

2023 PNG UPDATE

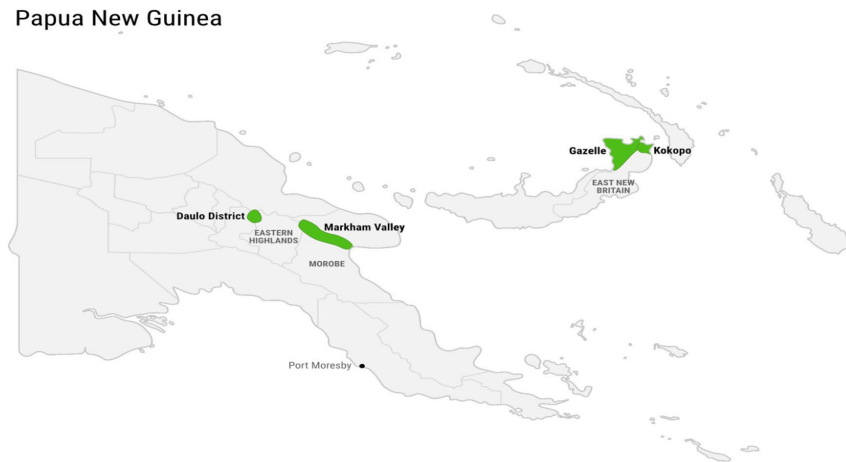
Resilient and Diverse Development

Development of a seasonal farm advisory
in Papua New Guinea for Climate Smart
Agriculture

Ruth Baiga

R. Friedman, S. Crimp, M. Okrupa, A. Galus, J. Pakatul, L Fooks

Empowering Farmers Through Climate- Smart Agriculture: The development of Seasonal Farm Advisory in Papua New Guinea.



- Our research project is working to understand how climate information can best address the need of farmers to build more adaptive and resilient agricultural systems.
- Study Sites;
 1. East New Britain
 2. Morobe
 3. Eastern Highlands Province

1. PNG Agriculture System and seasonal climate variability

- plays a critical role among the livelihood strategies of most Papua New Guineans
- closely tied to climate, making agriculture one of the most climate-sensitive of all economic sectors
- at risk of being affected by weather and climate variability resulting in low productivity of agricultural production



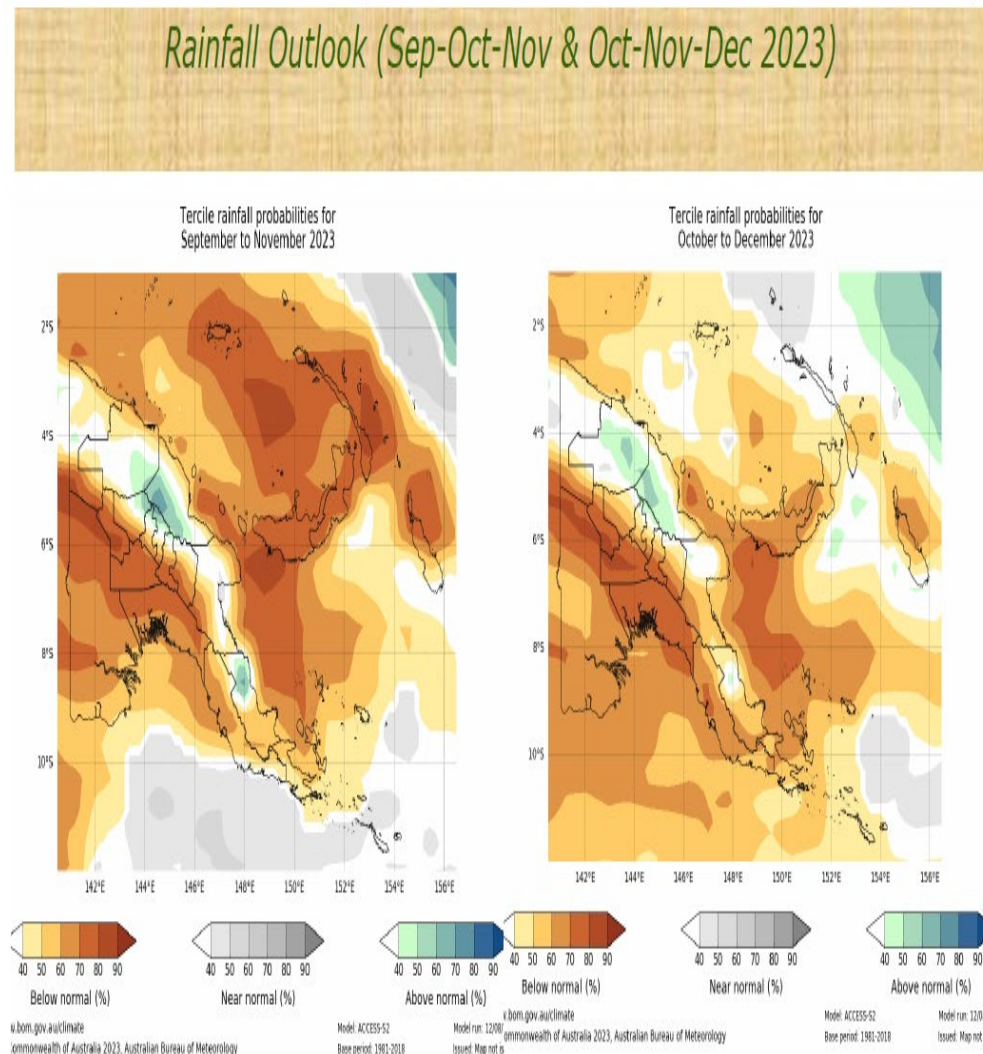
2. What is a seasonal Farm Advisory (SFA)?

