



Accelerating Genetic Gains
in Maize and Wheat

Developing climate-resilient and input-responsive improved maize varieties

Primary Outcome 2 (PO2)

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AGG-Maize builds on the strong foundation laid by STMA

STMA: Major Achievements	AGG-Maize: What's New
Shifted focus from specific <u>traits</u> to multiple stress tolerant <u>products</u> based on conceptualized product profiles	Rigorously implementing product profile-based breeding for developing multiple stress tolerant products with active involvement of partners
Greater focus on <u>must-have traits</u> that are key to adoption of ST varieties/hybrids	Focus on key traits in product profiles that help replace targeted old/obsolete but market-dominant maize varieties
Greater use of DH in some of the CIMMYT maize breeding programs	Increasing use of DH by partners (besides CIMMYT and IITA) to accelerate rate of genetic gain in breeding pipelines
Extensive testing enabled selection and commercialization of superior products with stable performance	Expand the potential of ST maize products for commercialization in target markets that are not presently well served
Used elite temperate (ex-PVP) germplasm for broadening the genetic base of adapted ST germplasm	Incorporate elite tropical/temperate germplasm to increase functional diversity for key traits in ST maize germplasm.

AGG-Maize builds on the strong foundation laid by STMA

STMA: Major Achievements	AGG-Maize: What's New
Succeeded in rapidly incorporating resistance to an emerging threat (MLN) and developing and releasing several products	Expand protection of genetic gains attained in stress resilience by incorporating resistance to FAW and MLN
Focused on traits linked to better hybrid seed production to develop hybrids attractive to the private sector	Integrate traits required by SMEs to reduce cost of seed production (COGS) in breeding pipelines
Employed molecular tools to increase breeding efficiency (MARS, GS, MABC, FB) for different traits (MSV, MLN) and defining heterotic affinities	Mainstream proven tools (DH) and technologies (e.g. GS) for increasing genetic gains
Analysed gender-preferred traits for inclusion in product profiles	Use key gender-preferred traits in parental selection and product development
Successfully delivered several 3-way cross and top-cross hybrids	Expand the product portfolio to include ST single-cross hybrids to simplify hybrid seed production

AGG-Maize Primary Outcome (PO2)

Climate-resilient and input-responsive maize varieties developed for the target product profiles and accessed by partners in SSA

Intermediate Outcomes	Description
2.1	Multiple stress-tolerant and input-responsive maize varieties/hybrids across product profiles available to partners in Africa
2.2	Breeding schemes optimized across CIMMYT, IITA, NARS and SMEs for various product profiles
2.3	Validated breeding innovations deployed in breeding schemes to increase genetic gains
2.4	Genetic diversity of Africa-adapted tropical maize germplasm broadened through systematic introgression of elite exotic germplasm, and resultant lines shared with partners

12 target Outputs that contribute to these intermediate outcomes

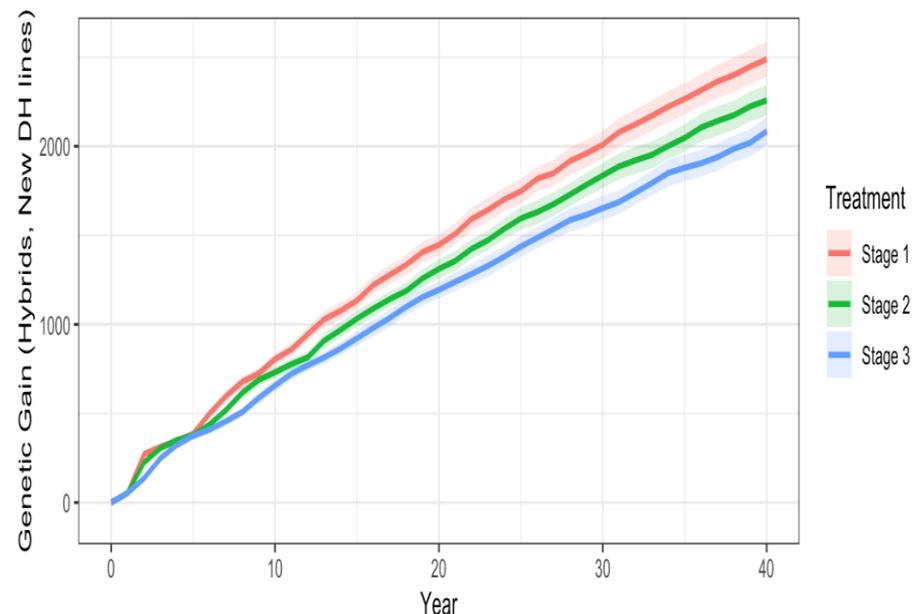
2.1: Multiple stress-tolerant and input-responsive breeding products available to partners in Africa

Develop climate-resilient products delivering 1.5 to 2.0% annual genetic gains using

- ✓ Elite and diverse stress tolerant germplasm with key adaptive traits
- ✓ Well-defined testing networks
- ✓ Suitable selection indices
- ✓ Appropriate stage-gate advancement process
- ✓ Strengthen heterotic groups
- ✓ Reduce the breeding cycle time

