



Ministry of  
Agriculture



# Zambia Agriculture Research Institute

## 2025 National Research & Seeds Field Day Report



Soil, Crop & Water  
Management



Seed Quality Control &  
Certification



Protecting Plants,  
Facilitating Safe Trade

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## Message from the Director



It is my pleasure to share with you the 2025 National Research and Seeds Field Day Report.

This year's event brought together farmers, researchers, partners and colleagues from across the country and what stood out most was the genuine sense of togetherness.

Everyone who participated came with a shared purpose: to learn, to exchange ideas and to find practical ways of strengthening agriculture in the face of climate change.

Our theme **“Adapting to Climate Change through Resilience, Innovation, and Sustainability in Agriculture”** reflects the reality that farmers are living every day. The rains are shifting, new pests continue to emerge and old farming calendars no longer hold. Yet, despite these challenges, the energy and openness we saw during the Field Day gave us confidence that Zambia's agriculture sector is ready to adapt and continue moving forward.

The partnership among Plant Quarantine and Phytosanitary Service (PQPS), Seed Control and Certification Institute (SCCI) and Zambia Agriculture Research Institute (ZARI), along with the support of more than 29 organizations, made this event meaningful. The technologies, improved seed varieties and services on display were designed with one goal in mind: to help farmers make better, more informed decisions. These innovations are the result of many years of research and teamwork, but they only come to life when they reach the hands of the people who need them most.

Over the past few years, ZARI has continued to grow its work developing new climate-resilient crop varieties, improving soil and water management services, strengthening diagnostic labs and working closely with farmers through demonstrations and training. None of this is done in isolation. It depends on collaboration, trust, and the constant exchange of knowledge.

What motivates us most is the passion of the farmers themselves. Their curiosity, their questions during the demonstrations and their willingness to try new approaches reminds us why we do this work. Every conversation in the field plots and every shared experience helps us understand how to serve them better.

I would like to extend my heartfelt thanks to the Minister of Agriculture and Permanent Secretaries for their guidance, and to fellow Department heads, all our partners for their contributions. Your support strengthens our research and expands the impact we can make across the country.



### Message from the Director

As you read this report, I hope you see it not only as a record of what happened during the Field Day, but as a reflection of the collective effort behind it an effort rooted in practical solutions, shared learning and a common commitment to building a more resilient and productive agricultural sector for Zambia.

**Dr. Ndashe P. Kapulu**

**Director**

**ZAMBIA AGRICULTURE RESEARCH INSTITUTE - ZARI**

## EXECUTIVE SUMMARY

The 2025 National Research and Seeds Field Day was convened by the Zambia Agriculture Research Institute (ZARI), in collaboration with the Plant Quarantine and Phytosanitary Service (PQPS) and the Seed Control and Certification Institute (SCCI), under the theme “Adapting to Climate Change through Resilience, Innovation, and Sustainability in Agriculture.” The Ministry of Agriculture Permanent Secretary in charge of Technical Services, Mr. John Mulongoti, was the Guest of Honor.

The event brought together farmers and stakeholders from government agencies, research institutions, private sector players, and development partners. It served as a platform to showcase the latest crop varieties, management practices and innovations aimed at enhancing resilience in the agricultural sector. A total of 45 partners participated in the NRSFD, bringing high-end research products. Various, they exhibited seed technologies, agrochemicals, farm implements and farm mechanization equipment. These products and services were availed to the more than 1300 attendees drawn from institutions of learning, farming communities both small-scale and largescale farmers and researchers from different research institutions. The interaction among the institutions and the farming communities facilitated direct knowledge exchanges which was the primary objective of the NRSFD.

All four divisions of ZARI (Crop Improvement and Agronomy Division, Farming Systems and Social Sciences Division, Plant Protection Division and Soil and Water Management Division) showcased their latest research and technology outputs and services focused on equipping farmers with practical, science-based solutions to the challenges posed by climate change. Their work reflected an integrated approach to soil health, crop improvement, pest and disease management, and sustainable farming systems. Among the new seed technologies showcased included groundnut rosette resistant variety (1), sorghum lines (4), maize lines (3) and Fall Armyworm tolerant maize varieties (3). These seed technologies position farmers for increased yield and enhanced resilience in the face of daunting climate induced challenges. In the area of service provision, the divisions presented pest and disease management technologies, GMO testing, soil mapping and soil improvement technologies.

The field day also showcased collaborative contributions from key partners such as PQPS, SCCI, farmer organizations, and private sector players. These partners showcased innovations in seed technology, phytosanitary standards, soil health, and market-oriented production systems, thereby reinforcing the importance of a multi-sectoral approach to building agricultural resilience. The Guest of Honor led a tour of the ZARI demonstration plots, including a special visit to the rice fields, exhibition stands where stakeholders engaged in knowledge exchange and demonstration plots for climate-smart agricultural innovations.

## Key Highlights

### Tour of JICA-Supported Rice Fields

The Permanent Secretary (PS-TS) and other delegates visited the rice fields established under the Japan International Cooperation Agency (JICA)-supported project. The tour showcased improved rice varieties and water-efficient cultivation practices aimed at enhancing rice production through research and technology development, extension services, and the promotion of a market-oriented rice farming model.



Delegates touring the irrigated paddy fields

### Tour of Tree Crops Section

The PS and delegates also visited the Tree Crops section, where ZARI is promoting diversified farming systems. This section highlighted the integration of fruit trees and perennial crops as part of sustainable land-use strategies and climate resilience efforts.

### ZARI Demonstration Plots

The Crop Improvement and Agronomy Division showcased a variety of demonstration plots featuring climate-smart agricultural practices. These included improved seed varieties, intercropping, integrated pest management, and conservation agriculture, all aimed at improving productivity and resilience in the face of climate change.

### Collaborative Efforts

The field day also showcased collaborative contributions from key partners such as PQPS, SCCI, farmer organizations, and private sector players. These partners showcased innovations in seed technology, phytosanitary standards, soil health, and market-oriented production systems, reinforcing the importance of a multi-sectoral approach to building agricultural resilience.

### Plant Quarantine and Phytosanitary Service (PQPS)

The Department of Plant Quarantine and Phytosanitary Service (PQPS) is mandated to regulate plant health and prevent the introduction of alien invasive species associated with plants and plant products moved across borders. This mandate is provided for under the Plant Pests and Diseases Act, Cap 233 of the Laws of Zambia. PQPS also operates in conformity with international frameworks that govern trade facilitation in plants and plant products such as the International Plant Protection Convention (IPPC) of the Food and Agriculture Organization (FAO), the World Trade Organization's Sanitary and Phytosanitary Agreement and Trade Facilitation Agreement, the African Continental Free Trade Area (AfCFTA), particularly Annex 7, and other regional sanitary and phytosanitary protocols.



**EXECUTIVE SUMMARY**

In relation to the Field Day theme on climate change adaptation, the event provided an important platform for PQPS to highlight how climate change alters pest and disease dynamics - expanding ranges and increasing outbreak frequency, thereby creating new risks for crops. Phytosanitary services such as inspection, surveillance, regulation, and certification were emphasized as critical tools for safeguarding the agricultural sector against these evolving threats. This is done through risk based inspections, surveillance and pest risk analysis. Resilience can be noted from the various strengthened surveillance systems to detect emerging pests and pathogens linked to climate shifts, build rapid response capacity for outbreaks, ensuring continuity of trade and food security.

