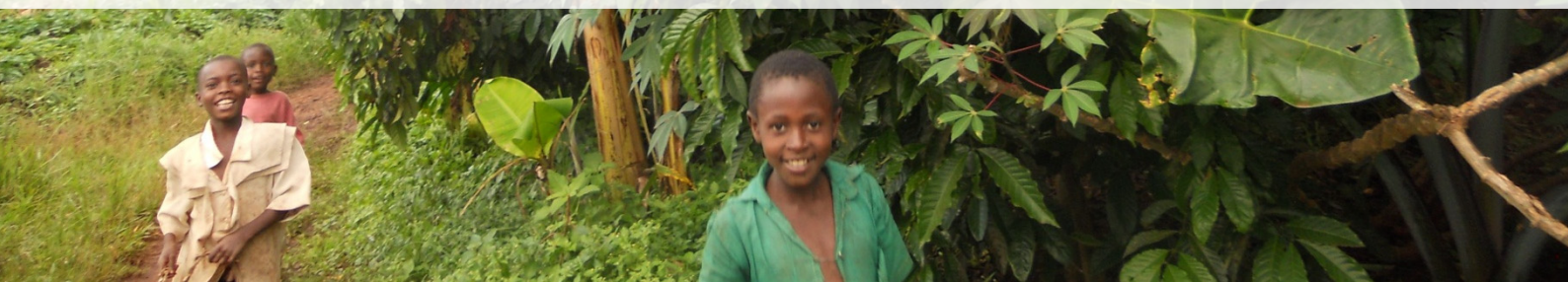


# 'Towards climate smart agriculture: lessons from a coffee × banana case'

Experiences from research for policy support in Uganda

Coffee and banana production in Uganda will be affected by climate change. While rainfall quantity might not drastically alter, its distribution is expected to become more erratic. Furthermore, the average temperature is expected to increase by 2 °C in the next few decades. This will affect coffee producing areas, most notably the Arabica growing regions, in addition an increase in pest and disease incidence is expected. Climate change is strongly connected to development issues. Economies, like Uganda, that depend heavily on natural resource based production systems such as agriculture, forestry and fisheries will feel the effects most profoundly. Smart development moves are needed beyond the traditional isolated approaches to achieve adaptation, mitigation, and development objectives.



## Key messages

- Without adequate responses a rise in temperature will result in a reduced area suitable for Arabica coffee as well as in increase in pest and disease related damage;
- Integrating climate change adaptation and mitigation options will contribute to sustainable development and food security;
- Policies need to be developed together with stakeholders, to integrate various agendas such that potential negative effects of climate change can be addressed and turned into opportunities;
- Introducing shade trees in the coffee x banana system can reduce the temperature by 2 to 5 °C, However, shade trees can be an alternative host for pests. A guideline for suitability of trees for introduction as shade tree is needed;
- Coffee and banana germplasm suitable for production in a warmer climate needs to be developed and made available;
- Extension workers, farmers and scientists need to engage in a strong cooperation to formulate clear messages and strategies.

The Climate and Adaptation project in Uganda (BO-10-009-003) is funded by the Netherlands Ministry of Economic Affairs, Agriculture & Innovation. Wageningen University and Research centre works in collaboration with the National Crops Resources Research Institute and the International Institute of Tropical Agriculture. The project aims to assist knowledge transfer and policy support to deal with decision making on adaptation to climate change and the link to mitigation.

Activities include: (1) Capacity development: regional training on adaptation to climate change in agriculture and natural resource management in partnership with Makerere University; (2) Case study research on coffee × banana systems.

## The impact of climate change on coffee x banana – a case study

Coffee is the most important cash crop for Uganda generating about 20% of the total export revenues. Extreme temperatures and changing rainfall patterns will impact the sector but to what extent and which adaptation measures are needed is not clear yet. Banana is an important staple and cash crop that is strongly linked to food security, Uganda has the highest per capita banana consumption in the world. Both crops, coffee and banana, are often found on the same farm in separate plots, as traditionally recommended by research and extension. However, smallholders increasingly prefer intercropping, bananas provide shade and mulch for coffee while not affecting coffee production in a significant way. Consequently, intercropping with banana provides additional food and income from the coffee fields. The permanent canopy, root systems, and mulch of these crops furthermore prevent soil erosion and help maintain soil fertility in Uganda's hilly landscape. If climate change were to affect the banana and coffee production, then the country as a whole and the smallholder producers in particular will be seriously affected. Focusing on coffee and banana-based cropping system allows for a combined analysis of the impact of climate change on Uganda's major food and cash crops and the livelihood of the smallholder producers.

Climate change will particularly affect the Arabica coffee production, which requires a cooler climate than Robusta coffee and is generally found above 1400m altitude. Experts predict that if the average air temperature increases by 2 °C or more in the coming decades this would make very large areas that currently grow Arabica coffee unsuitable, increasing the altitude threshold to at least 1700-1800m. For Robusta coffee, the threat will particularly come from increased pest and disease pressure such as coffee leaf rust and coffee berry borer which are expected to increase with rising temperatures. Similarly, major banana pests and diseases such as the root burrowing nematodes, banana weevils, and Sigatoka leaf disease will become significant problems in Uganda's current major production areas in Uganda.

Adaptation of the coffee production systems is therefore a must and adding a shade component to this system seems a promising strategy. Studies across the globe have shown that shade plants such as trees and bananas can change the micro-climate and reduce the temperature of the coffee by 2 °C or more. This therefore presents an opportunity to develop climate-smart intercrop shade.

First, intercropping trees and bananas in coffee can generate 50% additional income as a recent study by the International Institute of Tropical Agriculture (IITA) has shown. Secondly, the shade helps to reduce the temperature and drought problems in coffee. Thirdly, the additional produce from the shade system helps farmers to diversify their income, spread their risks, and improve their food security. Trees planted in the coffee field will also help to mitigate climate change by capturing CO<sub>2</sub> from the air, in addition banana provides mulch contributing to improved soil quality and carbon sequestration.



Shaded coffee production systems are climate-smart systems that can help reduce the impacts of the anticipated climate change problems. However, the type of shade plants to use needs careful consideration. Depending on the ecology and farmer needs, some shade plants may be favoured over others. Some shade plants may even have a negative impact. For instance, *Albizia* spp. is, as well as coffee, a host for the twig borer. Recent studies by the coffee scientists of the National Crops Resources Research Institute (NACCRI-NARO) and IITA in collaboration with Wageningen

University & Research Centre have shown that the incidence and damage of important pests like the twig borer seems to increase with certain types of shade tree.

## Consultative workshop

A workshop with stakeholders from the public sector, research and NGO's was held on the 21st of November 2011. The aim of the workshop was to share and verify findings from the case study on coffee x banana, climate smart strategies, to discuss possible strategies and identify gaps between research, the public and the private sector. The outcome of the workshop is formulated in the key messages.

### Further information can be obtained from:

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### For background information see:

<http://www.naro.go.ug/>, <http://www.iita.org/>,  
<http://www.saiplatform.org/> and  
<http://portals.wi.wur.nl/climatechange/>