Climate-smart coffee systems in East Africa

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Climate change has an impact on Arabica production in Tanzania

Year 2050
- 134kg/ha
Equivalent to
- 60million USD
Of foreign export earnings per annum
Coffee systems will change in the future
Planning for climate change adaptation in coffee: different things in different locations

- Adapt your systems
- Adapt your crops – change your crops
Climate change has an impact on coffee directly and an impact on pests and diseases.

Example of Coffee Berry Disease (but also coffee stem borer and leaf rust)

Is altitude (climate) the real factor?

There is a significant interaction between production systems.
What can we do? Importance of scales
At plant level: drought/disease resistant varieties, pesticides, herbicides, fertilizers, GAP, etc.

At plot level: coffee x banana, integrated soil fertility management, coffee x shade, etc.

Yield gap analysis for coffee in Uganda

- Soil P deficiency
- Low coffee plant density
- Soil K deficiency
- Soil P concentration
- High shade tree density
- Unfavourable soil pH
- Low coffee plant density
- Coffee twig borer
- Old coffee trees
- Soil Mg concentration
- Elevation
- Lack of mulching

- 774 kg/ha (1500 kg/ha)
- 760 kg/ha (1464 kg/ha)
- 966 kg/ha (1701 kg/ha)
- 778 kg/ha (1737 kg/ha)
- 1090 kg/ha (2244 kg/ha)
Need short-term benefits for the farmers

Do attitudes matter for technology adoption?

<table>
<thead>
<tr>
<th>Pessimist</th>
<th>Optimist</th>
<th>Pragmatist</th>
<th>Trapped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative attitude, does not think farming is a good investment. Prefers investing in off-farm activities.</td>
<td>Proud to be a farmer, farming is good investment. Wants children to farm.</td>
<td>Positively coping, farming is a good investment but children should not farm.</td>
<td>Does not want to farm and has low hope. But seems to be trapped in farming.</td>
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</table>
Not every investment costs the same money, we need to know which strategies are needed where, but we also need to know their cost.
Coffee and other crops

Communal grazing land

Intensifying? Adapt to CC?

Wetland

Eucalyptus

Need to develop more resilient agricultural practices
- Shaded coffee systems
- Integrated soil fertility management
- Water harvesting technologies
- Crop diversification / shifts

Community in a landscape
Climate change adaptation at policy and institutional level

In the case of Rakai

Align wetland policy with climate change adaptation plan

Other challenges

Planning:
- Develop climate change adaptation plan at national and regional level
- What is the vision for the future?
- Scaling?

Adoption:
- Quality of inputs
• Training packages need to be planned by location
• Climate change adaptation also means developing other livelihood options than coffee
• Most of the research on climate change adaptation at plant and plot level
• There are different types of coffee farmers
• We need to have an investment scale with the technologies adapted to farmer types
• Constraints at landscape level might prevent adoption of CSA practices
• Constraints at policy level might prevent adoption of CSA practices

![Diagram showing possible changes in land use and crops induced by climate change](image)

<table>
<thead>
<tr>
<th>Plot level functions</th>
<th>Full sun monocrop</th>
<th>Shade tree monocrop</th>
<th>Banana / food intercrop</th>
<th>Polyculture system</th>
<th>Forest system</th>
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<tbody>
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<td>Yield quantity</td>
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<td>Yield quality</td>
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<td>External input use</td>
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<td>Nutrient recycling</td>
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<td>Production risks</td>
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<td>Plantation life</td>
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<td>Food security</td>
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<td>CC adaptation</td>
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<td>Carbon stock</td>
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<td>Ecological services</td>
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Color key: light color = low, dark color = high.
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