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Solidarity
Equality
Sustainability

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Introduction

Agriculture and food systems are central to global food and nutrition security, with over 700 million people experiencing hunger and Africa being particularly worst affected by food insecurity. The transformation of agrifood systems is essential to achieving global food and nutrition security, ensuring sustainability and building resilience, which also fosters job creation and community development in the face of climate change, biodiversity loss, fragmentation, and economic inequalities. This transformation can be realised by embracing climate-smart practices, preserving biodiversity, and adopting precision and digital agricultural solutions, among other things.

The Group of Twenty (G20) Meeting of Agricultural Chief Scientists (G20-MACS) provides a critical platform for key agricultural research and innovation partners to interrogate solutions for these challenges. South Africa's G20 presidency presents a unique opportunity to lead the charge in transforming agrifood systems to enhance climate resilience, sustainability, and inclusive growth. Premised on the underlying principles of ubuntu, South Africa's G20 presidency approach emphasises collective effort and shared responsibility, fostering collaboration across nations to craft policy recommendations and actions that are inclusive and equitable and offer pathways for long-term, sustainable transformation. This issue note outlines the six thematic focus areas for the 2025 G20-MACS, outlining the global challenges, discussion questions, and key recommendations for each theme.

The six proposed thematic areas for the G20-MACS support the Agriculture Working Group's resolve to advocate for policy actions that promote inclusive market participation, empower youth and women, foster innovation and technology transfer, and build climate resilience. Identification of the themes followed intense national and continental dialogues held physically and virtually, considering inputs from local, continental, and global knowledge partners, experts, industry, farmers, and related community organisations. The African continental consultation makes this South African G20 presidency unique, and it was done consciously to ensure that science, technology, and innovation deliberations in G20-MACS support Sustainable Development Goals (SDGs), the African Union's Agenda 2063, and Africa's Common Position on Food Systems.

Theme 1: Transformation of Agrifood Systems

Transforming agrifood systems is a global imperative, and G20 countries play a central role in driving this shift towards sustainability, equity, and resilience. Current systems

are under strain from climate change, resource scarcity, and rising food insecurity, particularly in vulnerable regions, such as Africa, where over 282 million people remain undernourished. There is an urgent need to transition from high-emission, resource-intensive models to regenerative, inclusive systems that deliver healthy diets and sustainable livelihoods. This transformation requires ensuring consistency in sustainable development across ongoing local initiatives, national policies, and global frameworks. The process is supported by international frameworks, such as the United Nations (UN) Food Systems Summit outcomes and the African Union's (AU) Agenda 2063.

As leaders in global agricultural production, trade, and innovation, G20 countries must lead by example, investing in science-based solutions, advancing policy coherence, and enabling equitable access to innovation, particularly for women, youth, and smallholder farmers. South Africa's own efforts, including the National Development Plan and the Agriculture and Agroprocessing Master Plan (AAMP), and Africa's Kampala Declaration, reflect this commitment to inclusive transformation. The upcoming G20-MACS discussions will centre on accelerating the transformation of global agrifood systems through strengthened scientific collaboration, increased investment in climate-resilient innovation, and policy measures that align food, health, environment and climate objectives. Bridging the persistent gap between knowledge generation and effective policy implementation remains a key challenge.

Questions for discussion
- How can G20-MACS support the development of evidence-based research and engagement in science-policy interfaces to foster global innovation environments that accelerate the transformation of agrifood systems in the face of climate change and resource scarcity?
- How can G20 countries support the integration of research organisations with diverse knowledge systems (including indigenous knowledge) and transdisciplinary approaches to design context-appropriate solutions and science-policy-society interfaces for equitable and sustainable agrifood systems?
- What mechanisms should be put in place to ensure effective and comprehensive partnerships, including mobilising expertise and know-how from the grassroots to the global scale, to support sustainable food, land, and water transformation in a climate crisis?

Key recommendations:
- Establish and support global innovation platforms and hubs for agrifood systems, designed to foster collaboration between public research institutions, the private sector, and local innovators.
- Adopt a food system coherence framework that integrates nutrition, gender equality, youth empowerment, environmental sustainability, and decent rural employment across all relevant subnational, national, and international policies.