During the Field Day, PQPS showcased laboratory equipment and inspection tools, distributed informational brochures on various phytosanitary themes, and screened documentaries carrying phytosanitary awareness messages targeted at the Field Day audience. The Department also exhibited and disseminated information on digital surveillance applications, including geospatial technologies that modernize pest surveillance, data capture and storage. In addition, PQPS showcased the Zamportal and the Zambia Electronic Single Window (ZESW), which support environmentally friendly, secure, and efficient digital phytosanitary certification processes.

**Seed Control and Certification Institute (SCCI)**

The Seed Control and Certification Institute (SCCI) participated in the 2025 National Research and Seeds Field Day, where it showcased a range of services and technologies aimed at supporting climate-smart agriculture and strengthening national seed systems. These included demonstration plots for climate-smart crop varieties, post-control trials, seed inspection services, seed testing services, administration of plant breeders' rights, and biotechnology services.

In addition, seed companies and agro-input companies were featured within the SCCI exhibition space, highlighting innovations across the seed value chain. Approximately 450 participants passed through the SCCI exhibition stations, where they engaged with technical staff and gained insights into quality seed assurance mechanisms, regulatory services, and emerging seed technologies.

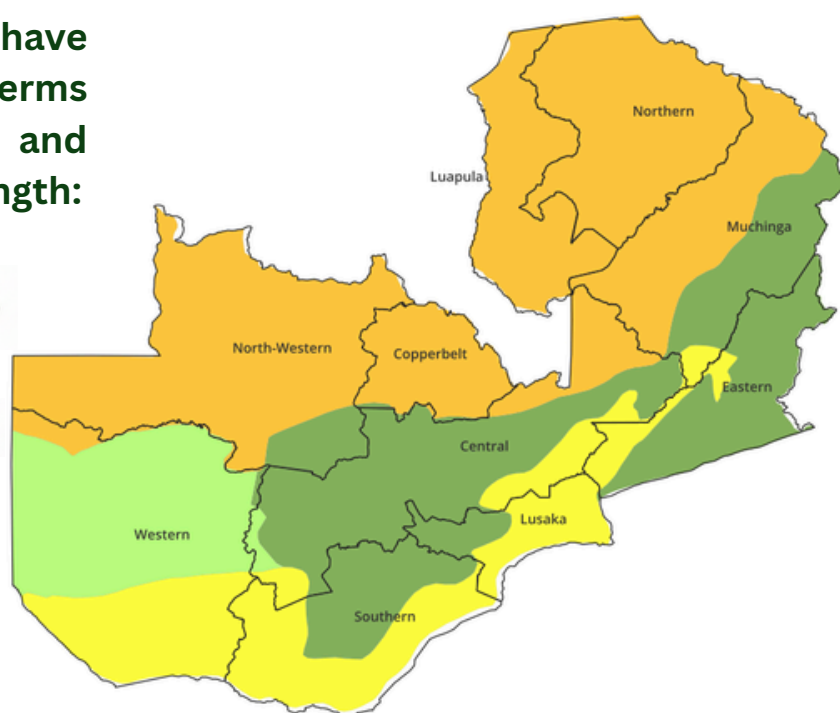
## Climate Variability and the Start of the Rainy Season in Zambia

Climate variability refers to fluctuations in aspects of climate such as temperature and precipitation relative to long-term averages. Although climate variability is a natural phenomenon, climate change is increasing the frequency and intensity of extreme weather events, thereby increasing climate unpredictability.

Recent analysis of rainfall data for Zambia's agro-ecological zones (Regions I, II, and III) from 1981 to 2024 underscores significant shifts in the onset and cessation dates of the rainy season. Data reveal marked year-to-year inconsistency, highlighting periods when rains start unusually early or late, coupled with variable durations and total annual rainfall. For instance, some seasons begin as early as mid-October and extend until early April, while others experience significantly delayed starts or premature cessations.

**Historically, farmers have understood each zone in terms of its average rainfall and expected growing-season length:**

-  Zone III: High Rainfall ( >1000mm )  
120 - 150 Day Growing Season 
-  Zone II: Moderate Rainfall ( 800 - 1000mm )  
100 -140 Day Growing Season 
-  Zone I: Low Rainfall ( ≤800mm )  
80 - 120 Day Growing Season 



These benchmarks have guided traditional calendaring of cropping cycles for decades, shaping everything from crop choice to input scheduling.

This inconsistency poses considerable challenges to agricultural practices, particularly for small-scale farmers who rely heavily on rainfall for crop production. Traditional agricultural planting calendars, developed in the 1970s and based on historical rainfall patterns, are increasingly unreliable. The shifts observed through detailed CHIRPS rainfall analysis demonstrate that relying on outdated planting guidelines risks crop failures due to false starts and unexpected dry spells, not forgetting the effect of either excessive or little rainfall on soil composition.

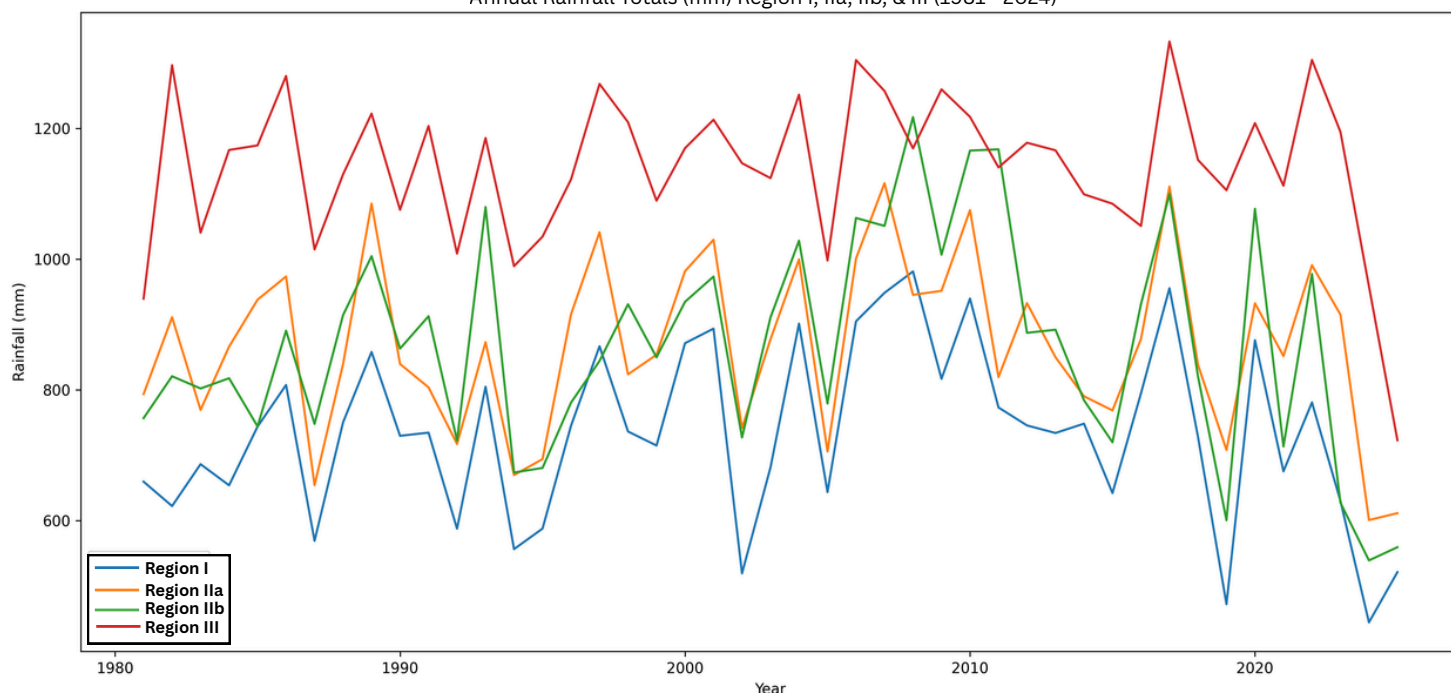
## Climate Variability and the Start of the Rainy Season in Zambia

