Gender & Breeding Initiative

CGIAR

Integrating gendered knowledge into banana breeding

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Background

- Banana is an important food and income generating crop for more than 50 million people in the African Great Lakes region
- Low on farm yield ~ 9.0 t/ha Cf. potential yield of 60-70 t/ha
- Short plantation lifespan of 3-5 yrs. from 50 yrs.

Factors responsible

- Declining soil fertility
- Poor agronomy
- Inferior banana varieties
- Drought
- Pests and diseases
  - Nematodes
  - Weevils
  - Black Sigatoka

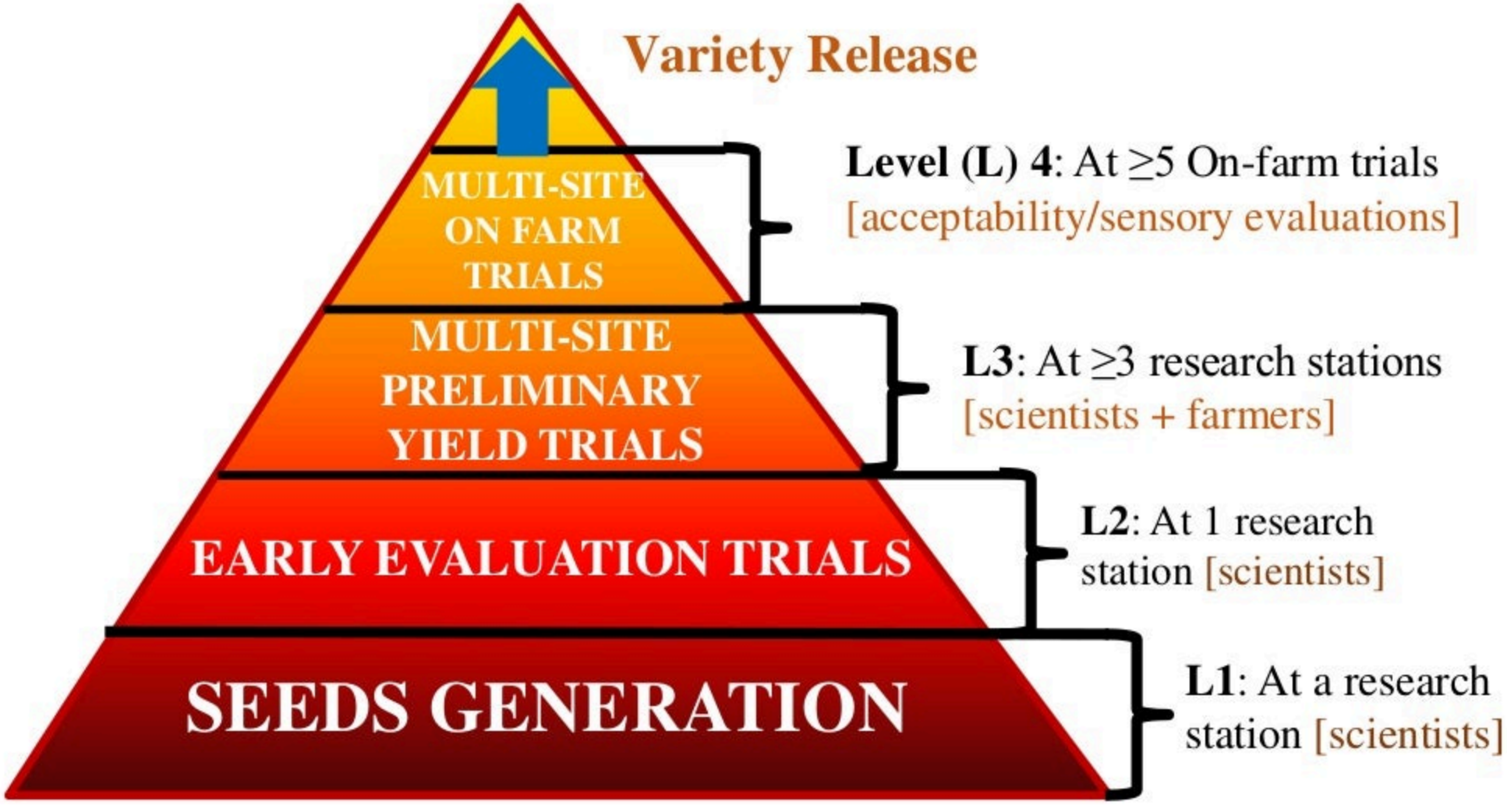
Breeding objective "Developing and releasing farmer acceptable high yielding banana varieties with multiple resistances to pests and diseases"

