Up-scaling resilience enhancing agricultural innovations for food and nutrition security in semi-arid Kenya

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KARI-McGill Food Security Research Project Team
Innovating for resilient farming systems
Research Context

• Semi-arid Eastern Kenya, 7.5 million hectares and 20% of the population

• Characterized by:
  • Low and poorly distributed rainfall (range 400 to 850 mm)
  • Poor fertility and degraded soils
  • Low yields
  • Frequent and severe droughts, crop failure and food insecurity
  • Frequent food aid/famine relief
Challenges Addressed

• Low innovation and adoption rates
• High levels of poverty (approximately 60%)
• Persistent food insecurity
• Environmental degradation
• Poor nutrition status, particularly women and children
• Poor producer-market linkages
Research Questions

• How to accelerate adoption of technological innovations to improve agricultural productivity and food security?

• How to build resilience in the farming systems through diversification of high value traditional (orphan) crops?

• How to improve utilization of locally available nutritious foods?

• How to enhance market development to create demand for technologies and improve incomes?

• How to influence resilience-enhancing policies?
Methodological Framework

Participatory Learning and Action Research: Innovation platform bringing together farmers, researchers and other stakeholders to jointly analyse issues, identify constraints and opportunities, seek and develop solutions, and implement and evaluate these solutions, in an iterative learning-action cycle.

Integrated Assessment: Applying a systems-thinking approach to understanding the contextual factors (environmental, organizational, inter-personal, intra-personal) affecting innovation to generate new and integrated insights for research, policy and practice.
Kenya Agricultural Research Institute
*Project coordination and implementation*

McGill University
*Project coordination and implementation*

Kenya Medical Research Institute
*Research in Nutrition and Health*

State Department of Agriculture
*Farmer mobilization, up-scaling and policy support*

Farmer Groups
*Learning partners, sharing farming experiences, Providers of land and labour input*

Freshco Seed Company
*Seed production, seed business development and farmer training in seed production*

Cascade Development
*Participatory Market Development*

Local Universities
*Contribution to research through studentships*

Provincial Administration
*Community Mobilization*
Three Project Sites

Machakos County

Tharaka Nithi County

Makueni County

KEY
- PPTE site
- Town

Location of Study Sites in Kenya

Location of Study Sites in Machakos County

Location of study sites in Tharaka County

Location of Study sites in Makueni County
Nutrition and Health Baseline Survey

- 23.8% stunting levels in children (6-36 months)
- 14.4% women underweight
- 64.2% women have medium & low dietary diversity
- 86% households with severe food insecurity
- 80% purchase foods on credit (coping mechanism)
Implementation

- **Scoping** done to characterize study area and inventory available technologies (>70)

- Consolidated into **16** main technologies

- Participatory selection of **8** priority technologies by farmers (**316 M** and **684 W**) in focus group discussions

- Formation of **Primary Participatory Technology Evaluation (PPATEs)** or peer learning sites in each county

- Recipients of knowledge from Primary sites formed **Secondary groups (SPATES)** that practiced the lessons through selected technologies
Implementation (2)
Initial Technologies

- Natural Pasture Improvement
- Grain Amaranth
- Cassava
- Napier Grass
- Pigeon Peas
- Green Grams
- Drought tolerant and early maturing maize
- Cowpeas
- Beans
- Sweet potato
- Gadam Sorghum
- Millet
- Indigenous Chicken
Participatory Assessment & Selection of Technologies

Assessment criteria:

• Potential to contribute to resilience of the farming systems
• Contribution to income diversification and stabilization to household food and nutrition security
• Contribution to equity at household as well as at community level

Makueni FFD, February 2014
## Participatory Assessment & Selection of Technologies (2)