To address this issue, the Zambia Agriculture Research Institute has been developing and promoting climate-resilient agricultural technologies, alongside soil sampling and analysis exercises. These interventions aim to enhance the adaptive capacity of small-scale farmers, enabling them to make informed, timely decisions aligned with prevailing climate conditions.

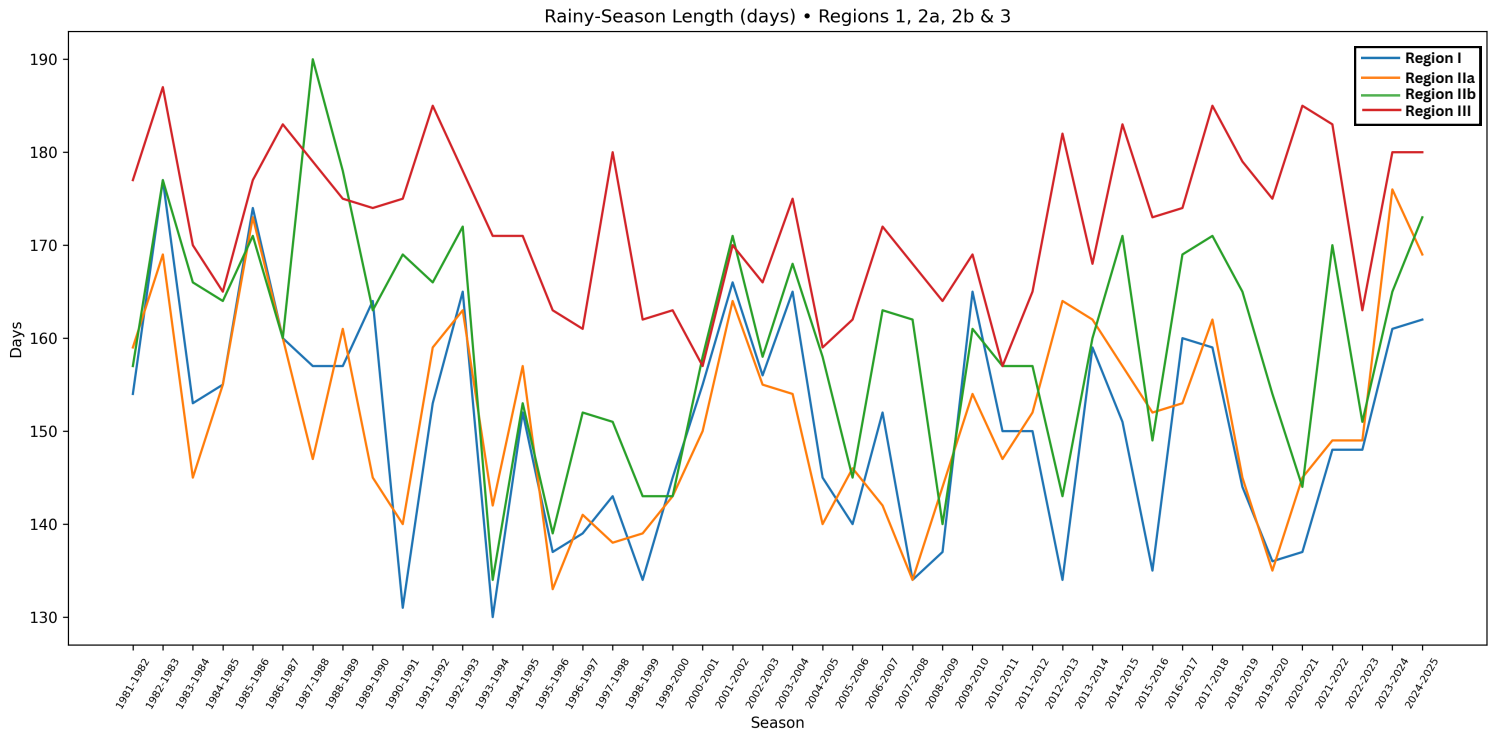
The comprehensive rainfall data analysed in this report covering true onset and cessation dates (based on a 20 mm cumulative rainfall trigger), annual and seasonal rainfall totals, and detailed trends across the updated agro-ecological zones provides a robust foundation for improved agricultural planning. This data-driven approach is critical to mitigating the impacts of climate variability and enhancing agricultural productivity and food security in Zambia.

Figures below visualise these findings showing the year to year swings in annual rainfall totals, the length of the rainy season, and the shifting onset and cessation dates across all four zones.

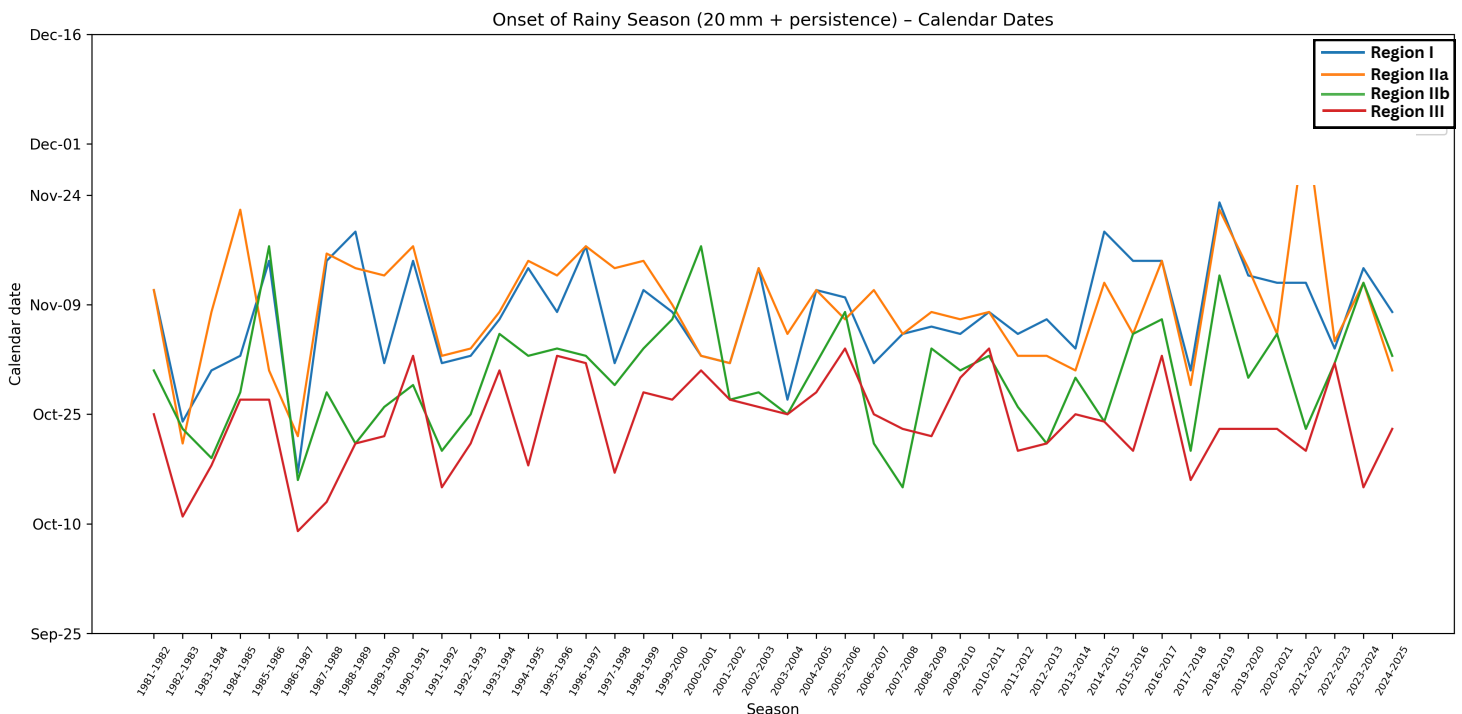
Annual Rainfall Totals (mm) Region I, IIa, IIb, & III (1981 - 2024)