- Tool for decision making that uses weather and climate information to guide farm management practices.
- provide users with a general idea of how the season will develop
- Provides recommendations for better planning farm management operations

	Rainfall forecast scenario (5 month)					Rainfall forecast scenario (5 month)				
	Dry	Dry	Dry	Dry	Dry	Wet	Wet	Wet	Wet	Wet
Crop selection	The lengthy dry conditions may require a shift to alternative drought tolerant crops.					The lengthy wet conditions may require a shift to crops that are less sensitive to waterlogging disease etc.				
	Drought tolerant crops?		Irrigation access?			Wet tolerant crops?				
Variety selection	The lengthy dry conditions may require a shift to alternative drought tolerant varieties.					The lengthy wet conditions may require a shift to varieties that are less sensitive to waterlogging disease etc.				
	Taro	Sweet potato	Bulb onion	Irrigation access?		Taro	Sweet potato	Bulb onion		
Sow/plant time	Drier than normal conditions early may lead to poor or non-uniform establishment and slow growth due to water stress. Consider delaying for rain.					Field access for tillage/ground works and sowing may be impaired by wetter than normal conditions early. Equipment and planting material should be ready at short notice when the weather breaks.				
	Soil water content?		Irrigation access?			Soil water content?		Irrigation access?		
Planting method	Consider planting methods that capture rainfall (i.e. lessen runoff) and reduce evaporative loss (e.g. unrounded mulch). Plant deeper if required to access soil water.					Consider planting methods that shed rainfall (e.g. mounding) during the early wet months. Mulch is not recommended as it will reduce evaporation and may encourage disease early.				
	Taro	Sweet potato	Bulb onion	Crop 4	Crop 5	Taro	Sweet potato	Bulb onion	Crop 4	Crop 5
Nutrient management	The forecast dry conditions may slow growth due to water stress and reduce nutrient demand and yield potential. Consider reducing rate of applied nutrient (organic or inorganic) compared to a normal season.					Higher than normal rates may be required to allow for nutrient losses from leaching and the likely absence of water stress (and hence higher yield potential). Consider split applications of manure/fertiliser to lessen leaching losses.				
	Taro	Sweet potato	Bulb onion	Crop 4	Crop 5	Taro	Sweet potato	Bulb onion	Crop 4	Crop 5
	Soil water content?		Irrigation access?							

