



Accelerating Genetic Gains
in Maize and Wheat

Gender inclusivity through maize breeding: Taking stock and future directions

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with Jason Donovan, Pieter Rutsaert, and Jill Cairns

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Outline

1. The gender inclusivity challenge in agriculture
2. Taking stock of existing knowledge about gender and maize in Africa
 - Improved seed adoption research
 - Maize trait preference research
 - Seed systems research
3. Looking ahead: gender research in AGG & beyond

Gender in development

Women in Development
(1970s)

Gender and Development
(1970s-1990s)

- Equity
- Efficiency/instrumentalization
- Empowerment
- Power & agency

Transformation of Gender
Relations (2000s+)

Gender inclusivity in agriculture



Premise of CIMMYT's gender focus:

Women often appear less likely than men to *use and benefit from* new technologies on their plots and in their households

- Women's access to innovations can be limited
 - Agency constraints in many contexts
 - Resource gaps
 - Reliance on different information and input sources than men
- Historically, many innovations have been developed without input from women

Core impact pathways of AGG maize

PO1: Optimization of innovative breeding tools and methods

PO2: Development of climate-resilient and input-responsive varieties for distinct, gender-intentional product profiles

PO3: Accelerated varietal turnover and wider adoption, particularly among women farmers

- **Increased production & availability** of high quality seed
- Improved functioning of **maize seed value chains**
- **Increased uptake & turnover** of varieties, especially by women farmers
 - Identification of drivers/bottlenecks
 - Testing of innovative marketing and distribution strategies

Assumptions about gender and breeding

- Men and women often have unique needs and preferences
 - Women show disproportionate interest in end-use traits (across crops)
 - Men show disproportionate interest in marketability (across crops)
- Women may not adopt seeds at equal rates because available varieties do not meet their needs and preferences
- Gender-responsive and gender-intentional breeding will contribute to greater uptake by women



Gender-responsive breeding

“Gender-responsive breeding ensures that the perceptions, interests, needs and priorities of women and men (which can differ because of their different roles and responsibilities in farming) will be considered in planning and decision-making for product advancement in a breeding cycle.”

Box 1. What can a breeding program do to be gender responsive?

- 1) Know when, where, and why women are an important beneficiary group. Take into account important differences in constraints faced by women and men farmers that breeding can influence.
- 2) Anticipate how design decisions (e.g., defining the plant ideotype, prioritizing traits, targeting and testing varieties with farmers) may impact and be influenced by women’s labor, resources and opportunities.
- 3) Design breeding objectives specifically to benefit women farmers when they are an important beneficiary group who require a special approach, and consider their needs, constraints and knowledge more generally in the breeding program.
- 4) Be accountable, making sure that the success of the breeding program is measured in ways that include positive impacts for women, as well as for households or farmers in general.

Ashby, J. A., & Polar, V. (2021). *User Guide to the GBI Standard Operating Procedure for G+ Tools (G+ SOP)*. <https://doi.org/10.4160/9789290605966>



<http://www.rtb.cgiar.org/gender-breeding-initiative/>

Review paper questions

1. What does research from Africa show regarding the role of gender in:
 - improved maize seed adoption
 - maize preferences
 - maize seed systems
2. What are the knowledge gaps surrounding gender and maize breeding?
3. What are the opportunities for conceptual and methodological advances in research around gender-intentional maize breeding?

Gender and adoption research



Who is adopting improved maize varieties, and at what rates?

Core approach:

Econometric impact assessments

Dummy variables for gender of household head or plot manager

Gender & adoption research: Key takeaways

1. Gender gaps in improved maize adoption are common (but not universal)

e.g., Fisher et al., 2019 in Uganda:

	Male HH heads	Female HH heads	Wives of MHHs
Awareness of DT maize	67%	51%	43%
Adoption of DT maize	29%	11%	5%

Gender & adoption research: Key takeaways

2. 'Gender' gaps are about resource access, primarily
 - Access to labor, land, information, education, and cash are often significant predictors of adoption
 - Access to these resources is correlated with gender; women lose out
3. Important insight into who constitute 'reached' and 'underreached' populations...
4. ... but minimal insight into how *preferences* influence adoption

Gender and trait preferences research

Which maize traits and varieties do men and women prefer?