Annual rainfall now swings  $\pm 20\%$  around the historic mean. The deep troughs in 1991-92, 2014-15, and 2024 sit well below the 'normal'  $\leq 800$  mm (Region I), 800–1000 mm (Region II), and  $> 1000$  mm (Region III) benchmarks confirming that drought years are becoming both more frequent and more severe.

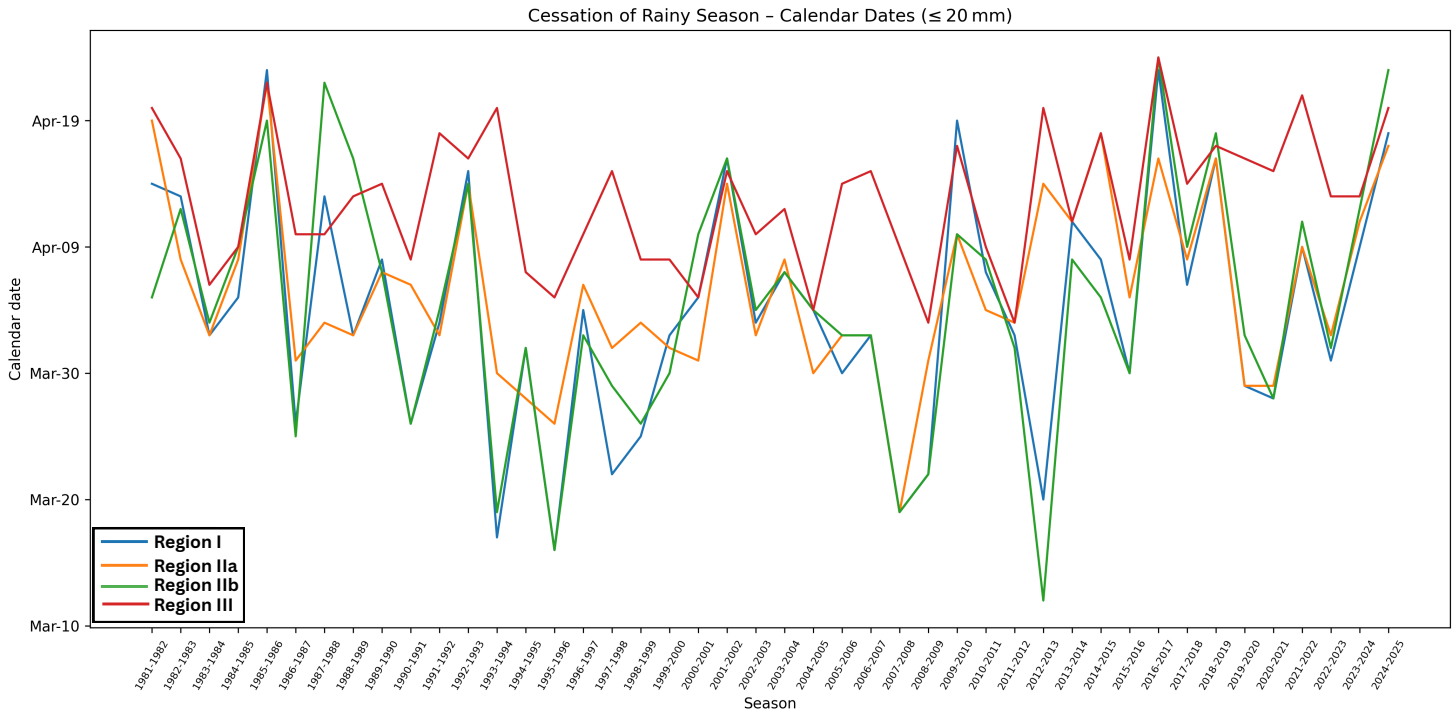


Compared with the classic 80–120 day (Region I), 100–140 day (Region II), and 120–150 day (Region III) expectations, the effective crop-growth window has shortened by 10–20 days in most zones. Region IIa now averages < 140 days, while Region I often slips below 100 days, raising serious maturity-risk for traditional maize varieties.

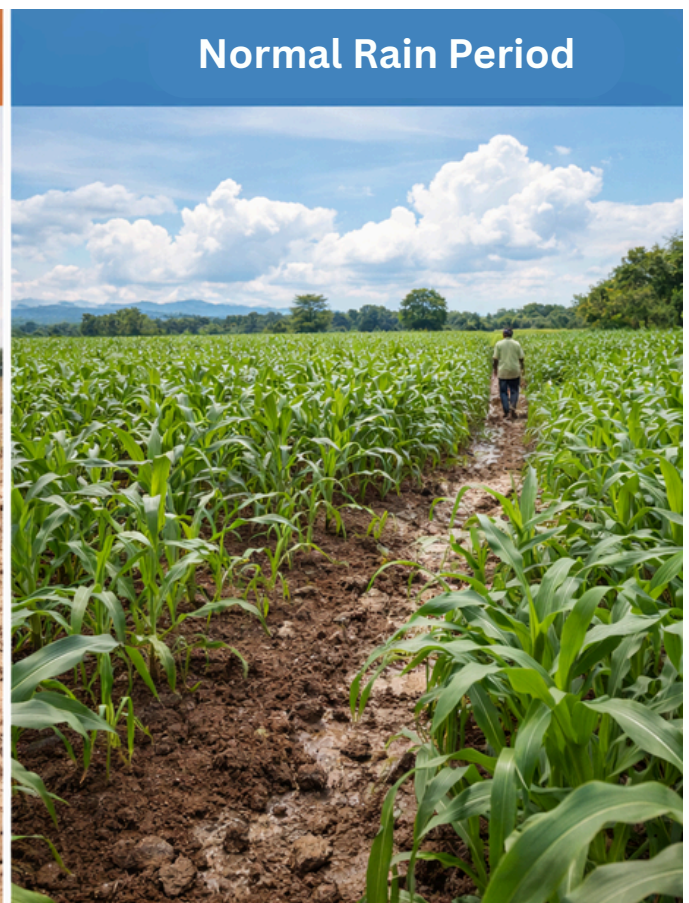


First reliable 20 mm rainfall (with no 10-day dry spell to follow) now occurs 10–15 days later than the historical mid-October benchmark. Zones I and IIb show the most pronounced drift, with several seasons crossing into December, evidence that ‘false starts’ and delayed planting conditions are becoming more common.