3. Strategic Food Production plans

- Making strategic food production plans ahead of evolving seasonal climate conditions is seen as an important way to improve the resilience of food production system.
- One tool that has been identified as facilitating adaptation to seasonal climate variability is SCF



4. Challenge

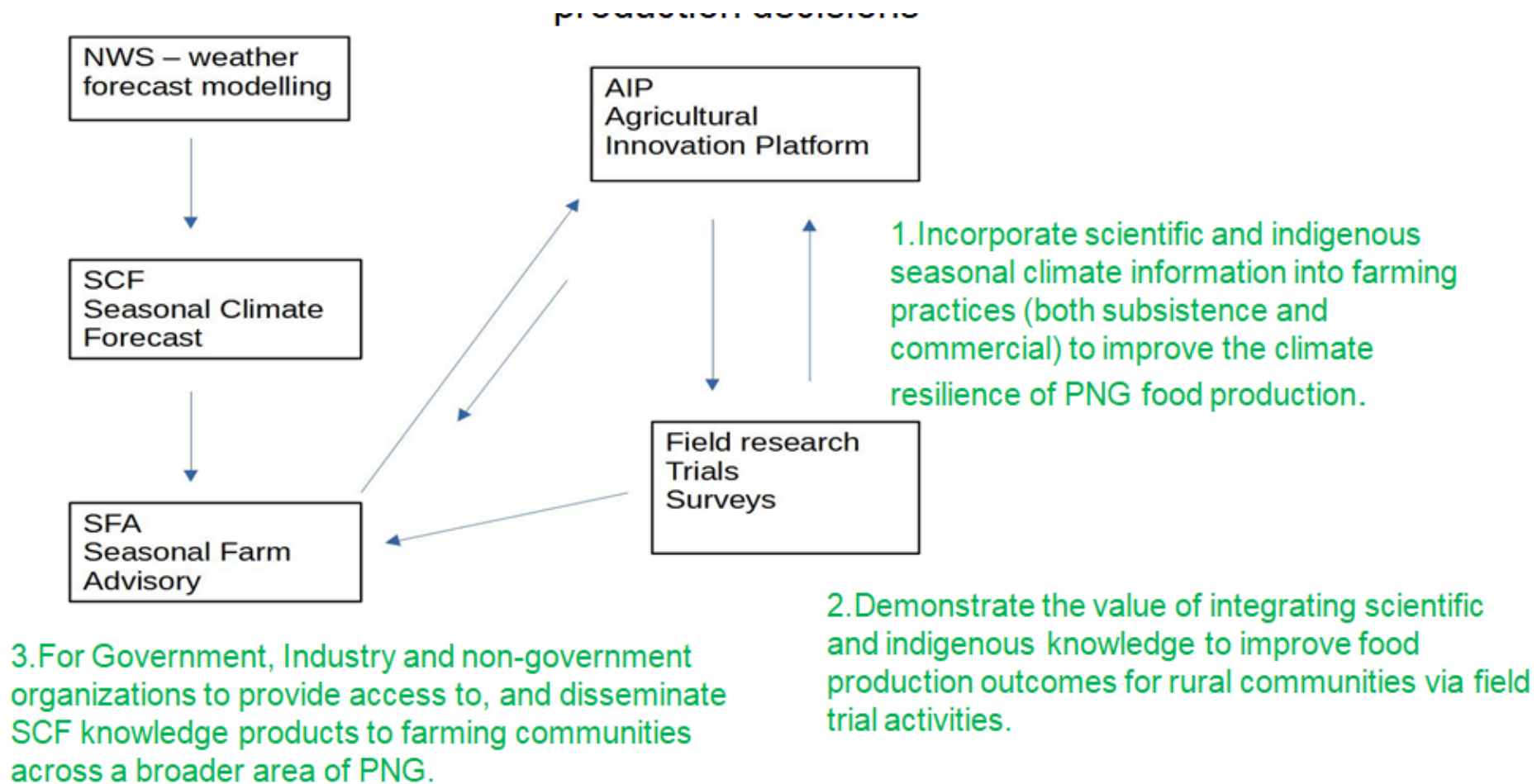
- SCFs improves the responses of agriculture to climate variability and change but:
 - 1. The nature of information available is too complex
 - 2. translating SCF information in ways that can trigger timely alerts and guidance for farmers and other agriculture stakeholders is challenging.

5. Addressing the challenge

- seasonal climate information, can be communicated and integrated with existing farm practices to increase the adaptive capacity of farmers.
- One approach to integrating SCF with rural community food production has been achieved through CSA activities.

