contact and translaminar	30-40
Fungicide	Amistar Xtra	Syngenta	contact, systemic and translaminar	30-40
Insecticide	Ampligo	Syngenta	translaminar	minimum 30
Insecticide	Coragen	Du Pont	stomach and contact	minimum 30
Insecticide	steward	Du Pont	stomach and contact	30
Insecticide	Fastac	BASF	stomach and contact	30
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	30 (15%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	> 30 (6%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	> 35 (3%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	30-35 (24%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	30-40 (9%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	30-50 (3%)

2.2.2. Droplet coverage

Good coverage of the agro-chemical is essential to maximise efficacy of the product formulation. Coverage of a spray application is expressed as the number of droplets per cm^2. For example, a droplet coverage of 30 to 40 droplets per cm^2 of two of the insecticides must be recovered at the target. Refer to Table 1 below.

As a rule, contact action pesticides require more coverage than systemic products, especially for contact action fungicides that must prevent further development of germinating fungal spores, and post-emergence application of herbicides require more coverage than pre-emergence application.

Table 2

The coverage (droplets per cm2) registered for aerial application of agro-chemicals in the sugar industry. For herbicides, brackets indicate the proportion of active ingredients (/34).

Agro-chemical	Product	Company	Action	Coverage Droplets/cm2
Fungicide	Abacus	BASF	contact and translaminar	50-70
Fungicide	Amistar Xtra	Syngenta	contact, systemic and translaminar	25-30
Insecticide	Ampligo	Syngenta	translaminar	25-30
Insecticide	Coragen	Du Pont	stomach and contact	30-40
Insecticide	steward	Du Pont	stomach and contact	30-40
Insecticide	Fastac	BASF	stomach and contact	25-35
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	20-30 (32%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	25-35 (6%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	30-40 (15%)

2.2.3. *Droplet size*

For each pest situation there is an optimum droplet size. The optimum droplet size .will result in best coverage of the target area by the spray mixture with the minimum loss of droplets (active ingredient) through drift. Droplet size is expressed on most agro-chemical labels as VMD in micron (µm) where 1 µm = 1/1000 mm. Refer to Table 3. These values are important especially for aerial spraying of fungicides and bigger droplet spectra for pre-emerge herbicides. Furthermore, all the sugar industry agro-chemical labels stipulate: “Ensure that the production of fine droplets less than 150 micron (high drift and evaporation potential) is restricted to a minimum.”

Table 3

The droplet size (VMD) registered for aerial application of agro-chemicals in the sugar industry. For herbicides, brackets indicate the % of active ingredients (/34).

Agro-chemical	Product	Company	Action	Droplet size (VMD in µm)
Fungicide	Abacus	BASF	contact and translaminar	250
Fungicide	Amistar Xtra	Syngenta	contact, systemic and translaminar	280-300
Insecticide	Ampligo	Syngenta	translaminar	280-300
Insecticide	Coragen	Du Pont	stomach and contact	250-280
Insecticide	steward	Du Pont	stomach and contact	250-280
Insecticide	Fastac	BASF	stomach and contact	280-300
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	250-280 (3%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	300-350 (3%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	350-400 (26%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	350-450 (6%)
Herbicide	Several active ingredients	Several	Pre-emergence to the weed	450 (3%)

2.2.4. *Flying height*

“*The height of the spray boom should be maintained at 3 to 4 metres above the target*.” This will increase the risk of drift when compared with the low volume ground application, e.g. for herbicide application with controlled droplet application (CDA). Refer to SASRI Information Sheet 10.4.

2.2.5. Suitable atomising equipment

On product labels is stated: “Aerial spraying must use suitable atomising equipment that will produce the desired droplet size and coverage, but which will ensure the minimum loss of product either through endodrift (within target field) or exodrift (outside target field).”

