

# DRONE TECHNOLOGY IS HERE, ARE WE READY?

## Introduction

With the chemical ripening season closing-in for the incline phase, growers must have already signed contracts with reputable service providers to ensure seamless ripener applications this season. Those who have not yet engaged any service provider yet, are strongly encouraged to do so soon. Growers with relatively small areas are advised to consider pulling together their farms/fields and engage service providers as a group. This will bolster their ability to negotiate favorable terms with service providers while garnering greater purchasing power. On the other hand, service providers gain advantage in that they will have multiple fields to spray at one location hence saving on travelling costs – a benefit which should accrue for growers ultimately.

## Drone technology is encouraged

Often, as Technical Services we get asked by growers if application of chemical ripeners by drones (unmanned aerial vehicles, UAV) is safe? The answer is a resounding yes... on condition that it is done correctly by a qualified operator. Application of chemical ripeners by drones is strongly encouraged especially because of the shortage of aircraft (fixed wings and chopper/helicopter) service providers. The principles upheld for aerial applications of agri-inputs should be observed for drone applications as well. These include the amount of product to apply per area (application rate, L or kg per ha) which is affected by spray height above the crop, spray discharge, speed of sprayer and spray width. Hence, growers need to ensure that service providers avail this information. It is also important for growers and spraying contractors to follow the product label. Similar to aircrafts, drone operators should be able to provide spray reports after every application event. **Figure 4** shows drones spraying sugarcane fields.

## Advantages

The drone technology provides several advantages to the cane growing business. Drones are able to spray

small fields, irregular shaped fields or part of fields, fields located next to protected areas, selected areas (spot spraying) within a field, and other fields that are not suited to aircraft applications. Drones are not only ideal for chemical ripener applications but they are useful for pesticides and fertilizer applications as well herbicide applications in some instances. Drones are also used to capture aerial photographs which are useful in monitoring crop health and identifying problem areas within a field which would otherwise have not

been possible with ordinary means. Drones can also be used to verify field areas.

## Precision agriculture

In essence, the drone technology has landed itself as a vehicle to advance precision agriculture (PA). PA, in the broadest sense, is the application of management decisions in space and time based on identifying, quantifying, and responding to variability. It is generally noted of the five Rs: application of right input, in right quantity, in right manner, at the right time and in the right place. PA is reckoned for its positive economic, social and environmental impact relative to conventional agriculture.

With agriculture moving speedily towards digitalization, which is a data driven space, the use of drones is expected to increase, and the Eswatini sugar industry cannot be left behind. Actually, there is a general concern that the drone technology is underexplored in the agriculture sector yet there are so many opportunities for its use in the drive to increase yields and operational efficiencies.



**Njabulo Dlamini**  
(Crops Agronomist)



**Figure 4:** Drones spraying agri-input in sugarcane fields



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## 2022/23, the season that never was

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## Radiation and temperature

Radiation and temperature are the most important climatic factors which determine cane yield

## Drone technology

In essence, the drone technology has landed itself as a vehicle to advance precision agriculture

# 2022/23, THE SEASON THAT NEVER WAS

## Introduction

The 2022/23 milling season has been an arduous one for the Eswatini sugar industry. As I pen down this article, it is unclear of when the crushing season will be completed and give way to factory maintenance in preparation for the 2023/24 crushing season. What made the year difficult is an interplay of several factors which have presented social and economic challenges to the industry. The season started with carry-over cane from 2021/22 approximated to 135 000 tonnes in the Big Bend mill area. This carry-over cane had been meant for crushing in the 2021/22 season, and the shortfall resulted in low sugar production 'injuring' the industry's overall revenue for that financial year. As such, the 2022/23 season was not only hard, but it started at a negative footing – a deficit in sugar stocks.

## Wet fields

When the season started in April, fields were extremely wet making extraction of cut cane from infield a difficult process to such an extent that some growers had to use large tractors to pull

loaded haulage vehicles out of the fields (**Figure 1**). While this was the only alternative given the circumstances, it led to soil compaction in most fields which may result to depressed yields the next seasons. The unfortunate situation of wet fields persisted to July in some estates, resulting to low cane quality and increased fibre content in the first few months of the season.



