

FLOODING: A RISING CHALLENGE

Introduction

Lately, floods are the most frequent type of natural disasters encountered during the rainy seasons. Floods are increasing in frequency and intensity, and they are expected to continue increasing due to changing climate. Human induced changes to the environment also increase the intensity of flooding. These include deforestation, removal of wetlands, changes in waterway course and removal of flood controls like levees.

Causes of floods

In this region, floods are often caused by heavy rainfall and tropical cyclones. In 2022, there were serious flooding incidences due to tropical cyclone Eloise. Floodings experienced in February 2023

were due to heavy rainfall received within a short space of time. In three days, more than 300mm rainfall was collected at Simunye and Mhlume (Figure 4).

Damages due to flooding

Floods can cause widespread devastations, resulting in loss of life and damage to infrastructure and crops. The following are possible flooding problems that may affect the sugarcane crop:

- **Ponding:** it could lead to waterlogged condition infield thus affecting root growth and nutrient availability.
- **Denitrification:** loss of nitrogen due to anaerobic soil condition leading to reduced yields.
- **High water table:** soil profile tends to take long time to dry-up thus resulting to soil compaction and stool damage

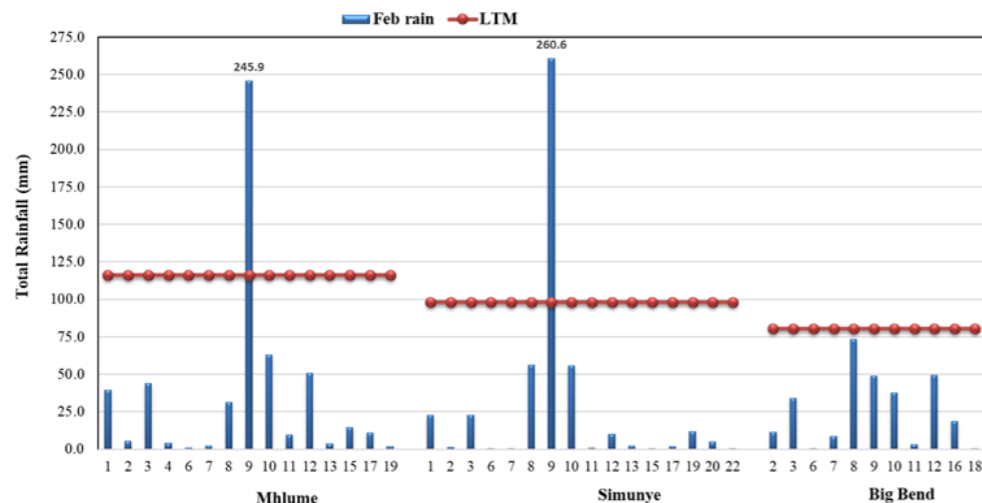


Figure 4: Rainfall received in the Lowveld region in February 2023



Figure 5: Flooding in a sugarcane field

(Figure 5).

- **Salinity/sodicity:** rising water table is often associated with increase in salt levels in the root zone
- **Loss of nutrients:** through deep percolation beyond root zone.
- **Soil crusting:** accumulation of sediments causing effects that resembles compaction thus restricting root penetration and water infiltration.

• **Soil erosion:** roots are left exposed thus fail to absorb water and nutrients and yields may drop.

• **Accumulation of unwanted debris:** some sedimentations may come with weed seeds and disease

pathogens bringing new challenges in the field.

• **Flooded pumpstations:** irrigation events could be delayed due to accessibility challenges, damages to suction sumps, motors and pumps.

Conclusion

Growers should ensure their fields and infrastructure are geared to cope with extreme occurrences of flooding. They should also follow closely weather forecast updates and adhere to issued warnings to minimize effects of harsh weather damages to crops and infrastructure.



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Tropical cyclones

More cyclones can still be formed in the Indian Ocean as their season is not yet over

Post-harvest irrigation systems maintenance

This ensures that the irrigation systems perform at their optimum levels across the season

Flooding

Floods are increasing in frequency and intensity, and they are expected to continue increasing due to changing climate

INCREASED OCCURRENCES OF TROPICAL CYCLONE

Introduction

Recently, there has been an observed increase in frequencies of cyclones. Between January 2023 and February 2023 (two month period), seven severe tropical cyclones were formed in the Indian Ocean. Four of these (Cheneso, Dingane, Gabrielle and Enala) had already dissipated at the time of writing this article. However, three of them (Freddy [Figure 1], Judy and Kevin) were still active. Although all these cyclones did not directly affect Eswatini, countries such as Madagascar, Mozambique, Malawi and Zimbabwe experienced severe flooding, loss of lives and property damage due to these cyclones. More cyclones can still be formed in the Indian Ocean as their season is not yet over. The Australian water in the Indian Ocean is said to be favorable for cyclone formations this year.