3. NEW RECOMMENDATIONS

The future option of further reducing aerial spray volumes to 5 or 10L per hectare would require thorough investigation for industry conditions. This would be driven by interested agro-chemical companies. The major advantage would be that lower spray volumes are more cost effective due to less refilling and more hectares covered with the same tank volume. However, a reduction of spray volume would require the application of smaller droplets in order to obtain effective coverage of the target, and small droplets have an increased risk of drift. There are three aspects important to consider for ULTRA-LOW VOLUMES agro-chemical application: these are efficacy, coverage and drift.

3.1. Coverage

Contact remedies require a denser droplet coverage than one with a systemic activity. Translaminar and “stomach acting” insecticides might retain good efficacy, provided the formulation had good translocation from the leaf to the target.

For pre-emergence herbicide application, there is a wide range of Koc values (adsorption to organic carbon in soil). More soluble products with low Koc values (e.g. hexazinone and metribuzin) leach more readily, and the active ingredient in the spray droplets would have to spread evenly in the soil water continuum (sideways as well as downwards) to reach all germinating weed seeds. To retain efficacy at ULV, these products would need increased coverage, and to achieve this, smaller droplets would be required. These would be more susceptible to drift.

Post-emergence herbicide spray droplets reach the target area by a) sedimentation (bigger droplets) on horizontal leaf surfaces and b) impaction (smaller droplets) on vertical leaf surfaces. The orientation of the target weed leaves depends on the species and growth stage, so interception would require a range of droplet sizes. To retain good efficacy, ultra-low volumes would require a proportion of small droplets to reach vertical leaf surfaces and this part of the spray spectrum would have increased risk of drift away from the target area.

Small droplets are beneficial by providing better distribution of the agrochemical and improved coverage of the target area. The disadvantage is they are more susceptible to evaporation and exodrift (moving off target)

3.2. Spray drift

Only the portion of active ingredient that reaches and remains on the target is effectively applied. As droplet size decreases they become more prone to drift, and this increases when wind speed increases. Most agrochemical labels in the sugar industry stipulate minimising the amount of spray droplets < 150 µm. Refer to Table 4.

Table 4

The droplet size (µm) and theoretical drift during aerial application of agro-chemicals. Taken from AVCAS notes, 2017.

Droplet size (µm)	Distance droplet will theoretically travel (m) from a 3m release height	
	8 km/h	15 km/h
1	220 000	420 000
10	2 200	4 200
100	24	45
200	9	18
500	3	6

3.3. Droplets and evaporation

Droplets < 150-200µm are prone to evaporation. In addition, water is the main diluent of most pesticide sprays and is relatively volatile. Small droplets can drift outside the target area in the lightest breeze, will be trapped by vertical/diagonal objects (targets) e.g. weed leaves, depending on the distance between release and target, they could evaporate completely before reaching the target.

3.4. Weather conditions and droplet movement

The proportion of spray droplets that reach the target, is greatly influenced by local climatic conditions, especially temperature, relative humidity, and wind velocity & direction. Their impact is greatest on small sized droplets. For aerial application, even during calm wind conditions, temperature inversions may cause drift damage over very long distances.

4. CONCLUSIONS

There are complex relationships between efficacy, coverage and drift when considering the feasibility of ultra-low volumes. Agro-chemical companies know the properties of their own products and

interested parties would develop formulations suitable for ultra-low volumes, optimising efficacy and taking into account the associated risks, e.g. drift, before considering trial protocols of appropriate products for ultra-low volumes registration.

Another avenue is ground application of reduced volumes (LV) with controlled droplet applicators. This would also be driven by agro-chemical companies.

