Review Meeting
Dryland Cereals Phase 1 and Extension Phase

Finger Millet for ESA region

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Product Line Description

Major constraints to finger millet production

• Blast disease
• *Striga* weed
• Drought
• Low soil fertility
• Labor intensity
• Poor post harvest handling
Objectives 2012-16

Overarching Goal

- Over a 10-yr period, an increase of 0.4 million tons in finger millet production in Ethiopia, Tanzania, Uganda.

Outcomes

- Germplasm evaluation and increased breeding efficiency
- Adaptation and stability across targeted agro-ecologies
- Enhanced access of farmers to knowledge and information
- Reduced drudgery and improved profitability
- Strengthened role of private sector, especially in seed sector, and market linkages
- Crop management for sustainable intensification
- Informing policy makers
RESULTS

- Targeting
- Germplasm collection and characterization
- Nutrient profiling
- Site stratification
- Varieties released
- Integrated *Striga* management
- Micro dosing
- Promotion of effective seed dissemination
- Post harvest handling
- Gender mainstreaming
- Capacity building
RESULTS: Germplasm collection and characterization

- 808 accessions collected from Ethiopia, Kenya, Tanzania, Uganda
- More than 1000 accessions characterized
- High genetic variability (including rare alleles) - useful for conservation and breeding
- High heritability for key traits - useful for selection in early generations
RESULTS: Nutrient profiling

- Profiled 638 accessions from core set, farmer preferred and released varieties
- Very high variability in accessions
- The farmer preferred and improved varieties low in Ca, Fe and Zn
- Positive correlation among Ca, Fe and Zn
- Select all the three micro nutrients concurrently
## RESULTS: Nutrient profiling

<table>
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<tr>
<th>Accession Name</th>
<th>Ca mg /100g</th>
<th>Fe mg /100g</th>
<th>Zn mg /100g</th>
<th>N mg /100g</th>
<th>Grain Yield t/ha</th>
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RESULTS: Site stratification

- Four countries group into two mega environments
  - Uganda, Kenya and Tanzania form one mega environment, and Ethiopia another
  - Uganda a possible representation for first mega environment
  - Varieties stable across countries and years identified
RESULTS: Varieties released

- 17 varieties released
  - Ethiopia 9
  - Kenya 5
  - Tanzania 2
  - Uganda 1
- Two varieties, **U15** and **P224**, released in 3 countries

**U15**
- High yield,
- early maturing,
- wide adaptation,
- good color,
- good head shape,
- tolerant to blast and *Striga*

**P224**
- High yield,
- big heads,
- responsive to high input use
RESULTS: Integrated *Striga* management

- Varietal resistance + micro dosing + intercropping with trap crop (*Celosia argentea* or *legume*) is the best *Striga* control measure
  - Increases finger millet performance (grain yield, dry head weight and plant height)
  - Reduces *Striga* emergence
RESULTS: Micro dosing

- Applying 20kg N increases yield by 25 to 40%
- Hastens maturity by as many as 10 days
- Performance under *Striga* infestation not significantly different from intercropping with *Celosia argentea*
RESULTS: Promoting seed dissemination

- 252 women farmers (including young women) trained in QDS production
- QDS seed producers provided with foundation seed
- 30 extension scientists trained in monitoring QDS production
- Small scale farmers linked to agro dealers
RESULTS: Promoting seed dissemination

Seed of promising varieties from PVS is packed in 0.5 to 1.0 kg packs and labeled as research material.

The packs are distributed during field days & agricultural shows at a fee.
RESULTS: Post harvest handling

- Main constraint to marketing is poor grain quality due to poor post harvest handling

- Use of cemented drying floors
- Use of canvas
- Threshing machines validated and promoted
Results: Value addition

- 20 women groups per country trained on value addition
- Recipes for products finger millet based developed
- Environment-friendly charcoal stoves promoted for baking
RESULTS: Gender mainstreaming

- Women farmers encouraged to participate in demos, training, field days and seed production
- Women involved in selecting their preferred varieties; usually based on traits like easy threshing, milling quality
- Women involved in priority setting
- Data disaggregated by gender
RESULTS: Capacity building

- 18 Scientists trained in data management and analysis (MET data, BMS tool)
- 26 Technical staff trained in emasculation techniques, experimental designs, data capture and curation
- Farmers, extension staff, agro dealers and other stakeholders trained in GAPs, post harvest handling and agribusiness
- 5 MSc and 3 PhD completed their studies
IMPACT

- Average *grain yield* increase from *0.6 to 1.2 t/ha* in target areas; highest in Tanzania
- *> 6 t per year pre basic and basic seed* availed to NARS per year
- Quality seed of improved varieties available and affordable to farmers.
- Income of farmers increased especially among female farmer groups as shown by acquisition of assets - houses, animals, bicycles and affording school fees from FM sales
Lessons Learned

- Gender preference for finger millet end use is important in developing varieties
- Demonstration of increased yield and reduced Striga damage by fertilizer application (manure or micro dosing) has led to farmers’ willingness to adopt the practice
- Men are willing to get involved more in tedious finger millet activities like weeding, harvesting and threshing if appropriate technologies are introduced
- Promoting some GAPs can be a challenge in traditional finger millet growing areas
- Introduction of a technology may present unintended consequences. e.g. row planting in Tanzania; where alternative solutions will be required eg in case:-value addition
Areas suggested for continued R4D

- Variety development, high yields with high nutrient content
- Management options: use of gender-preferred planting machinery, weeders and threshers
- Alternative seed systems and the possibility of merging informal and formal seed systems
- Product development and utilization of products based on finger millets e.g. use of finger millet for bio-fortifying maize and cassava flours
- Generation of information on production areas, technologies, market trends
Contributing Bilateral Projects

i. Harnessing Opportunities for Productivity Enhancement (HOPE) of Sorghum and Millets in Sub-Saharan Africa and South Asia (BMGF)

ii. Accelerated Value Chain Development (AVCD) Program – Drought Tolerant Crops (DTC) Value Chain AVCD-DTC (USAID)
Summary

- Germplasm collected and characterized
- Representative testing sites identified
- 19 improved varieties released
- Seed of improved varieties availed to farmers leading to increased food and income
- Three management options validated and promoted
- Gender mainstreamed into finger millet R4D in the region
- 3 PhD students and 5 MSc theses supported
List of Posters

1. Evaluation of nutrient-dense finger millet accessions for nutrient stability across agro-ecologies in East Africa


3. Progress Towards Identification of Natural Genetic Variability for Nutritional Quality and Bioavailability Traits in Finger Millet at a Whole Genome-level.

4. Effect of phosphate application Rates on Growth, Nitrogen Uptake, Yield and Quality of Finger Millet in Busia, Kakamega and Makueni Counties of Kenya.
Sure, are surely practicing what they preach.
Presenter’s Note

Finger millet Team:

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