Theme 2: Stewardship of biodiversity, genetic, and natural resources

The conservation of biodiversity and genetic resources is critical for building resilient and sustainable agrifood systems, ensuring long-term food and nutrition security, and addressing climate change. This priority aligns with the Kampala Declaration, which underscores the importance of biodiversity-friendly agricultural practices and ecosystem restoration. It also supports global commitments under the Convention on Biological Diversity (CBD), the Kunming-Montreal Global Biodiversity Framework, the International Treaty on Plant Genetic Resources for Food and Agriculture, the UN Decade on Ecosystem Restoration, and the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger) and SDG 15 (Life on Land). Discussions should focus on advancing biodiversity-friendly agriculture and ecosystem restoration, with an emphasis on sharing innovative practices and policies for the sustainable use of genetic and natural resources.

Questions for discussion
- Are current global efforts to protect biodiversity and natural resources sufficient to halt or reverse degradation?
- How can sustainability principles and the role of traditional knowledge systems be better integrated into biodiversity conservation, especially within agricultural and food systems?

Key recommendations:
- Facilitate research and knowledge sharing on ecosystem restoration approaches aligned with the Kunming-Montreal Global Biodiversity Framework and the Kampala Declaration to provide scientific evidence to support implementation.
- Enhance collaborative research efforts to advance the conservation and sustainable utilisation of genetic resources, with emphasis on developing frameworks that ensure fair benefit-sharing and equitable access.

- Encourage the development and adoption of sustainable, biodiversity-friendly, and climate smart agriculture (CSA) technologies and practices such as ecosystem restoration, agro-ecology, and soil conservation.

Theme 3: Soil health and sustainable management

Soil health is the foundation of sustainable agriculture and a critical element in ensuring long-term food and nutrition security. Global soil health is under severe threat owing to unsustainable agricultural practices, deforestation, overgrazing, pollution, and climate change. Africa's Agenda 2063 emphasises the importance of sustainable land management and soil restoration for enhancing agricultural productivity. South Africa's focus on soil health aligns with SDG 15 (Life on Land) and African efforts to promote sustainable land use and soil conservation practices across the continent. There is a need to promote ongoing research into regenerative farming and sustainable soil management to provide evidence as key approaches to reversing soil degradation, which impacts more than 33% of the world's soils. Broad incentives that include smallholder farmers should be explored, as well as the need to foster coherence and convergence across issues of the biodiversity-soil-climate change nexus. Discussions should focus on scaling sustainable soil management practices, leveraging innovation and technology to improve soil health, and supporting farmers in soil productivity management.

Questions for discussion
- Do current policies effectively incentivise and promote the adoption of sustainable soil management practices across different agricultural systems, including smallholder farms?
- What role should evidence-based research, innovation, and technology play in soil health monitoring, management, and productivity, particularly in smallholder farming?

Key recommendations:
- Increase national investments in ecological restoration by promoting the adoption of regenerative practices to build resilient agrifood systems.
- Develop and harmonise national and regional frameworks for soil health assessment and monitoring using appropriate methodologies and digital technologies.

- Promote policy and action convergence regarding soil health across the biodiversity–soil–climate nexus by strengthening cross-sectoral national policies and establishing joint international coordination mechanisms.

Theme 4: Reinforcing climate-smart agriculture for resilience in food systems

Climate-smart agriculture is a transformative approach that enhances agricultural productivity, strengthens resilience to climate variability, and reduces greenhouse gas (GHG) emissions. Given the increasing urgency of addressing climate change, CSA is central to global commitments, including SDG 13 (Climate Action), the Paris Agreement, and the Koronivia Joint Work on Agriculture under the United Nations Framework Convention on Climate Change (UNFCCC). For South Africa, CSA aligns with national climate priorities outlined in the National Development Plan (NDP), the Climate Change Bill, and the Low Emissions Development Strategy (LEDS). Additionally, it supports the broader objectives of CAADP in increasing climate resilience in African agriculture and promoting sustainable agri-food systems. The G20-MACS discussions should prioritise strategies for scaling CSA globally, with a focus on enabling policies, climate finance, advisory services, promotion of adaptable production systems, and knowledge sharing to enhance food and nutrition security in the face of climate risks.

Questions for discussion
- Which policies and financing mechanisms can effectively support the widespread adoption of CSA across diverse agricultural systems, considering farmers' economic incentives and decision-making processes?
- How can we improve knowledge sharing and technology transfer to increase agricultural productivity and farmer income while addressing barriers to adoption, such as awareness, affordability, and access?