Examples of technologies and practices	Examples of benefits
Soil management	
<ul style="list-style-type: none"> • Zero-tillage, minimum-tillage or conservation tillage • Erosion control (such as reducing the degree and length of slopes through progressive and bench terracing) • Protective soil cover from mulch, crop residues or cover crops • Soil compaction management • Restoration of degraded soils • Fallowing 	<ul style="list-style-type: none"> • Practices that increase soil organic carbon maintain productive soils, require fewer chemical inputs and support important ecosystem functions such as nutrient cycling, contributing to enhanced productivity, adaptation, mitigation and building resilience to climate change
Nutrient management	
<ul style="list-style-type: none"> • Integrated soil fertility management using inorganic and organic fertilizers; management of nitrogen fertilizer; using mulch, compost, manure or green manure in place of inorganic fertilizers 	<ul style="list-style-type: none"> • Integrated nutrient management such as green manures can contribute to adaptation and reduce costs to farmers
Crop management	
<ul style="list-style-type: none"> • Crop diversification • Crop rotation • Intercropping (e.g. with leguminous plants) • Increasing the use of perennial crops and grasses • Growing nutrient-use efficient crop varieties • Integrated pest and/or weed management • Breeding and using crop varieties with increased resistance to extreme conditions such as droughts • Mulch or cover cropping • Rice intensification and improved cultivation techniques • Landscape-level pollination management 	<ul style="list-style-type: none"> • Pollination management can improve landscape level ecosystem resilience • Planting nitrogen-fixing crops can contribute to adaptation and reduce costs to farmers
Water management	
<ul style="list-style-type: none"> • Water harvesting • Groundwater development • Construction or enhancement of dams • Irrigation (e.g. modern technology, accurate scheduling) • Drainage and flood management • Restoration of riparian habitat or creation of rivers • Improved hydrological monitoring and weather forecasting capacity 	<ul style="list-style-type: none"> • Irrigation improvements can reduce GHG emissions, contributing to mitigation; increase crop and grassland productivity; and support adaptation

6. Generating the SFA (mixture of Methods)



Surveys, Field days and gender-specific focus groups



- The surveys have provided baseline information about;
 1. Where farmers get climate and weather information
 2. How information is shared
 3. What climatic information is used for
 4. Times of the year information is needed.



Field Trials



- provided initial evidence of the value of seasonal climate information for making farm management decisions on;
 1. Crop management
 2. Water Management
 3. Soil Management
 4. Nutrient management

Developed master document template for SFA

Seasonal Farm Advisory (06/06/2023)

Alerts and Warnings

Drought alerts or warnings are issued when acute water shortages are likely to occur.

Figure 1 highlights areas considered to be suffering from a prolonged drought watch, various drought alert or severe rainfall deficiencies (drought critical). The terms **drought watch**, **drought alert** and **drought critical** are defined by:

- Drought watch** - rainfall has between the bottom 10th and 10th percentiles for the period in question.
- Drought alert** - rainfall has above the bottom five per cent of recorded rainfall but below the bottom ten per cent for the period in question.
- Drought critical** - rainfall is among the bottom five per cent for the period in question.

There is a strong likelihood of persistent dry conditions over southern parts of West Bank, **Agga**, **Wag**, West New Britain, East New Britain, New Ireland and Bougainville continuing from July through to December 2023. The persistent dry conditions over East New Britain, Bougainville, New Ireland and Manus could lead to drought alert and drought critical conditions in some areas.

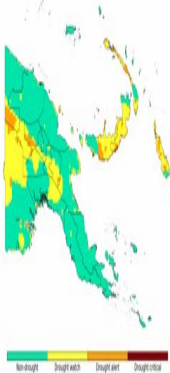


Figure 1: The drought inclusion for a 6-month period starting in July 2023

If you are planting food crops in July in East New Britain, Bougainville, New Ireland and Manus you will need to consider that hard irrigation might be required over the period July to November 2023 to ensure the crops mature without water stress and labor inputs are not negatively influenced.