Core approaches:

- Surveys, focus groups & choice experiments
- Participatory varietal selection (PVS)
 - Large scale varietal trials
 - Farmers (men and women) invited to evaluate varieties at harvest
 - Researchers determine which traits to evaluate
 - Potential for quick, direct farmer feedback
- Consumer evaluations

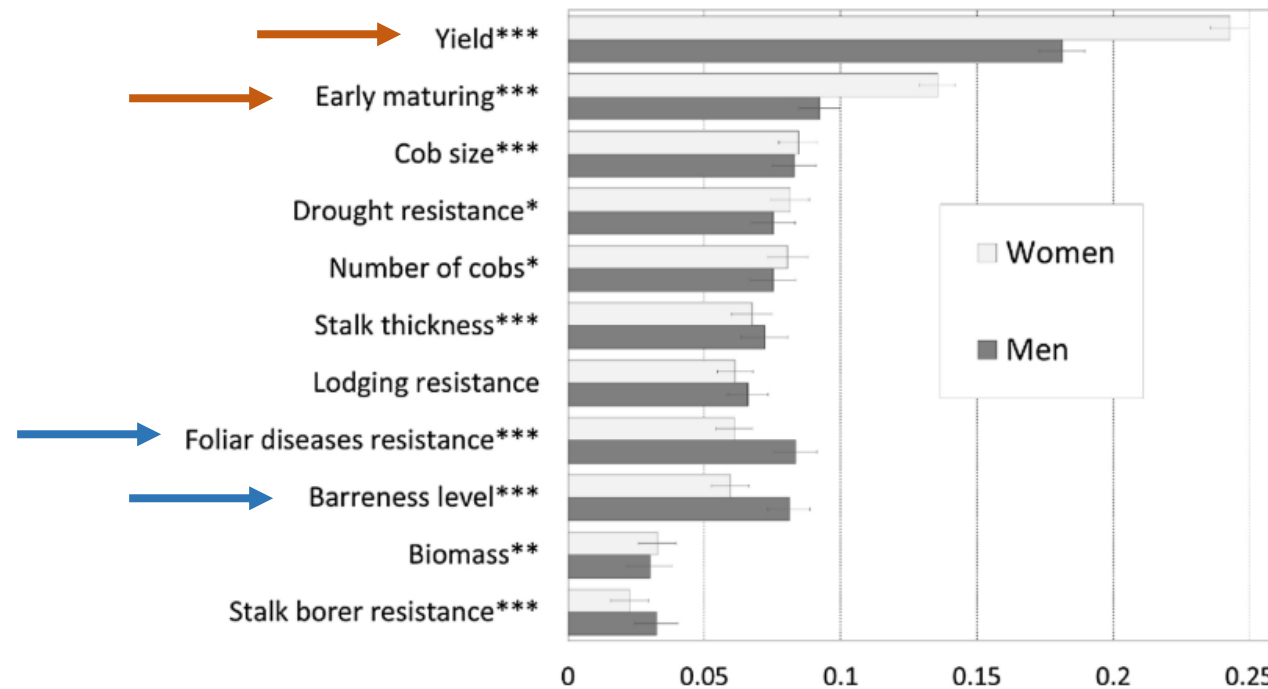


Gender & trait preferences research: Key takeaways

1. Men and women demonstrate generally similar agronomic trait preferences for maize

E.g., Worku et al. 2020:

Where there are differences, they don't necessarily affect the *relative* importance of traits...