Key Recommendations:
1. Develop and implement effective policies that integrate CSA into agricultural systems and prioritise farmers' access to finance and resources.
2. Enhance the use of CSA technologies and digital tools for climate adaptation to build resilience of agrifood systems and mitigate agricultural greenhouse gas emissions in accordance with national and regional circumstances.

Theme 5: Building Resilient Agricultural Bioeconomies

Africa holds vast untapped potential in its bioeconomy, an economic activity that leverages biotechnology and biomass to produce goods, services, and energy. The bioeconomy and agriculture are intrinsically linked, with agriculture serving as a primary source of biomass for bio-based industries. The bioeconomy offers solutions for sustainable and efficient food production and resource management. However, challenges such as limited investment, inadequate infrastructure, underdeveloped regulatory frameworks, and fragmented innovation ecosystems hinder the development of a robust bioeconomy. South Africa is taking proactive steps to advance its bioeconomy and is investing in research and innovation hubs, fostering public-private partnerships, and supporting the development of policies that facilitate bioeconomic growth. Discussions will focus on advancing bioeconomy policies, scaling up investment in bio-based technologies, and ensuring that smallholder farmers benefit from bioeconomy value chains.

Questions for Discussion

a) What is the potential of bioeconomy in addressing food systems challenges and how does it integrate with other sustainable agricultural practices

b) Which financing models and investment incentives can be leveraged to scale up bio-based technologies and infrastructure in Africa?

Key Recommendations:

1. Invest in research that links traditional knowledge with modern biotechnology to enhance local value chains.
2. Establish capacity-building programs in biotechnology, agro-processing, and sustainable resource management.
3. Strengthen public-private partnerships and regional bioeconomy strategies to create sustainable economic opportunities in agriculture.

Theme 6: Digital Agriculture and Adoption of 4IR Technologies

The rapid evolution of Fourth Industrial Revolution (4IR) technologies, including artificial intelligence (AI), internet of things (IoT), big data analytics, and remote sensing, is transforming global agriculture. These technologies have the potential to enhance productivity, promote climate resilience, and drive sustainability, making them central to Agenda 2063 and its goal of economic transformation through technological innovation. Despite these opportunities, Africa continues to face a significant digital divide, with only 25% of farmers having access to digital solutions. Recognising this

challenge, South Africa has prioritised innovation-driven agriculture through public-private partnerships. Discussions will focus on reducing the digital divide by enhancing access to digital tools, developing policies to govern AI use ethically, and encouraging partnerships to scale up digital agricultural technologies.

Questions for Discussion

a) How can equitable access to digital tools and technologies in agriculture be promoted to improve productivity and sustainability?

b) What effective and sustainable strategies can be implemented to address the digital divide in rural agricultural communities?

Key Recommendations:

1. Implement policies that ensure the ethical use of AI and data while promoting transparency and benefit-sharing.

2. Facilitate collaboration between governments, the private sector, and farmers to scale up the adoption of digital agriculture technologies in rural and underserved agricultural communities.

Conclusion

In the future, the transformation of agrifood systems in response to the challenges posed by climate change, resource scarcity, and food insecurity is both an urgent necessity and a tremendous opportunity for global cooperation. Discussions initiated at the G20-MACS lay a strong foundation for developing integrated, innovative, and inclusive approaches to agrifood systems transformation.

We recognise the importance of strengthening the convergence between desertification, climate and biodiversity actions, and more globally, between food, environment, and health objectives. Ensuring coherence between local, national, regional, and global policies is essential for their effective implementation. We advocate for substantial investment in research and in partnerships for research at the global level, as suggested in the 2011 G20 Conference 'Agricultural Research for Development' promoting scientific partnerships for food security, alongside capacity sharing through partnerships. Furthermore, we emphasise the critical role of innovation hubs in accelerating agrifood systems transformation.

The recommendations outlined for each theme offer a clear pathway for action, emphasising the need for policies that are inclusive, scalable, and tailored to the local

context, particularly for smallholder farmers. With collective commitment and a focus on long-term, sustainable transformation, the global community can chart a course towards resilient agrifood systems that not only secure food and nutrition security but also foster economic growth, environmental sustainability, and social equity for generations to come.