Banana "matooke" product profile

Market segment	Trait (economic, sustainability, livelihood) and value	Target trait level	Market Priority	Selection Objective
Fresh mkt and processing	Yield	30% greater than Mbwazirume variety across a range of soil and management conditions	1	Maximize
	Table quality (needs regional assessment)	A general acceptability score of at least 4 (on a hedonic scale of 1 to 6), using Mbwazirume as a check (acceptability is tested after cooking as taste, aroma, colour, texture/mouth-feel)	1	Reach threshold
	Earliness: planting to harvest	300 to 390 days	2	Minimize
	Plant stature (girth at 1m/height ratio)	A ratio of at least 0.15	2	Maximize
	Plant height	Less than 350 cm	2	Minimize
	Suckering behaviour	75% follower sucker growth at flowering, 3-4 suckers at flowering	2	Optimize
	Resistance to black Sigatoka	INSL at flowering of 70% and above	3	Reach threshold
	Resistance to weevils	40% resistance higher than that of the moderate resistant check (Kainja)	2	Maximize
	Resistance to *Radopholus similis and P .goodeyi*	40% resistance higher than that of the moderate resistant check (Kainja)	2	Maximize
	Resistance to BXW	Sources of resistance to be identified	2	Opportunistic
	Bunch orientation	Pendulous score of 1 or 2	1	Opportunistic
	Drought tolerance (water productivity)	Tools to be developed	3	Reach threshold
	High ProVitA content	Average –Carotene (≥20 µg/ g dry weight)	2	Opportunistic
	Fusarium	Comparable to resistant check (Calcutta 4)	1	Maximize
	Resistance to BBTV	Sources of resistance to be identified	3	Opportunistic

Banana breeding process: NARO-IITA

Banana variety development, evaluation, selection and release



Adoption of 'new' varieties

- **Current adoption** of new banana varieties **slow and lower than expected**
- Breeders often give priority to "key traits" (Brown et al, 2017) and to lesser extent & later in breeding cycle tastes that markets demand
- Approach may fail to consider potentially important traits and other factors (earlier in breeding pipeline) for which economic value maybe more difficult to assess → consumer attributes

Project activities (Work package 4)

1. **Evaluation of promising EAHB hybrids (NARITAs) developed by NARO and IITA in UG & TZ** -'Breeding Better Bananas' project

- Multi-location participatory varietal selection (PVS)
- Assess extent to which gender-differentiated preferences have been documented in Sub-Saharan Africa (systemic lit review)
- Characterize target population environments (TPEs) from a gender perspective (baseline survey)
- Assess suitability of hybrids to local farming conditions in TPEs (on station and on farm trials, crowdsourcing)
- Evaluate key criteria used by male & female farmers to adopt/reject 'new' cultivars; assess acceptability (sensory eval, preference ranking)

Project activities cont.... (RTBfoods)

2. Understanding drivers of trait preferences and development of multi-user banana product profiles - 'RTBfoods' – new project

- Develop **gendered product profiles** for cooking bananas - set of quality criteria that meet consumer demand to inform physio-chemical characterization and demand-led breeding programs

Ultimate goal: Develop and disseminate varieties that meet user preferred quality traits to increase adoption and improve food security and welfare of men, women as well as households in target communities

Using the "Decision checklist

Decision Checklist (Green = required info has/will be collected)	Examples of decision(s) made/to be made
1) Gender included in social targeting: Have market segments been defined and then prioritized to be targeted, with a gender dimension?	▪ Baseline study in 2 target regions where banana is grown: high banana producing region (i.e. Western UG) and one with high demand but prod has reduced (Central UG)
2) Sampling: Are the data used for targeting and for the resultant customer profiles representative of the gender-differentiated population(s) that the breeding program expects will adopt its actual or future breeding products?	▪ Sampling strategy – purposive at regional & district level; random at village and ensured both men and women were included
3) Does the customer profile for each social segment the program decided to target have a gender dimension?	▪ Segments to target – male and female farmers (growers) in banana growing communities

Using the "Decision checklist

Decision Checklist (Green = req info has/will be collected, red = no/limited info)	Examples of decision(s) made/to be made
4) Has the demand for desired traits been determined representatively – for each customer profile, taking gender into account? What is the most important demand of the most important customer? 5) Have alternative outcomes (and impacts) for breeding been evaluated considering the expected economic, environmental, food security and nutritional gains for the targeted beneficiaries with explicit consideration of changes in gender equity?	▪ Methods to better understand gendered trait preferences, particularly '**quality, consumption and processing**' traits as they seem critical for adoption ▪ Analytical methods to provide measurable & quantifiable traits packages ▪ Questioning what 'yield' means to diff segments: harvesting 'reasonably' sized bunches throughout yr. vs bumper harvests at peak times for commercial purposes ▪ Need to assess breeding feasibility for some traits?