SASRI COMMUNICATION ACTION PLAN: ULTRA-LOW VOLUME RATES FOR HERBICIDES AND PESTICIDES

COMMUNICATION PLAN REFERENCE NUMBER				17RD19			
RESPONSIBLE SASRI SPECIALISTS							
Name:	Dr Peta Campbell (Scientist: Weed Management) (Peta.Campbell@sugar.org.za)						
COMMUNICATION PLAN OUTLINE							
Knowledge Exchange activities to be implemented (marked with 'X')							
Publications		Presentations		Discussions/Workshops			
The Link and/or Ingede	X	Staff Colloquium for ESs		Grower Day			
Extension Newsletters	X	SASTA		Grower Study Group	X		
Information Sheet update		Other (specifed below)	X	Short Course			
Information Sheet new		To be discussed with interested agro-chemical company		Other (specified below)			
Other (specified below)							
To be discussed with ES and KMU. If registration is attempted, confidentiality might be agreed.							
Objectives and desired dates of Knowledge Exchange activities							
Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*			
Feasibility of ULV (Ultra Low volume) application of agro-chemicals	English	Driven by agro-chemical company	To be discussed	Agro-chemical registration			

FALL ARMY WORM
(SASRI Reference: Issue 20)

Click here to return to index

RDE Issue Description

Crop Protection - Fall Army Worm - likelihood of moving into cane?

Background

Maize, even Bt maize - still seeing damage from Fall Army Worm.

Desired End Result

Info on Fall Army Worm

SASRI COMMUNIQUÉ: FALL ARMY WORM

Even though sugarcane appears on the Centre for Agriculture and Biosciences International (CABI) list of plants attacked by the fall army worm (FAW), sugarcane entomologists in the USA, part of the home range of FAW, find that even though it attacks maize, pastures and other crops, it is not a major pest of sugarcane. Similarly in Brazil, FAW is a major pest in maize, but not in sugarcane. In addition, SASRI scientists are in regular contact with agronomists and agricultural managers of African sugarcane estates in all countries where FAW has been found. In many cases, as in South Africa, FAW has been found infesting maize, sweetcorn, sorghum, wheat etc in close proximity to sugarcane, but has not been recorded as feeding on the close by sugarcane.

Nevertheless, growers are advised to monitor sugarcane growing in proximity to maize. Small-scale growers should be particularly vigilant if non-Bt maize is being grown near to their sugarcane. As a precautionary measure, three insecticides (Coragen, Steward and AVI-Merkaptothion) have received emergency registration against FAW in sugarcane. Several additional products are registered for use in maize.

Correct identification of FAW is essential. An identification guide developed by Dr D. Visser of the Vegetable and Ornamental Plant Institute (VOPI) of the ARC, which shows how FAW differs from other commonly occurring Lepidoptera occupying the same niche as FAW in South Africa is available. SASRI will need to add the trash caterpillars found in sugarcane to this document to make it more complete. In the cooler regions of the South African sugarcane belt, where maize is grown, FAW will be entering diapause at the time maize is harvested, so will not be a major threat when the maize is gone.

SASRI COMMUNICATION ACTION PLAN: FALL ARMY WORM

COMMUNICATION PLAN REFERENCE NUMBER	17RD20

RESPONSIBLE SASRI SPECIALISTS

Name:	• Dr Stuart Rutherford (Principal Scientist: Integrated Pest and Disease Management) (Stuart.Rutherford@sugar.org.za) • Dr Des Conlong (Senior Scientist: Entomology) (Des.Conlong@sugar.org.za)

COMMUNICATION PLAN OUTLINE

Knowledge Exchange activities to be implemented (marked with 'X')

Publications		Presentations		Discussions/Workshops	
The Link and/or Ingede		Staff Colloquium for ESs		Grower Day	
Extension Newsletters		SASTA	X	Grower Study Group	
Information Sheet update		Other (specifed below)		Short Course	
Information Sheet new				Other (specified below)	
Other (specified below)	X				
Contact producer of fall army worm (FAW) identification powerpoint to include trash caterpillar and similar sugarcane moth species to the identification key, for use in sugarcane.					

Objectives and desired dates of Knowledge Exchange activities

Knowledge Exchange Activity	*Target Audience (include language requirement)*	*Objective(s)*	*Implementation Date(s) / Period(s)*	*Measure to Determine Successful Knowledge Exchange*
SASTA paper	All growers	Inform growers about FAW and its differences to African army worm, Control options available, and incursion plan to prevent its invasion into sugarcane	SASTA 2018	No incursions of FAW into SA sugarcane