Worku, M., et al. (2020). On-farm performance and farmers' participatory assessment of new stress-tolerant maize hybrids in Eastern Africa. *Field Crops Research*, 246(November 2019), 107693. <https://doi.org/10.1016/j.fcr.2019.107693>

Gender & trait preferences research: Key takeaways

2. Some studies show women care about a *wider range* of traits than men:

Table 7.5. Traits mentioned more often or ranked higher by women than by men.

Production-related traits	Post-harvest traits
Earliness **	Food security *
Ease of harvesting and transport *	Threshability *
Grain traits *	Cooking quality *
Pest and disease resistance *	Less decortication, dehulling, milling losses
Multiple harvests **	Market value
Requirements for weeding *	Resistance to storage pests *
	Straw quality for roofing
	Processing quality for locally marketed product
	Grain and leaf quality *
	Medicinal properties *
	Taste of specific dishes *

1. Stability of production
2. Consumption
3. Reduced labor

From Weltzien et al., 2019 (a cross-crop study)

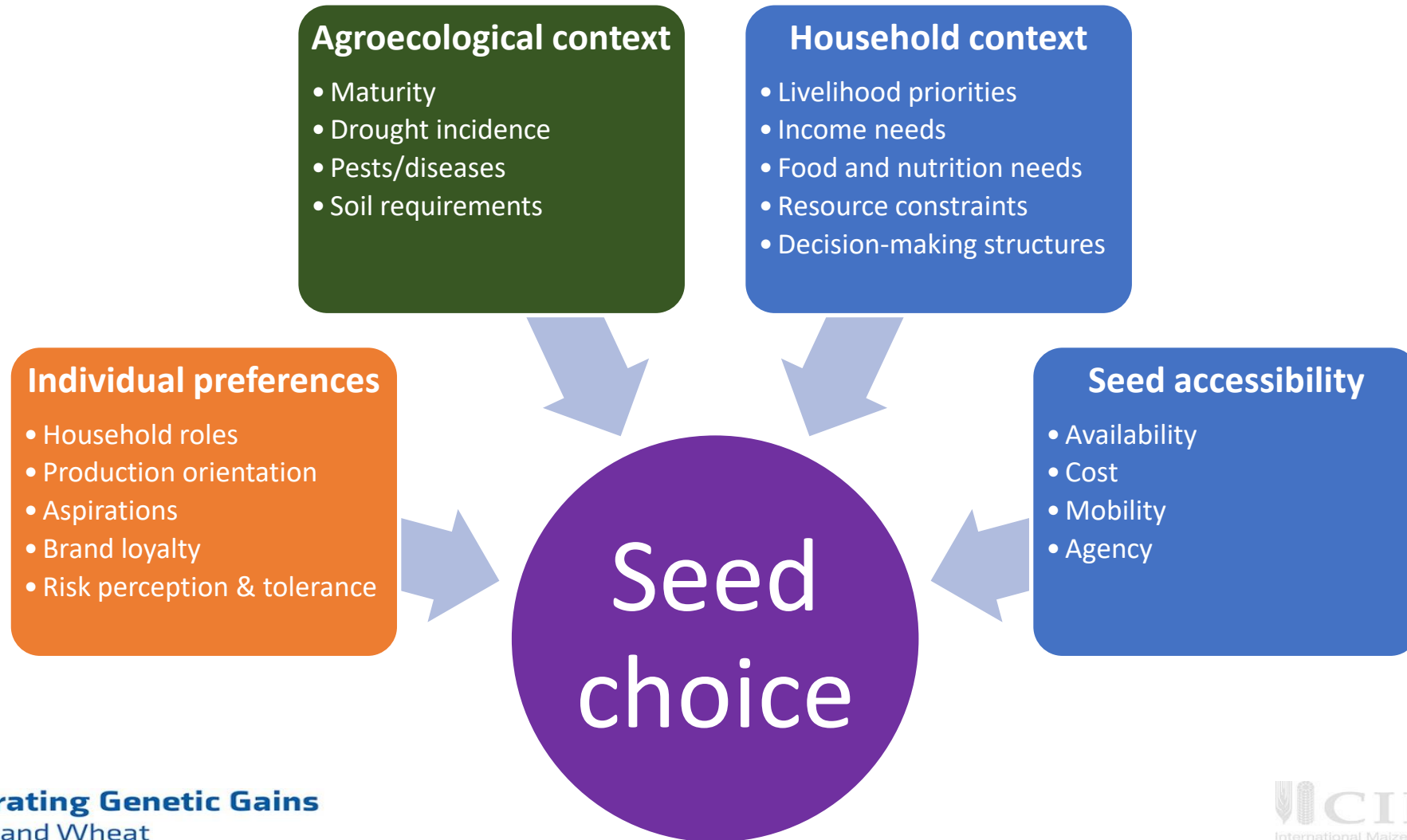
Gender & trait preferences research: Key takeaways