The date when only  $\leq 20$  mm of rain remains is edging earlier in Zones I and IIb, trimming around two weeks from the late-March/early-April norm. Zone IIa shows a modest advance, while Zone III remains comparatively stable. Earlier cessation shortens the grain-filling window and raises drought risk for late-planted crops.



**The 2025 National Research Field and Seeds Day was guided by the following objectives:**



**To Promote Climate-Resilient Agricultural Innovations**

Showcase research-based technologies, improved crop varieties, and sustainable farming practices developed to help farmers adapt to the effects of climate change, including erratic rainfall, drought, and pest outbreaks.



**To Facilitate Knowledge Sharing Among Stakeholders**

Provide a platform for interaction and information exchange between researchers, farmers, seed companies, agrochemical suppliers, fertilizer providers, and policy stakeholders to bridge the gap between research and practice.



**To Engage and Empower Small-Scale Farmers**

Enhance farmer awareness and capacity on climate-smart agriculture through live demonstrations, peer learning, and exposure to new technologies and practices that can increase productivity while conserving natural resources.



**To Align Agricultural Research with National Development Priorities**

Reinforce the role of agricultural research in supporting Zambia's national goals on food security, sustainable land use, climate change adaptation, and inclusive rural development.



**To Strengthen Farmer Linkages to ZARI Services and Expertise**

To provide a platform for farmers to access essential services, resources and expertise offered by ZARI to support their adaptation efforts and enhance agricultural productivity.

## ZARI Divisional Contributions to Climate Change Adaptation

In line with the theme of this year's National Research and Seeds Field Day, the four divisions of the Zambia Agriculture Research Institute (ZARI) showcased their ongoing research, innovations, and extension services designed to strengthen the agricultural sector's resilience to climate change. Each division plays a critical role in supporting smallholder farmers through science-driven solutions that promote sustainability, productivity, and adaptability. From developing climate-resilient crop varieties to improving soil and water management, ZARI's interdisciplinary approach reflects its commitment to building a climate-smart agriculture system in Zambia.



### Soil & Water Management Division

ZARI's Soil and Water Management division focuses on promoting appropriate soil and water management practices to enhance crop production and productivity. By offering soil advisory services and promoting soil conservation measures, ZARI assists farmers in optimizing soil fertility, water use efficiency and crop resilience to environmental stressors.

#### Key Projects and Activities:

##### National Soil Mapping Program:

The division is currently undertaking a comprehensive soil mapping exercise aimed at generating up-to-date and digitized soil information across Zambia. This data is essential for guiding land use planning, sustainable soil management, input application, and climate-smart farming decisions.

##### Soil Sample Analysis:

To date, the division has collected and analyzed over 20,000 soil samples from smallholder and commercial farms across the country. These analyses help provide targeted soil fertility recommendations to farmers and extension agents.

##### Soil Advisory Services:

Farmers are being supported through interpretation of soil health reports and training in good soil management practices. This includes promotion of lime use for acidic soils, composting and integrated nutrient management approaches.

##### Production of Soybean Inoculants:

Recognizing the role of biological nitrogen fixation in legume production, the division produces soybean inoculants (rhizobium-based biofertilizers) to boost yields and improve soil health. In 2024/25, over 40,000 sachets were distributed to support smallholder farmers and reduce reliance on chemical fertilizers. The demonstrations emphasized the effectiveness of using beneficial microbes to improve nutrient uptake and crop resilience. Also, worth mentioning is the importance of integrating both chemical and biological fertilizers to enhance soil health and ensure sustainable productivity.



## Enhancing Extension Delivery through Research and Training in Climate Smart Agriculture

In 2023/2024 the division played a key role in the development of a national manual and subsequent training of extension officers and farmers in climate smart agriculture under the Zambia Growth Opportunities project (ZAMGRO).



### Crop Improvement and Agronomy Division

The Crop Improvement and Agronomy division (CIA) of ZARI develops and adapts high-yielding crop varieties and improved crop management practices through research in agronomy, plant breeding, and genetics. With a focus on Zambia's diverse agroecological regions, the division's core objective is to enhance crop productivity, resilience, and sustainability, ensuring farmers have access to improved varieties that can withstand challenges such as climate change and other environmental stresses.

The division plays a vital role in supporting the Presidential Initiative (PI) to increase production of key crops, including maize, soybeans, and wheat. Currently, maize production stands at approximately 4 million metric tons, but the PI aims to boost this to 10 million metric tons annually. Under the same initiative, soybeans and wheat are targeted to reach 1 million metric tons, respectively. To achieve these ambitious targets, ZARI is actively making available basic seed of crop varieties with superior qualities and high yielding for access by seed companies and farmers.

### Key Projects and Activities:

#### Production and Management of Climate Smart Agriculture (CSA) Crops

In response to the devastating 2023/2024 drought, the CIA implemented an activity focused on the production and management of Climate-Smart Agriculture (CSA) crops. The objective was to support climate change adaptation and mitigation efforts by developing and promoting resilient crop varieties.

To support Climate-Smart Agriculture (CSA) initiatives, various crops were produced to generate sufficient basic seed, including cassava, drought tolerant maize, rainfed wheat, sorghum, pearl millet, sunflower, cowpeas, sunhemp, velvet beans, tree crops, and groundnuts. The production of these crops aimed to ensure a steady supply of high-quality seeds for farmers adopting CSA practices, ultimately contributing to improved crop productivity, resilience, and sustainability.





The division also submitted several climate-smart crop varieties for pre-release to support Climate-Smart Agriculture (CSA) initiatives. The varieties included multiple sorghum lines, such as ZSV-108, ZSV-251, ZSV-261, and Lemon Yellow, as well as other promising maize varieties like GV-5050, GV-5024, GV-7035. These pre-releases aim to introduce resilient and adaptable crop options for farmers, enhancing their ability to cope with climate-related challenges and improve agricultural productivity.

### **Demonstrating New Crop Varieties for Food Security and Sustainable Development**

The CIA division achieved significant milestones in demonstrating various crops developed by the institution. To showcase these innovations, demonstration plots were established across the country, strategically located at ZARI research stations in nine of the ten provinces of Zambia.

### **Maize: Fall Army Worm tolerant varieties**

Fall Army Worm (FAW) tolerant maize varieties, such as GV-6022, GV-6088, and GV-6076, were showcased. These varieties have the potential to minimize losses when under attack by FAW and improve maize yields, contributing to food security and farmer livelihoods.

### **Groundnuts: Rosette Resistant**

The division also demonstrated MGV-10, a groundnut variety resistant to rosette virus, a major threat to groundnut production in the country. Groundnuts are a vital crop for smallholder farmers in Zambia, particularly in the Eastern Province, where they provide a significant source of income and food security. By developing and disseminating resistant varieties like MGV-10, the division is helping to protect the livelihoods of these farmers and enhance the country's groundnut production.

