

Can GMOs play a role in adapting sub-Saharan Africa's agriculture to climate change?

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Introduction

Sub-Saharan Africa (SSA) is the most vulnerable region to climate change due to low adaptive capacity, high exposure to drought and floods, high population growth & heavy dependence on agriculture¹. Agriculture employs over 70% of the labor force and accounts for over 25% GDP in most countries². Impacts of climate change are already being felt in SSA (Fig 1).



Fig 1. Devastating drought in Zimbabwe caused farmers high maize yield losses in 2007³

Impacts of climate change on crop production in Sub-Saharan Africa⁴

- There is increased frequency in drought events since the 1970s (Fig 2). Over 200 million people face drought each year. This number is expected to rise to 600 million by 2050¹.

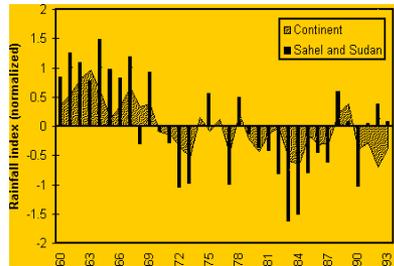


Fig 2. Rainfall pattern for Northern SSA region compared with Africa's rainfall patterns for 1960-1993. ⁵

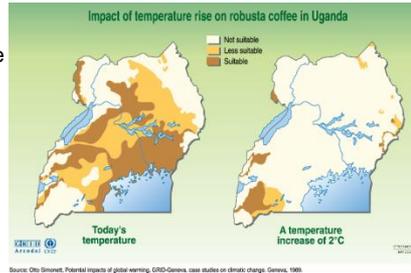
- More than 90% of SSA agriculture is rain fed. Increased crop loss and declining yields are occurring due to drought. About 50% yield loss is expected in rain-fed agriculture by 2020⁴.
- Severe flood events are increasing. For example in 2000 Mozambique experienced the worst flood in 150 years, and in 2007 Uganda also experienced one of its worst flood events¹.

Literature cited

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- Africa has about 35,000 native plant species. Increasing extreme events, pest and disease, plus land use change are expected to cause about 25-42% loss in this biodiversity by 2050⁴.
- A 2°C temperature rise, expected by 2080, will cause 9-20% arable land loss⁴. In Uganda for example, this is likely to heavily affect coffee production, resulting in 40% export earning loss (Fig 3).

Fig 3 Impact of 2°C temperature rise on coffee production in Uganda.



Adaptation strategies for agriculture

- Adoption of crop varieties that tolerate drought, pest and disease, as well as having improved nutrient composition is one of the adaptation strategies suggested by IPCC (2007).
- Some important African crops are difficult to improve using traditional breeding methods.
- Techniques for developing genetically modified organisms (GMOs) broaden opportunities for crop improvement. There is increasing adoption of GM crops globally (Fig 4).

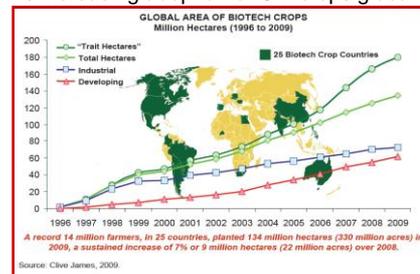


Fig 4 Global adoption of GM crops is increasing⁶

Challenges for GMO adoption in SSA

- Lack of a **clear national policy and legislation** on GMOs.
- Decline in **public funding of agricultural research**, which is necessary to develop products for local needs and priorities.
- Limited capacity in **intellectual property rights management**, particularly in relation to agricultural products.
- Inadequate **capacity for risk assessment**, management and risk communication, given the risks associated with GMOs.
- Trade issues** with some European countries who are major importers of agricultural products, and they are opposed to GMOs.
- Advocacy for organic agriculture** by many donors. Yet FAO Director-General Jacques Diouf has stated that "while organic agriculture should be promoted, it cannot feed the 6.8 billion people today nor 9.1 billion expected in 2050".
- Diffusion of GMOs** into social system. GMO products must be superior, yet compatible with existing farming systems, and affordable.

Conclusion

The high population growth in SSA, and its heavy dependence on agriculture is likely to exacerbate the region's vulnerability to climate change. This calls for consideration of all potential adaptation options including GMOs. External assistance may be needed by some nations to develop appropriate legislation, and strengthen institutions for effective decision-making, monitoring and management of these new adaptation strategies.

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