2.2: Breeding schemes optimized across CIMMYT, IITA, NARS and SMEs for various product profiles

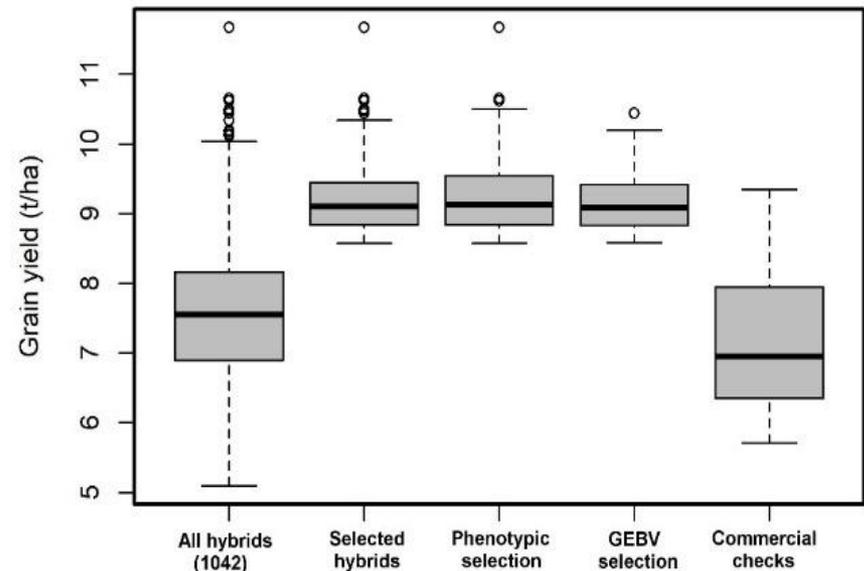
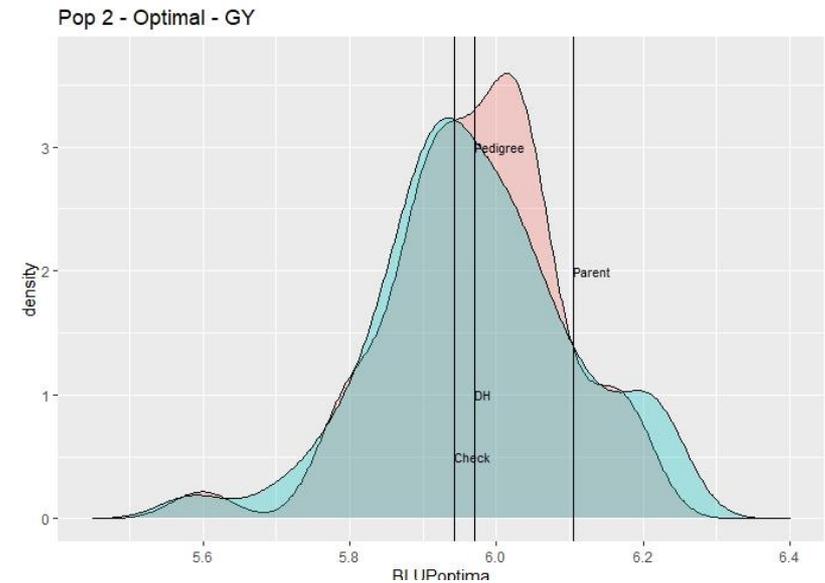
- Standardizing high performing parental selections
- Refining screening protocols and breeding strategies
- Applying marker data for recurrent selection to increase frequencies of favorable alleles for combination of core traits
- Using validated high throughput phenotyping tools
- Improving trial repeatability through mechanization, efficient experimental designs, and electronic data capture
- Adoption of the Enterprise Breeding System (EBS)



Stage 2 and Stage 1 treatments generated 1.08 and 1.19% times more gain, than the stage 3

2.3: Validated innovations deployed in breeding schemes to increase genetic gains

- Increasing DH use in breeding programs
- Using molecular markers to screen early generation and DH lines for adaptive traits (MLN, MSV, GLS and TLB)
- MABC for MLN introgression and MSV conversions of selected lines
- Implement RC-GS in breeding programs; all stage I lines will be genotyped with high-density marker
- Ensuring the identity and purity of lines through quality control (QA/QC)



2.4: Genetic diversity of Africa-adapted tropical maize germplasm broadened

- Introduce carefully selected elite exotic maize lines
 - US Ex-PVP lines for high yield, stress tolerance, standability, and earliness
 - Tropical Asian, Caribbean and South American varieties
 - Resistance to key diseases and lodging
 - Good grain quality
 - Tolerance to heat and drought stresses
- Meticulous introgression of elite exotic germplasm into Africa-adapted elite lines without disrupting heterotic groups
- Share the functionally enriched elite maize lines with partners for their breeding programs and product development

Ex-PVP susceptible for MSV



FAW tolerant line under artificial infestation

Thank you for your interest!

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