**Figure 1:** Wet field damaged by haulage tractors

On the milling front, this led to inconsistencies in cane supply and increased mill ash hence compromising factory performances. The consequences thereof are inefficiencies in resource use and increased milling costs.

## Cane lodging

The excessive rains received prior and within the milling period, often accompanied by harsh winds, led to severe cane lodging. Cane lodging is undesirable in sugarcane production as it presents several negative effects on the present and subsequent ratoon crops. These effects include reduced cane quality, stalk breakages, increased fibre content, increased pests and disease infections, difficult traversing through cane fields, reduced

*Continued in the next page*

## ...THE SEASON THAT NEVER WAS *CONT...*

harvesting efficiencies and decline in yields of the next ratoon crops. Therefore growers, where possible, are strongly encouraged to prioritize lodged fields when scheduling their harvesting to minimize losses thereof. **Figure 2** shows a lodged cane field.

### Nutrient leaching

Intensive rains are known to be associated with nutrients leaching especially in freely draining soils. If this remains unchecked, through soil and or leaf sampling, nutrient deficiencies may lead to reduced cane yield. On the other hand, poor draining soils also provide a serious challenge during periods of excessive rains. Fields are waterlogged leading to anaerobic conditions which restrict growth and effectiveness of the root systems. Poor draining soils take relatively longer time to dry-off thus delaying harvesting operations. Where practically possible, poor draining soils should be harvested during the dry period of the milling season.

### Low yields

Due to the extended rainy days late 2021/22 and early 2022/23 - a period of optimum cane growth - the 2022/23 harvested crop did not benefit from long sunshine hours and optimal day temperatures. This was so because rainfall is accompanied by a heavy presence of clouds which negatively correlate with these climatic factors. This eventually led to lower yields than what most growers anticipated. Most growers had forecasted higher yields due to the frequent rains and healthy water resources. However, the impact of reduced radiation and favorable temperature outweighed the rainfall effect. For maximum yields to be realized, these three factors (i.e., radiation, temperature and rainfall) must be available in balanced or complimentary proportions.

The impact of the change in climate is now tangible in the sugar industry. Predicting trends of the key climatic factors is getting more difficult even for the most advanced technologies. The rains mentioned in this article, as excessive as they were, were highly erratic and variable across and within areas. This, in turn, affects grower decision making.

### Preparedness

Since these eventualities are not likely to change

moving forward, it is critical that sugarcane growing businesses and the sugar industry at large are prepared to withstand them by embracing climate adaptive and mitigation practices. These will demand concerted effort from all stakeholders across the value chain including researchers and policy makers.

### Political and labour issues

Similar to 2021/22, political and labour issues emerged in 2022/23 which had tremendous effect in the performance of the sugar industry. Significant milling hours were missed due to threats that were political in nature and industrial action by a certain sect of employees servicing the sugar industry.

### Rising production costs

All these happen, at the height of unprecedented increase in production costs. The costs of fuel and farm inputs skyrocketed over the past 12-months, doubling in most instances. To mitigate the effects thereof, the Technical Services department of ESA hosted two grower days, one in the South and one in the North, during the

year and the theme was “grower resilience in difficult times”. Growers were highly responsive and the attendances were impressive.

In addition to the rise in costs, availability of farm inputs such as herbicides and fertilizers proved to be a challenge as well. This challenge persisted from year 2020, when Covid-19 struck and it was worsened by the continuing Russia-Ukraine war. Growers interviewed late December, whose fields were highly infested with weeds, indicated that they are battling to source herbicides from known suppliers. This will require growers to resort to hand weeding. Growers intending to use hand weeders should target to complete weeding within the shortest possible time to avoid excessive seeding of weeds particularly grasses. Once grasses are allowed to seed, the problem is likely to persist to the next years.