Historical Summary

It is important to understand how much rain has fallen up until the point at which the forecast is made. The cumulative rainfall over the previous four months provides an important insight into the level of soil moisture available for crops. When 100mm to 1500mm less rainfall has fallen than the four-month average, soil moisture levels

are likely to be lower than normal. A forecast of dry conditions, coupled with lower than normal soil moisture levels will mean that farmers will have to consider management practices that conserve moisture.

Figure 2 highlights that much of Southern West Sepik, **OK**, **Agga** and North Flyway, greater highland region including **Wag** region have received between 50 and 500 mm less rainfall over the March to June period, than the average total for the 2000 to 2022 period.

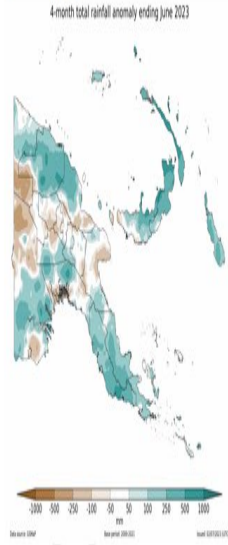


Figure 2: The cumulative rainfall map for the four-month period 01 June 2023.

Seasonal Climate Forecasts

There is an increased likelihood of drier than normal conditions developing over central PNG, East and West New Britain, New Ireland, Bougainville and Manus islands over the next three to four months (Figure 3 and 4). The likelihood of below normal rainfall conditions for the July to September 2023 period is between 40 and 80% over much of the central PNG, East and West New Britain, New Ireland, Bougainville and Manus islands (see Figure 3). For the August to October period, the likelihood of below normal rainfall continues to be between 40 and 80% over much of East and West New Britain, New Ireland, Bougainville and Manus islands (see Figure 4). Over the central PNG region, the likelihood of below normal rainfall has strengthened to 60 to 70%.

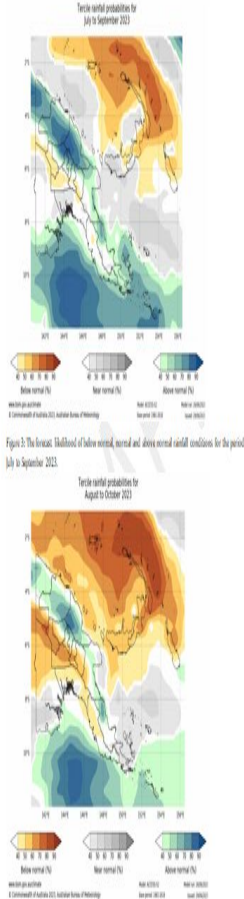


Figure 3: The forecast likelihood of below normal, normal and above normal rainfall conditions for the period July to September 2023.
The location specific rainfall outlook is:

Mariton Valley

June	July	August	September	October
Normal to 10% below	10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below
10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below

The monthly seasonal forecasts for the Mariton Valley region suggests near normal to above normal rainfall conditions from June to August followed by below normal rainfall conditions for September to October.

Agga

June	July	August	September	October
Normal to 10% below	Normal to 10% below	Normal to 10% below	Normal to 10% below	Normal to 10% below
10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below

The monthly seasonal forecasts for the **Agga** Valley region suggests near normal rainfall conditions from June to September, with a 40 to 50% likelihood of below normal rainfall conditions in October 2023.

Wag

June	July	August	September	October
Normal to 10% below	10% to 20% below	Normal to 10% below	Normal to 10% below	Normal to 10% below
10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below

The monthly seasonal forecasts for the **Wag** region suggests below normal rainfall conditions in June, September and October, with above and near normal rainfall conditions in July and August respectively.

Bes

June	July	August	September	October
Normal to 10% below	Normal to 10% below	Normal to 10% below	Normal to 10% below	Normal to 10% below
10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below

The seasonal forecast for the Bes region below normal rainfall conditions for all months except July when near normal rainfall conditions may persist.

Wag

June	July	August	September	October
Normal to 10% below	Normal to 10% below	Normal to 10% below	Normal to 10% below	Normal to 10% below
10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below	10% to 20% below

The seasonal forecast for the **Wag** region suggests below normal rainfall conditions will persist for much of the June to October 2023 period.