### **Pigeon Peas: Climate-Resilient Varieties**

New pigeon pea varieties were demonstrated, showcasing crop diversification and climate resilience and multiple benefits, including a reliable source of protein and income for farmers, and contributions to soil health through nitrogen-fixing properties. Both perennial and annual varieties were promoted for their nutritional value and potential to enhance food security and sustainable agriculture practices.



## Plant Protection Division

ZARI's Plant Protection Division is dedicated to the development and adaptation of both pre- and post-harvest technologies aimed at reducing crop losses caused by pests, diseases, and invasive species. The division's work plays a crucial role in safeguarding crop yields and ensuring food security, particularly as climate change leads to the emergence and spread of new pests and diseases. The division also provides vital diagnostic services to help farmers and extension workers correctly identify crop health issues and apply timely, effective control measures.

### Key Projects and Activities:

#### Integrated Pest Management (IPM) Research:

The division is promoting the use of IPM strategies, combining biological, cultural, mechanical, and chemical methods to manage pests in an environmentally and economically sustainable way. IPM demonstrations were conducted during the field day on various crops including maize, soybean, and groundnuts.

#### Pest and Disease Diagnostic Services

Over **200 pest and disease samples** were received and analysed in the past year. These diagnostic services help guide targeted interventions and reduce the misuse of agrochemicals, while also building local capacity for early detection.

#### Climate-Sensitive Surveillance and Monitoring

In response to the increased risk of pest outbreaks driven by shifting weather patterns, the division is scaling up surveillance for invasive pests such as fall armyworm and *Tuta absoluta*, and developing early warning systems in collaboration with regional partners.

#### Post-Harvest Loss Prevention Technologies

Research is ongoing into storage pest control methods, including hermetic storage technologies, use of botanicals, and improved granary designs to reduce grain losses after harvest.

#### Farmer and Extension Training

The division continues to deliver training and extension support to farmers on safe and effective pest and disease management, with a special focus on reducing pesticide misuse and improving ecosystem health.

#### Innovative Rice Varieties through Anther Culture Technology

Anther Culture is a cutting-edge plant breeding technique that involves cultivating plant tissues from the anthers, the pollen-producing parts of flowers, to produce double haploid plants. This method significantly accelerates plant breeding processes, enabling rapid development and stabilization of desirable traits in new varieties.

The Plant Pathology unit is leveraging this innovative approach to actively address climate change through resilience, innovation, and sustainable agricultural practices. A notable project involves developing new rice varieties that are early maturing, high yielding, and aromatic traits highly valued in Zambia.



Currently, researchers are working with an F2 generation cross between Kita Kaori (a short-duration, aromatic Japonica variety from Japan) and Nene (a longer-duration Indica variety). Unlike conventional breeding methods, which typically take about 10 years to produce new varieties, Anther Culture technology shortens this process to approximately four years, potentially even three with expedited evaluations by the Seed Control and Certification Institute (SCCI).

Through this initiative, the unit aims to provide farmers with improved rice varieties better suited to Zambia's changing climate conditions, supporting local preferences and agricultural sustainability.



### **Farming Systems and Social Sciences Division**

The Farming Systems and Social Sciences Division plays a vital role in bridging scientific research with the realities of smallholder farming communities. This division focuses on adapting agricultural technologies and innovations to the socio-economic, nutritional, gender, and cultural contexts of rural households. By doing so, it ensures that research outputs are practical, inclusive, and responsive to the needs and capacities of end-users.

#### **Key Projects and Activities:**

##### **On-Farm Technology Evaluation:**

The division works with farmers across different agro-ecological zones to test and adapt technologies in real-world conditions. This participatory approach ensures that new practices are not only technically sound but also socially acceptable and economically viable.

##### **Gender and Youth Integration:**

Special attention is given to empowering women and youth in agriculture through targeted training, access to innovations, and promotion of inclusive practices that enhance their roles in farming systems.

##### **Nutrition-Sensitive Interventions:**

The division promotes crop diversification, kitchen gardens, and production of nutrient-dense crops (e.g., orange-fleshed sweet potatoes, groundnuts, leafy vegetables) to combat hidden hunger and improve household nutrition outcomes.

##### **Farm Management and Resource Allocation Training:**

Farmers receive guidance on input use, financial planning, and production strategies tailored to their specific resource endowments and market goals. This supports better decision-making for sustainable and profitable farming.

##### **Socio-Economic Surveys and Impact Monitoring:**

Continuous data collection is carried out to evaluate adoption rates, assess farmer needs, and guide future research and policy directions.

Through its inclusive and systems-based approach, the Farming Systems and Social Sciences Division ensures that ZARI's innovations are not only technically sound, but also practically relevant and socially transformative.



### Summary of Remarks by the Ministry of Agriculture - Permanent Secretary, Mr. John Mulongoti

Mr Mulongoti officially opened the 2025 National Research and Seeds Field Day. In his address, he welcomed participants and highlighted the government's commitment to transforming the agriculture sector into a productive and commercially viable contributor to national development. This commitment is in line with the Vision 2030, the 8th National Development Plan, the National Agricultural Policy, and the Comprehensive Agricultural Transformation Support Programme (CATSP).

He emphasized that the theme of the event,

**“Adapting to Climate Change through Resilience, Innovation, and Sustainability in Agriculture”**, aligns well with government aspirations. The Permanent Secretary stressed the vital role of agricultural research in addressing pressing issues such as low productivity, pest and disease outbreaks, soil degradation, and climate-linked challenges like droughts and floods.

He noted that growth in agricultural productivity and production depends heavily on access to appropriate technologies and support services. The Ministry, through ZARI and its partners, is investing in innovations to ensure that smallholder farmers can benefit from improved technologies.

The speech further highlighted key components of the government's agricultural transformation agenda, including increased productivity, enhanced value addition, promotion of agro-exports, job creation in agri-food systems, and improved nutrition. He stressed that with the right support and a stable policy environment, Zambia could become food secure and serve as a regional breadbasket.

After touring the exhibitions and demonstration plots, the Permanent Secretary acknowledged the significant work being done by ZARI and its partners. He noted the impressive range of improved crop varieties on display including maize tolerant to fall armyworm, improved sorghum, sunflower, soybeans, and legumes as well as the laboratory services ZARI offers, such as soil testing, fertilizer analysis, and pest diagnostics.

He expressed satisfaction with the progress made in applying scientific research and innovation to support smallholder farmers and urged all farmers present to take home valuable lessons from the field day to enhance their farming practices.







Dr. Ndashe Kapulu, Director – Zambia  
Agriculture Research Institute (ZARI)

### Summary of Welcoming Remarks by the Director of ZARI – Dr. Ndashe Kapulu

Dr. Ndashe Kapulu, Director of the Zambia Agriculture Research Institute (ZARI), welcomed participants to the 2025 National Research and Seeds Field Day, highlighting the collaborative nature of the event. Organized under the theme “Adapting to Climate Change Through Resilience, Innovation and Sustainability in Agriculture,” the field day brought together three key technical departments of the Ministry of Agriculture: ZARI, the Seed Control and Certification Institute (SCCI), and the Plant Quarantine and Phytosanitary Service (PQPS).

In his remarks, Dr. Kapulu acknowledged SCCI’s role as a center of excellence for seed services in Zambia, noting its international accreditation and capacity to support seed exports. He also highlighted PQPS as the National Plant Protection Organization (NPPO), which has facilitated critical trade protocols and phytosanitary measures to protect Zambia’s food system and promote export opportunities.