**Figure 2:** A lodged sugarcane field

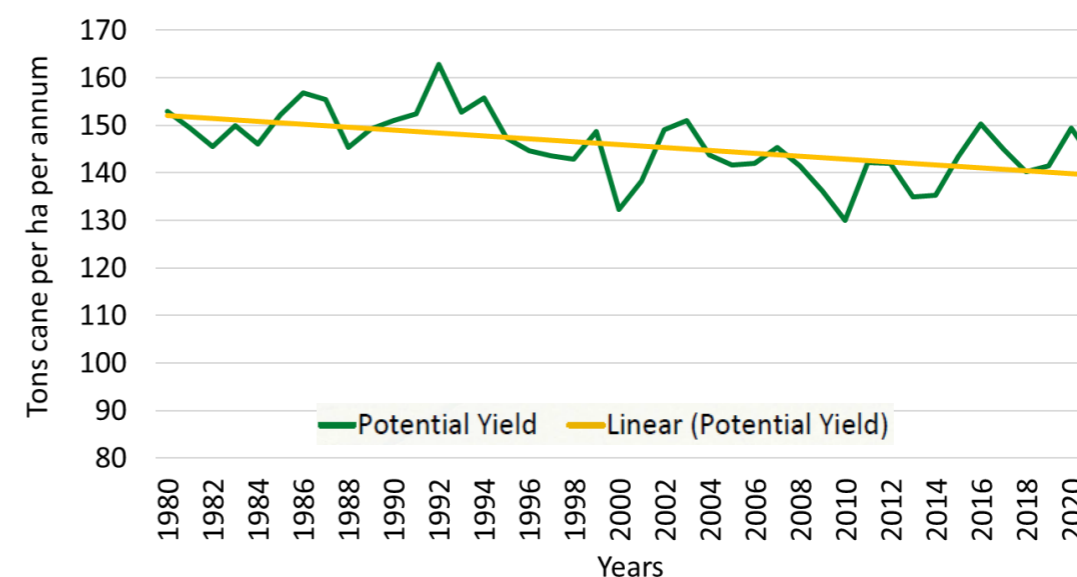


*Njabulo Dlamini  
(Crops Agronomist)*

## RADIATION AND TEMPERATURE, ARE THEY TAKING A NOSE DIVE?

### Introduction

A long-term analysis of climatic yield potential indicated that radiation and temperature are becoming less favorable for cane growing in the industry (**Figure 3**). Radiation and temperature are the most important climatic factors which determine cane yield. [Climatic yield potential, in this context, refers to cane yield limited by radiation and temperature. It assumes that all other production factors such as soil and management, are not limiting]. This finding is consistent with the Technical Services department’s periodic reports that radiation reported was below long-term means. On the other hand, in Newsletter No. 82, it was reported that during spring and summer seasons, long-term industry temperature trends indicate that heat waves exceeding 40°C



**Figure 3:** Climatic yield potential trends from 1980 to 2021

were becoming more frequent especially in the last ten years. These changes are attributed to the changing climate being experienced globally. These effects, exacerbated by the intrusion of exotic pests like Yellow Sugarcane Aphids, are rendering the environment less favorable to cane growing.

### Factors affecting cane yield

Factors affecting cane yields are broadly categorized into three, namely: genetic, environmental and management. Genetics refer to variety, which is an expression of the combined genes of the variety’s ancestors. Different sugarcane varieties are known to perform differently even under similar conditions, suggesting variation in genotypic expressions. The Technical Services department endeavors to provide growers with different varieties that are specific or

broadly adapted to different conditions. The responsibility to correctly site these varieties in their suited environments resides solely with the grower.

### Environmental factors

Environmental factors affecting cane yields are classified into biotic and abiotic. Biotic factors include prevalence of pests, diseases and weeds, while abiotic factors include climate (i.e., temperature, rainfall, radiation, frost etc.) and soil properties such as soil structure, texture (drainage features) and inherent fertility which is characteristic of the parent material.

### Management factors

On the other hand, management factors include activities such as irrigation, crop nutrition, weed control, pest and disease control, chemical ripening and harvesting operations. As the environmental conditions responsible for cane growth become less conducive, it is very critical for growers to raise the level of crop management, and be intentional about it. Things can no longer be decided by fate, management is critical. These activities need to be properly planned and executed correctly and on time if sustainable yields are to be realized. Suboptimal management will ultimately lead to below optimal yields.

The need to adopt improved and or best practices can no longer be postponed. It is time growers take charge of what happens in their farms to drive up productivity to profitable and sustainable levels.



*Njabulo Dlamini  
(Crops Agronomist)*