A HOLISTIC APPROACH TO CROP NUTRITION (*CONTINUED*)

the use of fertilizers. One way of achieving this is embracing an all encompassing approach towards crop nutrition. Such an approach includes: soil sampling, soil analysis, fertilizer recommendations, fertilizer application, leaf sampling, leaf analysis and corrective action. There is no shortcut. This is essential for sustainable crop production while eliminating potential environmental pollution.

This article covers leaf sampling, leaf analysis and corrective action. However, should growers need information pertaining soil sampling, soil analysis, fertilizer recommendations and fertilizer application, such is readily available at SSATS.

Leaf sampling

Leaf sampling is used to monitor the uptake of nutrients by the crop, thereby monitoring the effectiveness of fertiliser recommendations based on soil analysis. It is particularly useful for checking the accuracy of whole cycle fertilizer recommendations. It closes the loop in the fertilizer programme. Soil sampling offers a similar service as auditing organizational accounts. It gives an opportunity to review any inefficiencies in the value-chain (soil sampling to fertilizer application). Thus cane growers are encouraged to adopt this practice.

Growers in sandy soils are encouraged to split potassium application. Some growers advocate for a single application of nitrogen immaterial of the time of harvest. Leaf analysis can help validate on farm such recommendations.

Timing of leaf sampling:

Leaf sampling should take place in the early morning between October and March at least four weeks after the last fertiliser application. Winter harvested fields should be sampled at five to six months of age with cane age at sampling decreasing gradually for later harvested fields. Summer fields should be sampled at about three months of age. Incorrect timing is likely to lead to misrepresentation of the crop's nutrient status. The crop should have been growing actively for at least a month prior to sampling and not under moisture stress at the time of sampling.

Leaf sampling procedure (Figure 5):

- Select stalks of average height, avoiding young shoots.
- Remove third leaf from the top (the first leaf from the top being the one that is at least half unfurled).
- Collect about 40 leaves from well-spaced intervals throughout the field systematically placing them one on top of the other.
- Holding the leaves together in a bundle, chop off the tops and bottoms leaving a central portion of about 300mm long.
- Strip out the midrib from this central portion as soon as possible after sampling.
- Spread the leaves out on a clean surface to dry in the sun.
- Bundle the dried leaves and attach a label for analysis at RSSC, Mhlume Lab. Ensure all details are given on the label.

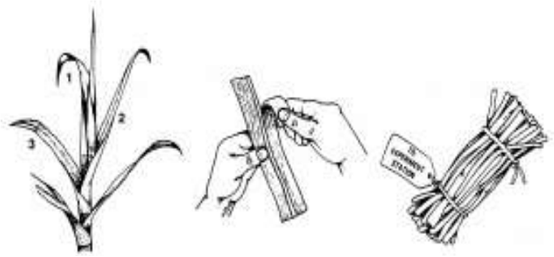

Figure 5*: Leaf sampling guide*

Important points to note:

- Do not contaminate samples by contact with fertiliser or used fertiliser bags.
- The midrib must be removed as soon as possible after sampling.
- Leaf analysis is meaningless if samples are taken at the incorrect age or from stressed cane.
- Labels are obtainable from SSATS.

Leaf analysis and interpretation of results

The laboratory performs the leaf analysis using scientifically proven extraction and measurement methods. The results are expressed as percentages to total dry matter for macro elements and on weight basis (mg/kg or ppm) for micro elements. Threshold values for leaf analysis were established experimentally from a large number of fertiliser trials conducted in the industry. If the leaf nutrient content as per analysis is below threshold level, depressed yields can be expected unless corrective fertiliser applications can be made.

When interpreting leaf analysis results, growers are encouraged to consult area Extension Officers.

Corrective action

- If leaf sampling is done early enough during the season, corrective application can be made in particular if nitrogen deficiency is detected.
- If the leaf results indicate discrepancies in nutrient contents, the fertiliser programme for the following season can be adjusted accordingly. Once again, growers are advised to seek the assistance of Extension Officers in this regard.

By Njabulo Dlamini (Crops Agronomist)

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SWAZILAND SUGAR ASSOCIATION TECHNICAL SERVICES

EXTENSION NEWSLETTER

Number 52 **2nd Quarter 2013**

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Allice information & Weather forecast for the next six months inside

African rust

"This unknown rust that was initially observed on sugarcane in Swaziland and Umfolozi in 2009, and re-appeared in spring 2011"

Irrigation

"It is very important to apply the first irrigation within a week after harvesting"

SUGARCANE RUST OUTBREAK

Introduction

There is an outbreak of rust throughout the industry. This unfortunately is happening at the time when there are concerns regarding new types of rust (**Orange and African Rust**). This now makes this situation even more worrying for the industry as when rust is encountered there is uncertainty if it is still the old **common brown rust** or something else.