Photo credit: H. de Groote

3. Prior learning can inform new approaches and increase consistency
 - Many small-n studies in many contexts using diverse methods
 - Treatment of gender as sole explanatory variable
 - Evaluation criteria typically selected by scientists, often narrow (timing and survey design)
 - Most PVS evaluations occur outside of farmers' household contexts

Gender & trait preferences research: The bigger picture

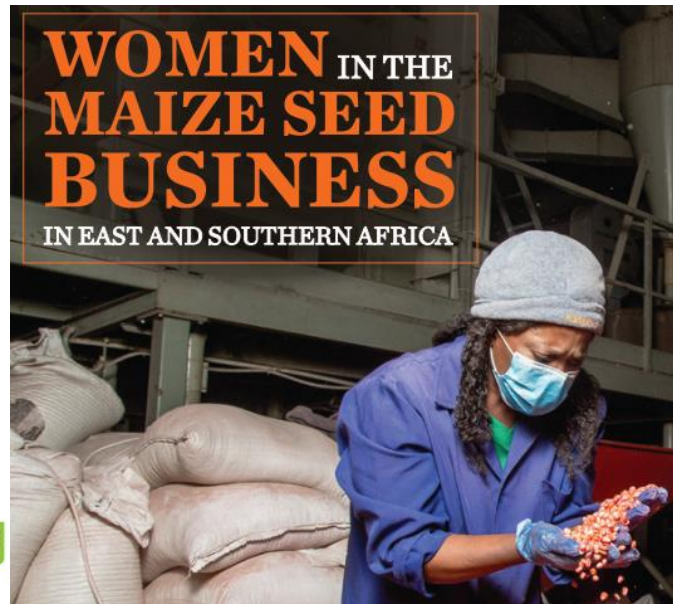


Gender and seed systems research

Are maize seed systems capable of delivering gender-responsive and gender-intentional varieties to women and men?

Recent CIMMYT seed systems research in maize:

- Gendered value chain analysis
- Case studies of women-owned seed businesses
- Recommendations for gender-responsive seed marketing
- Studies of farmer-agrodealer interactions



Article

Gender relations along the maize value chain in Mozambique

Rahma I Adam¹, Maria da Luz Quinhentos²,
Pauline Muindi¹ and Jessica Osanya¹



Gender Dynamics in the Retailing Behavior of Agro-dealers and the Purchasing Behavior of Farmers in Kenya:
A summary brief



Gender and seed systems research

Beyond CIMMYT...

Broadly speaking, most attention has been to:

- Legumes and VPCs
 - Informal seed systems
- =>

Relatively little attention to:

- Cereal crops, including maize
- Formal seed systems

RTB
Working
Paper

**Gender mainstreaming in
root tuber and banana crops
seed systems interventions:
identification of lessons
learnt and gaps**

Netsayi N Mudege and Silvia Torres

Taking stock

Is current research in maize adequate to support gender-responsive and gender-intentional breeding?

Box 1. What can a breeding program do to be gender responsive?