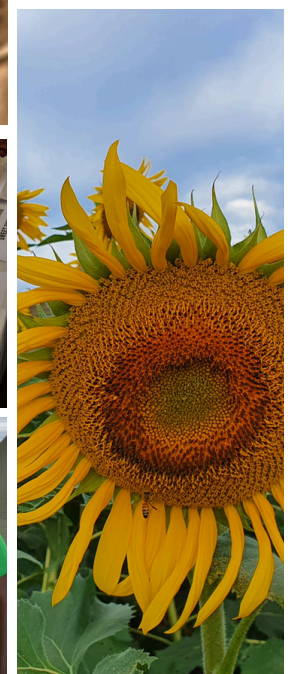
Turning to ZARI’s mandate, the Director emphasized the institute’s central role in developing and disseminating climate-smart agricultural technologies. These include improved crop varieties, soil and water management practices, pest control strategies, and post-harvest solutions. ZARI is also leading efforts to preserve agricultural biodiversity through germplasm collection and conservation.

Dr. Kapulu reported on ZARI’s achievements over the past five years, including the development of over **50 crop varieties**, analysis of more than **15,000 soil samples**, distribution of over **300,000 fruit tree seedlings**, and provision of **300,000 soybean inoculant sachets** to smallholder farmers.

He concluded by thanking the Government, particularly the Permanent Secretary for Technical Services, Mr. John Mulongoti as well as the over 29 companies and organizations that participated in the event. He reaffirmed ZARI’s commitment to serving the Zambian farmer through continued innovation and collaboration.









Tour of the Irrigated Paddy Fields – JICA and ZARI Partnership

As part of the field day, delegates were taken on a guided tour of ZARI’s irrigated paddy fields, implemented in partnership with the Japan International Cooperation Agency (JICA). The tour highlighted collaborative efforts to strengthen Zambia’s rice production systems through research, seed system development, and climate-resilient technologies.

The site showcased an array of research activities and seed production initiatives, including pre-basic and basic seed multiplication, variety evaluation, yield trials, genetic resource conservation, and adaptation studies. These efforts aim to enhance rice productivity, support the development of resilient rice varieties, and ensure sustainable seed supply systems across Zambia.



Delegates at the irrigated paddy field stand under the Japan International Cooperation Agency and Zambia Agriculture Research Institute partnership

Key Activities at the Paddy Fields:

| Activity                      | Variety                         | Objective                                                        |
|-------------------------------|---------------------------------|------------------------------------------------------------------|
| Pre-basic seed Production     | Supa Mg, NERICA 4 and Kilombero | Production of quality pre-basic seed for further multiplication. |
| Pre-basic seed Production     | Nene, SARO5 and WITA 9          | Production of quality pre-basic seed for further multiplication. |
| Yield Trial- Direct seed Rice | 135 IRRI lines                  | Evaluating yield potential and adaptation of the lines.          |





| Activity                               | Variety                                 | Objective                                                                                          |
|----------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------|
| Photosensitivity test (Pot experiment) | Supa MG and NERICA 4                    | Assessing the photoperiod sensitivity of selected varieties to determine optimal planting periods. |
| Breeder seed maintenance               | 10 Dh lines                             | Maintaining genetic purity                                                                         |
| Seed production under Citizen science  | Supa Mg plus 8 other pre-released lines | Adaptation evaluation                                                                              |
| IRRI hybrid Trial                      | 8 lines plus 2 varieties                | Evaluating yield potential                                                                         |
| Rice Genetic Resource Evaluation       | 240 accessions                          | Evaluation of genetic diversity for potential breeding applications.                               |
| NVRT                                   | 6 pre-released varieties                | Testing for adaptation                                                                             |
| Seed Production (DH lines)             | HU7,36,42                               | Seed multiplication                                                                                |
| Line evaluation                        | DH43                                    | Performance assessment of the line for potential release or further breeding.                      |





A collection of rice seed accessions maintained for breeding, multiplication, and long-term seed preservation.



Tour of the Tree Crops Section

Following the tour of the rice fields, the Permanent Secretary and delegates proceeded to the Tree Crops Section, which underscores ZARI’s commitment to promoting diversified and climate-resilient farming systems.

This section focuses on the research, propagation, and distribution of fruit and perennial tree crops suited to Zambia’s agro-ecological conditions. By investing in tree crops, ZARI is advancing strategies that:



Provide income opportunities



Enhance agroforestry practices



Improve household nutrition



Boost land sustainability

Currently, ZARI maintains a diverse collection of seedlings ranging from high-value export crops to indigenous species critical for local food systems.

Tree Crop Summary

| TREE CROP       | SEEDLINGS COUNT | NOTES                                                |
|-----------------|-----------------|------------------------------------------------------|
| Mango           | 1,546           | Popular for nutrition & income generation            |
| Guava           | 194             | Fast-growing, drought-tolerant                       |
| Avocado         | 11,661          | High-value crop with export potential                |
| Citrus          | 5,579           | Rich in Vitamin C, adaptable                         |
| Pawpaw          | 66              | Rapid fruiting, food security crop                   |
| Macadamia       | 631             | High-income nut crop for smallholders                |
| Moringa         | 1,397           | Superfood; medicinal and nutritional value           |
| Musangu         | 1,509           | Indigenous, nitrogen-fixing tree for agroforestry    |
| Coffee          | 2,101           | Income-generating crop for highland zones            |
| Gliricidia      | 2,001           | Soil fertility & fodder tree; used in alley cropping |
| Mulberry        | 51              | Used in silkworm farming and as forage               |
| Masuku (Uapaca) | 1,013           | Indigenous fruit tree; supports local nutrition      |
| Pomegranate     | 142             | Drought-resistant, high-antioxidant fruit            |
| Mexican Apple   | 120             | Hardy tree for diverse climates                      |
| Apple           | 427             | Grown in cooler zones and has market potential       |
| Granadilla      | 77              | Vine fruit with good income returns                  |



Crops and Varieties Exhibited at the 2025 Field Day

The tables below summarise the crops and varieties grown during the 2024–2025 season at ZARI Mount Makulu Research Station. They highlight key research materials across different crop categories, reflecting ongoing efforts in crop improvement, adaptation, and diversification.

ZARI HORTICULTURE CROPS

|                     |
|---------------------|
| Corchorus           |
| Amaranth            |
| Cleome (Variegated) |
| Nanga Rape          |
| Nightshade          |
| Mustard Rape        |
| White Okra          |

ZARI SORGHUM

|         |
|---------|
| Lemon   |
| ZSV 261 |
| ZSV 199 |
| ZSV 251 |
| ZSV 134 |
| ZSV 110 |
| ZSV 208 |

ZARI GROUNDNUTS

|           |
|-----------|
| MGV 5     |
| MGV 7     |
| MGV 8     |
| MGV 9     |
| Wamusanga |

ZARI SWEET POTATOES

Mansa

Orange

Chingovwa

ZARI MAIZE

GV 6022

GV 672A

AF 635



## Acknowledgments and Thanks

The Technical Working Group for the 2025 National Research and Seeds Field Day extends its heartfelt gratitude to all who contributed to making this event a success. Your presence, energy, and commitment made the day both impactful and inspiring.