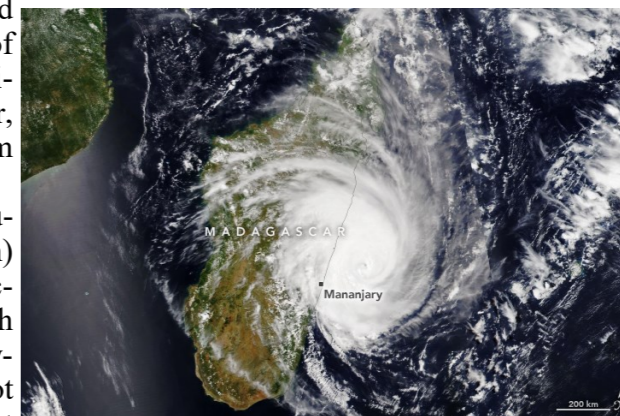


Figure 1: Tropical cyclone Freddy landing in Madagascar

Precautions and actions to counter-act tropical cyclones challenges

- Growers should continue to constantly check short-term and long-term weather updates in order to get the latest weather warnings and advisories.

- Growers should monitor river water levels and when necessary, remove pumps and electric motors from river pumpstations.
- Growers should ensure that open drains and waterways are well constructed to allow free movement of water to nearby streams.

• Keep vegetation and/or build structures around the farm that can act as a barrier to moving water to reduce flood severity and impacts.

• Drain excess water from the fields to minimize build up of long-term drainage problems.

- Take leaf samples to test nutrients content and top dress with nitrogen fertilizer where necessary to minimize yield losses.
- Remove debris and sediment that could affect the sugarcane crop and impede field operations.
- Repair gullies and other damages caused by surface runoff water.
- Carry out soil ripping after harvesting to break compaction caused by machinery on flooded fields.



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POST-HARVEST IRRIGATION SYSTEMS MAINTENANCE

Introduction

The 2023/24 milling season is fast approaching. Drying off early season harvest fields has already begun, and growers are preparing for post-harvest activities. One of the key post-harvest activities is maintenance of irrigation systems. This ensures that the irrigation systems perform at their optimum levels across the season.

Checking and maintenance of irrigation system devices

An irrigation system should operate as close as possible to its original design specifications. The equipment require monitoring and periodic checking as they wear-out over time and may malfunction or stop functioning at all. Below are some of the important irrigation system devices, their functions and maintenance procedures.

Pump

Pumps should always run smoothly without any vibrations. Pumps must be checked for abnormal noise and power consumption regularly. Growers should follow the pump maintenance schedule provided by manufacturers. The maintenance includes checking pump alignment; inspecting and cleaning bearings; replacing oil; inspecting wear and tear; carrying out hydraulic test; replacing gland packing; and inspecting cables.

Electric drive

Monitor the operating current and voltage measured by ammeters and voltmeters, respectively. Operating current (or voltage) above the rated values leads to excessive power consumption, thus damaging motor windings and bearings. This decreases motor lifespan. If the hands in the meters are no longer moving, it may mean that the meters are non-functional hence they should be

replaced. All electrical cables, bearings and belts must be checked and replaced if necessary, according to manufacturer's prescriptions.

Pressure gauge

Irrigation efficiency is one of the important indicators of an irrigation system performance. A critical aspect of enhancing irrigation efficiency is pressure management where pumping is done. Operating an irrigation system at optimal pressure ensures uniform distribution of water in the field. Pressure gauges (**Figure 2**) should be checked periodically and replaced whenever they are defective as they assist to pinpoint performance issues of a pressurized irrigation system. For example, a drop in pressure may indicate a broken pipe or too many sprinklers running at the same time. On the other hand, higher pressure than recommended can result in pipe bursts and

poor water distribution.

Flow meter

The Water Act (2003) requires growers to account for water usage. Flow meters (**Figure 3**) also provide other critical information such as: low flow rates than normal may indicate pipe leaks, faulty pump, or obstructed valve. High flow rates than normal may indicate

that too many outlets are operating simultaneously. The physical condition of the flow meter and electric cables should be checked. Best time to service flow meters is during dry-off.



Figure 2: A pressure gauge showing pressure reading from a hydrant valve



Figure 3: A flow meter installed in an irrigation pipeline

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POST-HARVEST IRRIGATION SYSTEMS MAINTENANCE *CONT...*

Maintenance of different irrigation systems

The table below provides a summary of the maintenance procedures for commonly used irrigation systems.

Irrigation system	Maintenance procedure
Sprinkler	<ul style="list-style-type: none"> • Check condition of horse pipes. • Check if nozzle size is the same across the field. • Check if sprinklers are placed upright. • Flush mainlines. • Service air and hydrant valves in each field. • Check and replace rubbers at quick coupling pipes where necessary.
Centre pivot	<ul style="list-style-type: none"> • Check nozzle package per tower & replace according to specification. • Check tire condition and pressures. • Fix any leaks and pivot pathways. • Check alignment of towers to avoid poor water distribution and breakdowns of the pivot. • Gearbox, drive oil levels, grease and bolts should be inspected as well; and necessary action be taken where needed.
Drip	<ul style="list-style-type: none"> • Check water quality and ensure filtration system is cleaned. • Check for leaks and flushing system. • Replace damaged dripper tapes. • Carry out chemigation during the dry-off period to minimize clogging. • Service air and hydraulic valves.
Furrow	<ul style="list-style-type: none"> • Remove weeds and trash from field channels and drains. • Ensure furrow ridges are intact. • Check if water reaches the downstream end of furrows. • Ensure consistency of furrow slope.

Conclusion

Growers are strongly encouraged to take the maintenance of their irrigation systems seriously. The costs of repairing damaged equipment far exceed those of maintenance. The adage "prevention is better than cure", holds true with irrigation systems as well. For more information, growers are referred to their respective Extension Officers and/or Irrigation section of the Technical Services of ESA.



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