- 1) Know when, where, and why women are an important beneficiary group. Take into account important differences in constraints faced by women and men farmers that breeding can influence.
- 2) Anticipate how design decisions (e.g., defining the plant ideotype, prioritizing traits, targeting and testing varieties with farmers) may impact and be influenced by women's labor, resources and opportunities.
- 3) Design breeding objectives specifically to benefit women farmers when they are an important beneficiary group who require a special approach, and consider their needs, constraints and knowledge more generally in the breeding program.
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Looking ahead: An agenda for gender research in AGG & beyond

1. A more nuanced understanding of gender dynamics in maize production and seed systems
2. New conceptual and methodological approaches to understanding seed needs
3. Steps to operationalize gender-intentional breeding

Next steps in gender and maize research

1. **A more nuanced understanding of gender dynamics in maize production and seed systems**
 - Integrating lessons from gender research
 - Power and agency
 - Intra-household dynamics
 - Clarifying the relevance of diverse entry points
 - Seed suitability
 - Information access and marketing
 - Complementary resource access
 - Seed availability and accessibility
 - Transformation of social relations



Intrahousehold decision-making around maize

Key questions

- 1. How is smallholder maize production structured in Kenyan households?*
- 2. What household resources support maize production?*
- 3. How are maize plot management decisions made?*
- 4. What are the implications for women's and men's ability to choose and acquire seed?*

Implementation plan

- Survey of 600 dual-adult households in 2 counties of Kenya (Nov 2021-Jan 2022)
- Scope:
 - Household and individual demographics
 - Maize production, input use, end-uses
 - Maize seed procurement
 - Individual involvement in decisions around maize plots

Intrahousehold decision-making around maize

Using vignettes to capture how management decisions are made within households, and by whom

Vignette example:

“Isaac isn’t much engaged in farming this plot; his wife Christina is the one who deals with the maize on this plot. Christina chooses which variety to use on this plot. She and Isaac don’t talk about this plot much, but this is okay because Isaac trusts Christina to make the best decision.”

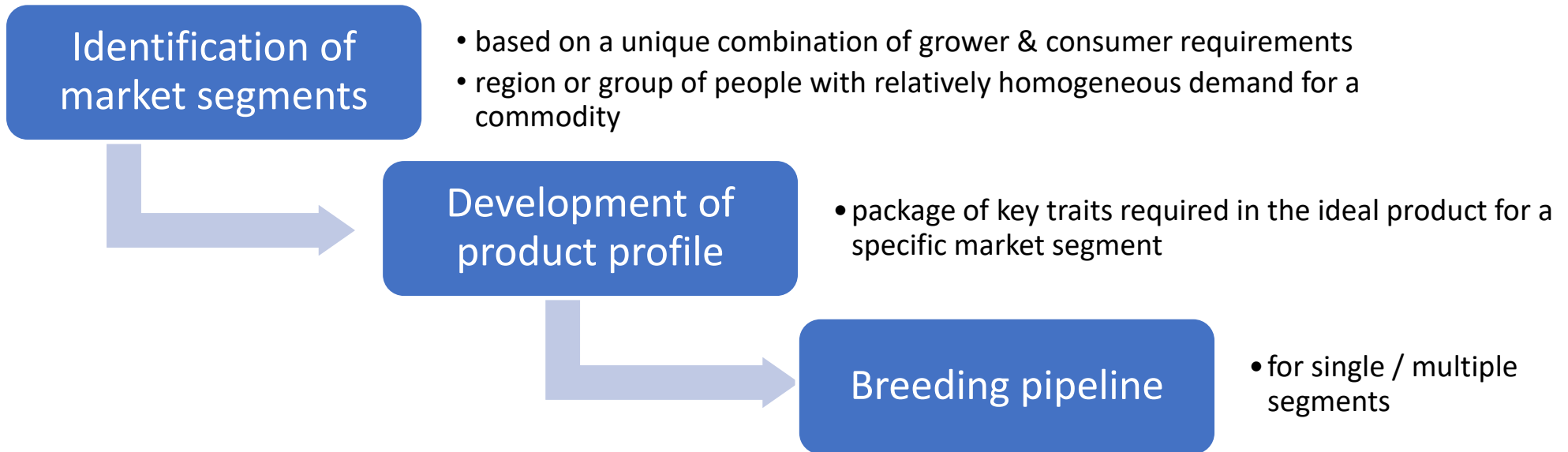


Next steps in gender and maize research (II)