Following the reports of rust by growers, SSATS did some assessments and what came out was that it was mostly on cane of two to six months of age and N25 was the most affected variety. What also came out was that a lot of the affected fields were cut in May/June. Also affected were nurseries planted in March. Rust requires a trigger of cold night temperatures and wetness on the leaves and apparently these crops went through winter at a young vulnerable stage. July cut fields had this disease but the infection was minor compared to the March planted and May/June cuts. SSATS went on to sample these fields for identification of the type of rust involved at the South African Sugar Research Institute (SASRI). The results were scary in that all the samples (**100%**) came out as the new rust known as African Rust.

Rust is a fungal disease of sugarcane all over the world. In Swaziland it affects sugarcane throughout the industry. What the industry has known all over the years is that sugarcane out-grows this disease and continue to grow up to harvest. Despite out growing this disease, the fact remains that by the time this happens, plenty of growth has been lost and thus yields are affected negatively (**10 to 25% yield loss**). This is because any disease that results in the de-colouration of the leaves inhibits photosynthesis thus affecting the manufacture of carbohydrates by the plant hence the disruption of growth.

It could help at this point of this out-break to recap on what the industry knows about common rust before the other types of rust are discussed.

Brown rust (common rust)

The rust that was experienced by the industry almost every year for as long as it could be remembered is common rust caused by the fungus, *Puccinia melanocephala*. Growers will also remember that while this disease affected the whole industry, certain varieties such as N14 were more devastated by this disease compared to the others. The second thing is that it affected young cane of about 2 to 6 months of age, being worse in plant cane than in ratoon crops. Thirdly, this disease was almost always seen in spring. The reason for this among others is that rust needs a trigger of very cold night temperatures accompanied by wetness on the leaves. For this reason it is likely be seen in March planted crops and April, May, June and July harvested crops that are still young in age during winter and spring.

Symptoms of brown rust:

Rust is more severe in the young stages of plant and ratoon crops, and it generally declines with increasing crop age.

- The earliest symptoms of common rust on the leaves are small, elongated yellowish spots which are visible on both surfaces of the leaf.
- These spots increase in size, mainly in length, and turn red-brown to brown in colour.
- A narrow, pale yellow-green halo develops around the lesions.
- When common rust is severe, numerous lesions occur on individual leaves giving them an overall brown or rusty appearance.

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SUGARCANE RUST OUTBREAK (*CONTINUED*)

- These lesions coalesce to form large, irregular necrotic areas and this usually result in premature death of the leaf. In such cases, the number of live leaves per plant can be seriously reduced, while in very susceptible varieties there may be fewer stalks per stool and reduced diameter and length of the stalks which all lead to yield reduction.
- In some cases, bands of lesions may occur; resulting from intermittent heavy infection while the leaf is in the partially unrolled spindle.
- Rust can also cause wilting, some leaf tip death and accelerated death of the leaves.

Figure 1*: Sugarcane brown rust*

Figure 2*: Advanced symptoms of brown rust*

African rust

This unknown rust that was initially observed on sugarcane in Swaziland and Umfolozi in 2009, re-appeared in spring 2011. This rust dubbed the African Rust is caused by the fungus *Puccinia sparganioides*. In August 2013, this new form of rust was confirmed by the South African Sugar Research Institute (SASRI) experts in a 10 month old field of N25. Since then SSATS has taken a number of samples from infected fields around the industry to SASRI to ascertain the prevalence of this new rust.

This new rust appears to be favoured by cool, moist weather and has been observed in crops of up to 10 months of age where brown rust symptoms would have vanished.

Symptoms of African rust:

- Orange to reddish brown lesions
- Lesions similar in size to brown rust
- Lesions more severe towards leaf tip

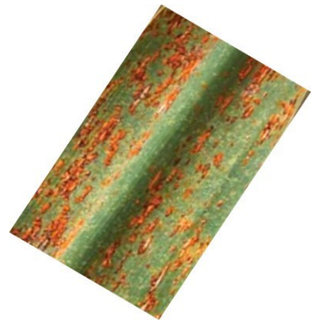

Figure 3*: African rust*

Orange rust

This type of rust is worth mentioning in this article even though there is no evidence of its existence in the local sugar industry. Orange rust is caused by the fungus *Puccinia kuehnii*. Symptoms are more prevalent on semi-mature to mature cane unlike in common rust where young cane is affected. This disease is favoured by humid summer and warm to cool autumn conditions.