Using the "Decision checklist

Decision Checklist	Examples of decision(s) made/to be made
6)Which changes for which traits are most desirable, which changes are necessary for a product to be of value for the targeted customers? Have traits been valued with a gender dimension? 7)Have feasible trait packages been defined considering potential impact on gender equality for men and women in different customer segments?	▪ Methodologies to collect, analyze and collate **ALL** req info to develop the 'product profile' → (which traits to maintain, maximise, minimise, reach threshold) e.g. soft texture, yellow pulp colour in Uganda for *matooke* ('food'), maturity time etc.

Using the "Decision checklist

Decision Checklist	Examples of decision(s) made/to be made
8. Has new variation been created or identified considering gender differentiated trait preferences and priorities? 9. Are gender-differentiated preferences included in evaluation criteria (whether by breeders' or participatory evaluations)?	▪ Evaluation of varieties by farmers on station ▪ Methodologies for sensory evaluations & preference ranking that will capture male & female user's criteria ▪ Decide best methodology and how to streamline process and assess cost effectiveness
10) Are gender-responsive strategies for seed production and distribution in use?	▪ Need to collect more data to support baseline data and literature on prod. constraints & gender inequalities in target regions (limited info for some regions)

Addressing Decision Points 1 and 2 – 'who to target…? , who are the customers…?

Research progress

- **Baseline study** in 2015/16 - 2 target regions in Uganda and 4 in Tanzania
  - Sex disaggregated - intra household survey & FGDs to characterize target population environments (TPEs) & understand end users' needs and preferences.
  - ~1000 hhlds, 1325 respondents (52.6% women) & 95 FGDs (44 ♂only, 46 ♀only, 5 mixed)

What next?

- Assess poverty levels, food security status, willingness to adopt , seed systems by gender etc.
- Identify 'products' (hybrids) to satisfy different regions in both UG & TZ
- Emerging issues e.g. importance of cooking vs juice types and possibility of other processing options ?

Addressing Decision Point 3 – 'demand for desired traits, taking gender into account for customer profile, impact on breeding…'

Research progress

- **Systematic literature review**, submitted to *Agric and Food Security*
  - Few studies documenting gender disaggregated trait preferences – only 4 from 44
  - Farmers prefer traditional cultivars with **superior consumption attributes**, even if prone to pests & diseases
  - Women & men value similar traits related to cooking quality, prod. constraints (e.g. resistance to pests), income enhancement, cultural use; women stated traits related to prod. (high suckering ability, early maturity)
  - Long list of traits- not detailed, not ranked → challenging for breeders to prioritize

- **Baseline data analysis**
  - Prelim results: potential complexity for breeding → large no. of factors (products, traits before & after processing, location, varieties)- need biochemical quantification
  - Consumption & processing attributes critical, but poorly understood in terms of: assessment (measurement), inheritance & their physicochemical nature (NARL, Uganda -analysing NARITAs)

Addressing Decision Point 3 – 'demand for desired traits, taking gender into account for customer profile, impact on breeding…'

What next?

- Assess gender differentiated trait preferences, reasons for preferences, impact of different attributes on adoption
- Further analysis on relative importance of consumption & processing attributes for adoption in the diff agro- ecological zones:
  - are there gender differences, who has the knowledge/expertise → multilocation sensory eval.
- Evaluations with other value chain actors in the different agro-ecologies and social contexts

Interdisciplinary dialogue

- Protocol and tool development
- Impromptu meetings - lessons learnt from both breeding and social science side
- Field visits together e.g. to determine which of the hybrids to take on farm, Robooni showed how farmers/other actors check characteristics that determine the potential end use of the banana
- Participated together in the Gender & Breeding Post-Doctoral Fellow (PDF) Study Design Workshop
- Report and paper writing (co-authorship) – submitted literature review

Final remarks

- Collaboration between breeders, social scientists, food scientists etc. extremely important
- Need to probe further and use methodologies that can tap into **tacit knowledge**
- Use methodologies that rank traits in order of importance, instead of long lists of traits. Breeders need measurable and quantifiable traits
- Traits demanded by men and women may converge in some instances hence gender differences not always important
- Should **not just narrowly look at gender** – go beyond the binary sex disaggregation

Partners


Multi-locational evaluation of
NARITA banana hybrids for
East Africa
IITA