# ASSESSING THE IMPACT OF CLIMATE CHANGE ON SWEET POTATO IN UGANDA

Sweet potato is a mainstay of household food security and a major source of vitamin A across sub-Saharan Africa, and particularly in Uganda. Understanding how climate change is likely to impact on sweet potato would be useful for policymakers in Uganda making decisions to improve food security and increase resilience to climate shocks. However, sweet potato is an under-researched crop and the impacts of climate change have not been systematically analysed. The Sweet Potato Catalyst Project aims to assess the impacts of climate change on sweet potato in Uganda and develop ways for local stakeholders to access and assess this information to strengthen governance. This policy briefing note provides an overview of the research, the approach being taken and anticipated outcomes that will feed into the UNFCCC Koronivia Joint Work on Agriculture.

## BACKGROUND

Around 224 million people in sub-Saharan Africa - 23% of the population - are under-nourished[1]. Sweet Potato is a mainstay of household food security and a major source of vitamin A across the region, outranking cassava and maize in importance in 7 countries of East and Central Africa. Uganda is the leading producer of sweet potato in Africa[2].

*Figure 1: Sweet Potato farmer in Mukono, Uganda.*


[1] FAO, 2017. Overview of Food Security and Nutrition Report, Africa 2017. www.fao.org/3/a-i8053e.pdf

[2] Ewell, P.T., 2002. Sweetpotato production in Sub-Saharan Africa: Patterns and key issues. Lima: CIP http://www.sweetpotatoknowledge.org/wp-content/uploads/2016/04/Sweetpotato-Production-in-Sub-Saharan-Africa-Patterns-and-Key-Issues.pdf

Any changes in the availability of sweet potato will have a significant impact on people's health, economic development and living standards. However, sweet potato is an under-researched crop and the effects of climate change have not been systematically analysed.

The importance of sweet potato in Uganda (Fig. 1), combined with the lack of information on climate change impacts, is a research problem which was identified through the Future Climate for Africa (FCFA) HyCRISTAL project.

The Sweet Potato Catalyst Project is building on understanding from HyCRISTAL[3] to investigate the factors that will impact sweet potato yields in Uganda under different climate change scenarios using a *Causal Network* (Box 1) approach. This will build on previous work where we have used a similar Causal inference approach to understand storylines of household food security impacts based on weather and other driving factors[4].

**Box 1: Causal Networks**

Causal networks are a way of representing a set of key variables and how they interact to cause an effect. A network provides a framework to combine information from different sources, including data, models, and expert knowledge. We will develop a network to understand the links between climatic and non-climatic variables, and how they interact to influence sweet potato crops. We will use this understanding to exploring potential impacts of climate change in the medium- to long-term on sweet potato production systems in Uganda, and the implications for food security, health and nutrition, and the wider economy.

## APPROACH

Interviews with sweet potato experts in Uganda and the wider region have been used to develop a network of drivers affecting sweet potato growth. The drivers have been combined in the form of a network diagram (Fig. 2), depicting the key factors affecting the growing stages of sweet potato.

Work has focused on quantifying these links in the network using data, models, literature and expert understanding[5]. This is challenging where data is limited, but the approach helps to build understanding of how much the different factors in the network affect each other. The aim is to be able to provide information about likely yield given the state of the different drivers in the network. For example, if the temperature had been particularly high and rainfall particularly low, what would the likely yield be? In this way we can assess the impact changes in the climate would have on yields, along with the impacts of farming practices and of policies affecting any drivers in the network.

This approach provides the potential to continue to develop the network further as more data and knowledge become available, along with flexibility as to how it can be developed. For example, where there are uncertainties in the links in the network these could be reduced as understanding progresses through improved data availability, model development, and increased expert knowledge. The network could also be expanded to incorporate other important drivers, processes and outputs, such as effects on the nutritional content of the sweet potato, and postharvest processing and storage.