General recommendations (Aggregated RNN)

The seasonal rainfall forecasts for June to August, July to September and August to October 2023 suggest above normal rainfall conditions over much of the northern half of PNG, **OK**, **Agga**, **Wag**, East Sepik and northern parts of West Sepik, the central region e.g. **Wag**, **Wag**, **Wag**, **Wag**, **Wag** and West New Britain is likely to experience below normal rainfall conditions. In general, the **Agga** production of both potato and **Wag**, over this period with adequate soil moisture for good root and tuber initiation and filling, moving to slightly drier conditions suited to harvest.

For the northern half of PNG, consider the following general farm management practices:

Land Preparation

- If possible, combine shaping ground and surface drains to enable some in-crop control of drainage. The drains will act to shed water during the early wet conditions and can then be blocked later to retain soil water, especially for crops that are vulnerable to late dry periods (e.g. tuber bulking in potatoes). For these water crops, consider planting close to an irrigation source for **Agga** water access. For water bearing crops such as rice, selection of sloping ground is less important. If possible, create crops on the same field to reduce the build-up of disease.

Irrigation

- For many crop types, late season irrigation is likely to benefit yield and quality under this rainfall scenario. Water requirements vary between crop types and between growth stages for each crop. While water deficiency can potentially inhibit root, canopy and tuber growth, excess water can promote disease, waterlogging and leaching. For this reason, it is recommended that farmers (especially commercial and semi-commercial farmers), seek expert advice from agronomists and other field officers on the most appropriate irrigation strategies.

Pest and diseases

- Soil moisture may be required in the monitoring and control of crop diseases. The risk of insect damage may be elevated in the drier part of the season. Next neighboring farmers, if there is a disease or insect outbreak, threat pressure is also likely to be high in the early part of the crop season and can compete with the crop for light, nutrients and water. Rhizome around the perimeter of the crop can also act as a host for various pests and diseases and should be monitored. Adequate labor and other post-harvest control supplies should be prioritized in advance. The use of chemical control measures only in the season may be restricted by frequent rainfall, which may require emphasis on other control measures (e.g. physical removal, variety selection).

Planting decisions

- Consideration may also be given to selecting earlier maturing types to reduce exposure to late season water stress, especially in the absence of irrigation.

For the central region, consider the following general farm management practices:

Irrigation

- For many crop types, irrigation is likely to benefit yield and quality under this rainfall scenario.
- Water requirements vary between crop types and between growth stages for each crop. While water deficiency can potentially inhibit root, canopy and tuber growth, excess water can promote disease, waterlogging and leaching.
- For this reason, it is recommended that farmers (especially commercial and semi-commercial farmers), seek expert advice from agronomists and other field officers on the most appropriate irrigation methods and strategies.
- Irrigation systems can range from simple bucket-based operations to more advanced, automated systems including pumps, piping and pumps.
- Channeling flowing water into the field's drainage system is another simple system available to irrigate plants.
- Consider drainage and other methods that capture and retain soil water (e.g. surface mulch, shallow or lower surface drains, block mixing drains, tree pits, **Wag** wind control).

Harvest

- There is less risk associated with leaving the crop to fully mature and cure in the field in this rainfall scenario.
- Harvest, early in the day or late afternoon to avoid peak periods of heat stress (for plant and person).
- Pest and diseases:
 - Under dry seasonal conditions, more vigilance may be required in the monitoring and control of insect damage (e.g. sweet potato weevil).
 - While wet periods may be reduced, control is important to minimize soil water uptake.
 - Disease pressure is often reduced under dry conditions, and chemical control is more available and effective.
 - Alert neighboring farmers if there is an insect or disease outbreak.
 - Adequate labor and other post-harvest control supplies should be prioritized in advance.
 - Note that sweet potato weevil is more prevalent during drier conditions due to soil cracking and exposure, entry points).
- Planting decisions:
 - Due to the drier than normal conditions, you may want to reconsider planting crops at this time.
 - Alternatively, irrigation may be required if you choose to plant in order to avoid water stress.

Conclusion

- An effective use of the weather and seasonal forecasts and the seasonal farm advisories can reduce climate risks of farming communities and provide them with well adapted guidance on their farm management.

Acknowledgements

Project Partners



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