2. **New conceptual and methodological approaches to understanding seed needs**
 - Innovating in preference research
 - Integration of qualitative and dialogue-based approaches
 - Larger scale, decentralized, with more farmer management
 - Grounded within household context
 - Attention to end uses and resilience-related traits
 - Breaking away from gendered trait preferences to understand market segments (& role of gender within them)
 - More focus on seeds as a 'package' product



Market segmentation



What are the distinct types of farmers and consumers we are breeding for?

What are their unique needs?

- Priorities of men and women growers, processors, and consumers
- Agroecological requirements
- Emerging market dynamics and long-term trends, e.g., climate change

Which segments should we prioritize?

*For gender:
Which groups are disproportionately made up by women?*

Concept testing using a Video-based Product Ranking Tool as a basis for market segmentation

(Pieter Rutsaert, Jason Donovan, Rachel Voss)



Approach: Translate farmer interests and needs into product concepts that are presented through a *video-based product ranking tool (VPRT)*. Farmers evaluate and rank presented concepts.

Implementation plan

- Kenya & Uganda, wet mid-altitude (n = 1200 per country)
- 8 product concepts developed
 - Incomplete block design (3 concepts per farmer)
- Integration into ClimMob software
 - Built for tricots (incomplete blocks meet citizen science)
 - Inter-CG standardization

Example product concept: Home Use Variety

This variety is called the “Home Use Variety”.

Name

It is focused on ensuring your family has enough maize to eat until your next harvest

Target benefit

What is interesting about this variety is that grain quality is prioritized:

- The quality of kernels allows household storage for up to 6 months without major losses due to rotting or weevil damage, without special storage bags or silos
- The variety has good flour conversion to ensure you have a good return of milled grain
- The variety gives a sweet taste to your posho or ugali.

Reason to believe

This variety has moderate resistance against drought or diseases like leaf blight or maize lethal necrosis but there will be yield loss if drought or these diseases occur. Fertilizer needs of this variety are similar with popular varieties on the market. You will have your normal yield in a period of about four months.

Basic info

Next steps for gender and maize research (III)

3. Steps to operationalize gender-intentional breeding

Key questions:

- What targets/benchmarks are needed to enable breeding of new end-use traits? How do we generate them?
- How much can/should we deprioritize other traits in exchange for gender-relevant traits?

Where to from here?

- More coordination across regions, crops
 - Alignment of AGG maize and wheat work on gender and markets
- Building links across teams in research design
 - Collaboration via Seed Systems Initiative, Market Intelligence & Product Profiles Initiative, others
- Continuing to identify and address persistent knowledge gaps
 - Generating quantifiable breeding targets for non-agronomic traits
 - Identifying and testing tools for gender-intentional maize seed marketing
 - Potentially different interests and priorities (concept testing ongoing)
 - Information constraints (women often reliant on informal sources)
 - Mobility constraints (new delivery mechanisms may be needed)

Conclusions

We've taken stock of existing research around gender and maize.

Research on adoption and trait preferences has generated **valuable insight**.
There are **many unknowns**, especially around **gender and maize seed systems**.

But sticking with the same approaches won't take us where we need to go next.

We need to embrace **new questions, tools, and approaches**:

- How to prioritize traits in gender-intentional breeding
- How best to reach women in MHHs
- Market segmentation & demand-driven product profiles
- Entry points throughout the seed system

More in our paper...

Review

Outlook
ON
AGRICULTURE

Gender inclusivity through maize breeding in Africa: A review of the issues and options for future engagement

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and Jill E. Cairns³ **

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Thank you for your interest!

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