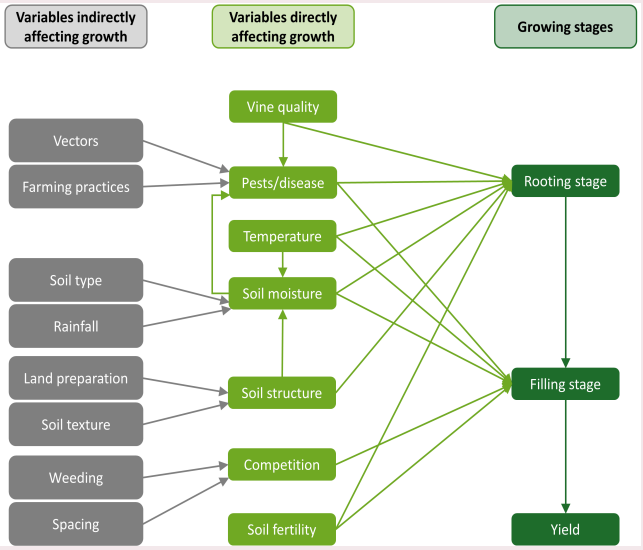


*Figure 2: Network diagram illustrating the drivers impacting on sweet potato growth*

## INFORMATION FOR POLICYMAKERS

Information from this network (Fig.2) will be combined with other datasets including livelihoods, climate and hydrological data within the Integrated Platform for African Policy Makers (IDAPS)[6], which is being developed by the Walker Institute in

[3] http://www.walker.ac.uk/projects/hycristal-integrating-hydro-climate-science-into-policy-decisions-for-climate-resilient-infrastructure-and-livelihoods-in-east-africa/; https://futureclimateafrica.org/project/hycristal/

[4] Young, H. R., et al., 2020. Storylines for decision-making: Climate and food security in Namibia. In review.

[5] Marcot, B. G., et al., 2006. Guidelines for developing and updating Bayesian belief networks applied to ecological modeling and conservation. Canadian Journal of Forest Research, 36, 3063-3074, doi: 10.1139/X06-135

[6] http://www.walker.ac.uk/research/projects/idaps-integrated-database-for-african-policy-makers/

partnership with the NGO Evidence for Development. The network offers a natural framework for connecting weather and climate to specific impacts and risk, mediated by human behaviour (policy, institutions, political economy, legal frameworks), to provide policymakers with evidence-based interventions to promote food security and resilience, strengthening potential for policy adoption[7]. This will contribute to ensuring national responses to climate change in Uganda are informed by the latest scientific information[8].

IDAPS will enable policymakers to create their own livelihood-impact scenarios and access output visualisations to inform decision-making. Policymakers will be able to explore the potential consequences of their actions across different sectors and support the development of contingency plans to manage shocks and increase resilience.

We anticipate that these outputs will to lead to the following long-term outcomes:

- Improved budgetary planning for sustainable climate resilient agriculture
- Welfare-reduced burden of disease through reduction in vitamin A deficiency
- Exporting expertise and centre of excellence through the application of CI networks in policy planning;
- Targeted flood resilient infrastructure investment with year round market access for poorer communities; and,
- Economic damage of climate related shocks minimised by greater local food security and reduced reliance on food imports.

## KORONIVIA JOINT WORK ON AGRICULTURE

We are working with Climate Action Network - Uganda (CAN-U) to share information generated by the project with relevant stakeholders in Uganda. CAN-U are training community farmer champions in Mukono, Uganda in the production of sweet potato and in policy influencing. CAN-U are also leading advocacy efforts, ensuring the work addresses the decisions being taken by policymakers and research findings and feeds in appropriately to policymaking at a national level on the Koronivia Joint Work on Agriculture[9] (KJWA). The KJWA within the United Nations Framework Convention on Climate Change (UNFCCC) emphasizes the importance of agriculture and food security in the climate change agenda. By mainstreaming agriculture into the UNFCCC processes, the KJWA can drive transformation in agricultural and food systems, and address the synergies and trade-offs between adaptation, mitigation and agricultural productivity.

*Figure 3: Focus group providing local information on employment and trade in Mukono, Uganda © Walker Institute 2020*

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[7] Cornforth, R. J., et al. 2018. The Integrated Database for African Policymakers. Technical Briefing Note WITBN1218/01, Walker Institute, University of Reading. http://www.walker.ac.uk/media/1610/idaps-technical-brief-walker-branding-dec-2018.pdf

[8] Acidri, J., et al. 2018. UGANDA - Synthesising Evidence for Targeted National Responses to Climate Change. Briefing Note WIBN0218/01, Walker Institute, University of Reading. https://zenodo.org/record/3510110#.XnnjR4j7Q2z

[9] https://unfccc.int/topics/land-use/workstreams/agriculture

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