**Mwala County - Kavumbu FRDA**

<table>
<thead>
<tr>
<th>Rank</th>
<th>October 2011</th>
<th>Scores</th>
<th>August 2013</th>
<th>Scores</th>
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<tr>
<td>1</td>
<td>Sweet potato</td>
<td>8.49</td>
<td>Indigenous Chicken</td>
<td>9.06</td>
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<tr>
<td>2</td>
<td>Cowpeas</td>
<td>8.30</td>
<td>Fodder &amp; forages</td>
<td>8.94</td>
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<tr>
<td>3</td>
<td>Beans</td>
<td>8.25</td>
<td>Green grams</td>
<td>8.94</td>
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<tr>
<td>4</td>
<td>Maize</td>
<td>7.96</td>
<td>African leafy vegetables</td>
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<td>Indigenous Chicken</td>
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<td>Sweet potato</td>
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<tr>
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<td>Sorghum</td>
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<td>7.63</td>
<td>Cowpeas</td>
<td>8.38</td>
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<tr>
<td>8</td>
<td>Cassava</td>
<td>7.52</td>
<td>Natural pasture improvement</td>
<td>8.00</td>
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</table>
Results

• Peer learning and extension through 54 Primary farmer groups (753 F and 498 M) and 216 Secondary groups (6,000 farmers)

• 121 Farmer Nutrition Champions trained to sensitize community on good nutrition and consumption of local high value crops

• 3 farmer groups trained by FRESHCO on production of high quality assorted seeds worth Ksh 4,121,730 (CAD 51,521)

• 18 Market opportunity farmer groups (MOGs) formed and trained to facilitate collective produce marketing
Crop technology evaluations and field activities

Evaluation activities with PPATEs

SPATEs harvesting green grams on farm
Up-scaling, field days, farmer exchange visits

Tomorrow’s farmers

Farmer exchange visit
Results (2)

- Increased awareness and allocation of land area for high value legume crops (20 – 67%)
  - green grams, cowpeas, pigeon peas, and dolichos

- Increased usage of manure/fertilizer combinations and water harvesting practices

- Improved produce prices by more than 50% when collectively sold

- 11 MSc and 5 PhD students trained
Comparison of improved technologies vs. farmers’ practice

Agronomic Practices

Farmers’ Traditional Practices
Scaling up of technologies using the PPATE-SPATE model

- *Increases the socioeconomic impact of technologies to larger scales of coverage to benefit more people and to foster policy and programme development:*

  - The process is geared towards ensuring that more (poor) farmers benefit from access to and effective use of agricultural technologies
  - It is a process that expands, replicates, adapts to sustain and reach a greater number of people
  - It is part of a broader process of innovation and learning
  - The process is not linear but an iterative and interactive cycle
Results (4)

Dissemination of research results through field days

Makueni FFD, February 2014

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<th>Year</th>
<th>No.</th>
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<tr>
<td></td>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Total</td>
<td></td>
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<tr>
<td>2012</td>
<td>13</td>
<td>1334</td>
<td>1229</td>
<td>2576</td>
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<tr>
<td>2013</td>
<td>4</td>
<td>441</td>
<td>790</td>
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<td>2014</td>
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<td>610</td>
<td>1244</td>
<td>1854</td>
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<td>2385</td>
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Results (5)

Capacity building for Trainers-of-Trainers

<table>
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<th>Type of Training</th>
<th>Gender/Number Trained</th>
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<tbody>
<tr>
<td></td>
<td>Men</td>
</tr>
<tr>
<td>Nutrition champions</td>
<td>41</td>
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<tr>
<td>Indigenous chicken service providers</td>
<td>24</td>
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<td>Agro-forestry</td>
<td>6</td>
</tr>
<tr>
<td>Post-harvest handling</td>
<td>50</td>
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</table>
Success stories... many!

Francis Mutua:

“My neighbours are my constant visitors at my farm and have been emulating the use of improved technologies and I am happy for they appreciate what I do”

Francis used to harvest 30-50 kg/acre of green grams and currently 450 kg/acre
And, what about food security...?

Percentage of households with insufficient food in given months (2011 and 2013/2014)

*** P < 0.01, ** P < 0.05, * P < 0.10 [McNemar’s test (one-tailed test)]
Key Messages

• Among the different methods of knowledge transfer, ‘learning by doing’ is appropriate for farmers to learn and internalize

• Access to input and output markets are key drivers to adoption of technologies in semi-arid farming systems

• Continuous sensitization of farmers on potential opportunities empowers them to make informed choices
Key Messages (2)

• Increased trust and communication facilitates the information flows required for system innovation
• Food security and resilience are complex challenges and decentralized approaches are essential
• Need for enhanced partnerships across institutions and better contextualized enabling policies for long term success
• How to sustain and scale up success using existing resources?
Acknowledgements

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Thank you