We are especially thankful to our distinguished guests, whose continued support motivates us to push forward in addressing challenges such as prolonged drought and climate variability. Your leadership reinforces our shared goal of building a more resilient and sustainable agricultural sector.

Our deepest appreciation also goes to the dedicated exhibitors, farmers, researchers, and volunteers. Your passion for innovation and sustainability remains the cornerstone of our progress, and your efforts on this day truly reflected the spirit of collaboration and advancement.

Together, we continue to grow knowledge, strengthen partnerships, and deliver technologies that matter.



**Dr. Rabson Mulenga**



**Mr. Allan Chilenga**



**Mr. Masiye Tembo**



**Mr. Edwin Ng'ona**



**Ms. Martha J Banda**



**Ms. Hildah Chimutingiza**



**Mr. Freddy Munyati**



**Mr. Wasa Moongwa**



**Ms. Kabosha C Lwinya**



**Ms. Astridah Ngoma**



**Mr. Gerald B Kalunga**

## Annex 1 – Rainfall Filter Methodology

| Step                         | Rule                                                                                                      | Rationale                                                                                |
|------------------------------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| <b>Data source</b>           | CHIRPS Daily v2.0 (0.05° grid, 1981–2024) aggregated to each agro-ecological zone.                        | Widely used, bias-corrected satellite + gauge product covering the full analysis period. |
| <b>Season window</b>         | 1 September (year N) → 30 April (year N + 1).                                                             | Captures potential early storms and all crop-relevant rainfall.                          |
| <b>Initial onset trigger</b> | First day cumulative rainfall since 1 Sep $\geq$ 20 mm.                                                   | 20 mm $\approx$ one moderate storm – enough to wet topsoil for germination.              |
| <b>Persistence filter</b>    | After the 20 mm day, the next 30 days must not contain any 10-day period with $\leq$ 5 mm total rainfall. | Screens out “false starts” where an early storm is followed by a long dry spell.         |
| <b>True onset date</b>       | The first 20 mm day that passes the persistence test.                                                     | Ensures soil moisture is likely to persist for seedling establishment.                   |
| <b>Cessation trigger</b>     | Scan forward from the accepted onset: the first day when $\leq$ 20 mm of rain remains until 30 April.     | Marks the point after which additional rainfall is too small to sustain crops.           |
| <b>Season length</b>         | Difference (days) between true onset and cessation dates.                                                 | Practical window for rain-fed crop growth.                                               |



**Annex 1 – Rainfall Filter Methodology**

Why these thresholds? 20 mm is widely used in southern-African agronomy as the minimum rainfall for safe planting on medium-textured soils. The “no 10-day dry spell” rule follows FAO guidance for distinguishing false from true onsets. Sensitivity testing with alternative thresholds (e.g., 30 mm trigger or 15-day dry-spell window) produced similar year-ranking but the chosen parameters balanced agronomic relevance and data stability.

# Thank You to Our Partners

The Zambia Agriculture Research Institute Field would not have been possible without the generous support of our sponsors. We extend our sincere gratitude and appreciation to the following organizations:

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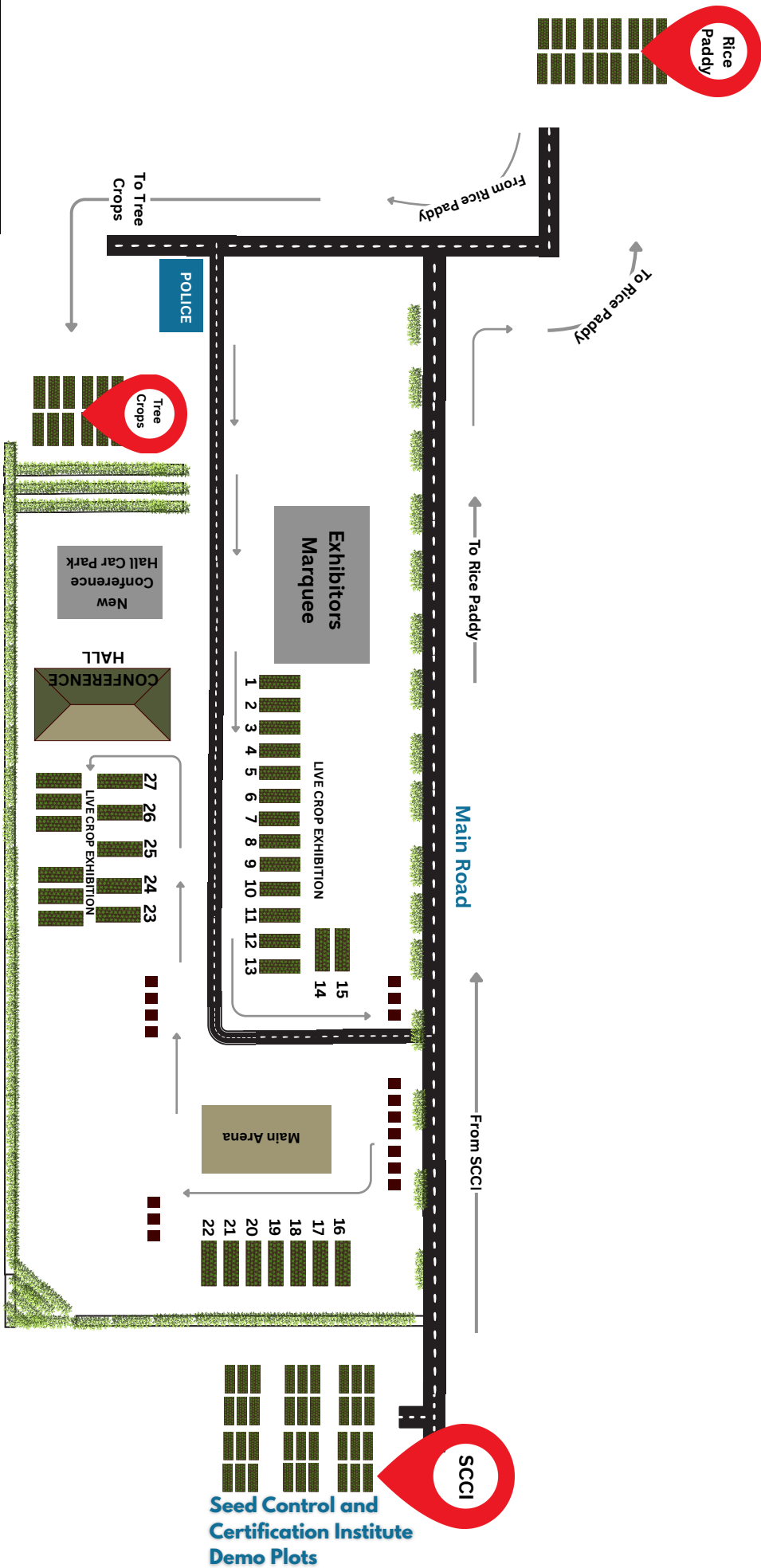
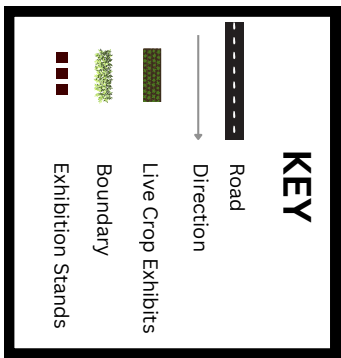


## EVENT ORGANISER



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