Symptoms of orange rust:

- The initial symptoms of orange rust are minute, elongated yellow spots which take on a pale yellow-green halo as they increase in size.
- As the lesions grow, an orange to orange-brown colour develops depending on the cane variety.
- Unlike common rust, orange rust lesions are never dark brown.
- Pustules of orange rust tend to occur in groups on the affected leaf surface with most pustules on the lower surface and more lesions towards the leaf base.

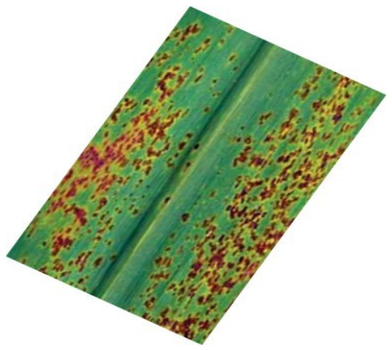

Figure 4*: Orange rust*

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SUGARCANE RUST OUTBREAK (*CONTINUED*)

Management and control of rust

This is with reference to common brown rust and African rust which has been confirmed to exist in the industry.

- Plant resistant varieties. Current situation is that N25 and N46 are more susceptible to rust.
- Diversification of varieties to avoid having a lot of area under a susceptible variety.
- Avoid light-textured soils for susceptible varieties as rust tend to be more severe on these.
- Burning of all trash after harvest of severely infected fields
- Avoid exceeding recommended rates of fertilizers as rust tend to be more severe on young vigorously growing cane.
- A new fungicide, ***Abacus*** can be sprayed at the rate of 1.6 litres per hectare i.e. two sprays separated by a month.
- Finally, report incidences of rust to extension officer and SSATS.

By Duma Zwane (Crop Protection & Extension Officer)

MANAGING IRRIGATION AT SPRING TIME

Introduction

The spring season (August to October) is the time when crop water demand starts to increase as shown by the long term mean (LTM) values in **Figure 4** for the Lowveld region. It is very important to apply the first irrigation within a week after harvesting. This is because the soil has been under dry-off conditions and the young ratooning crop needs moisture to develop tangible roots system. Any delays at this period affects the ratooning ability because any regrowth under very dry conditions dies back which in turn has adverse effects on the plant population and the intended yields.

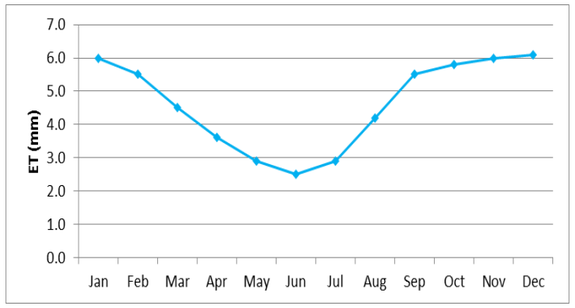

Figure 4: ***Crop water demand for the Lowveld***

The crop water demand varies according to harvest season and the growth stage of the crop. To ensure that the first irrigation is applied on time, it is important that once a field is on dry off, sourcing of repairs material and maintenance of the irrigation system should resume immediately.

In the case of those systems that cannot be removed from the field, maintenance should commence immediately after harvesting. It is during the springtime when increasing number of heat waves are experienced up to February. There is a tendency among growers to apply more water than required once the heat waves start. It is true that heat waves are scary. Nonetheless, they do not persist for long consecutive days and are sporadic. As much as their impact is felt on the day(s) they are on, trends have shown that their effect in the long run does not necessitate an increase in water requirement. The evapotranspiration (ET) in the past four years have been below the LTM most of the time despite heat waves' occurrences.

Low ET below the LTM means normal to below normal irrigation requirements. There is a need for growers to follow a proper irrigation schedule even during the warm season despite the occurrences of these heat waves. Proper scheduling ensures that water requirement of the cane crop is met. Unnecessary excessive irrigation should be avoided at all times. Over irrigation wastes electricity and also increases irrigation labour costs. Over irrigation further causes drainage problems, leaches nutrients, increases weeds incidences and causes poor growth which results in low yields. Therefore, heat waves do not mean more irrigation but a reminder to properly plan for irrigation based on sound irrigation principles. When irrigation events are properly scheduled, with or without heat waves the cane will be correctly irrigated thus proper growth and good yield is achieved.

By Patrick Mkhaliphi (Irrigation Officer)

A HOLISTIC APPROACH TO CROP NUTRITION

Introduction

The warmer months have come, cane growth is vigorous and fertilizer application is expected to upsurge. Tragically, the cost of fertilizers continues to rise owing to increases in world oil prices, weakening local currency and the ever increasing demand for fertilizer products. These factors are, however, beyond the control of the grower. Nonetheless, cane growers can exercise a high level of judiciousness and sensitivity in managing

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