



Extension-led Early-Generation On Farm Testing For Faster, Demand-Driven Common Bean Breeding In East Africa

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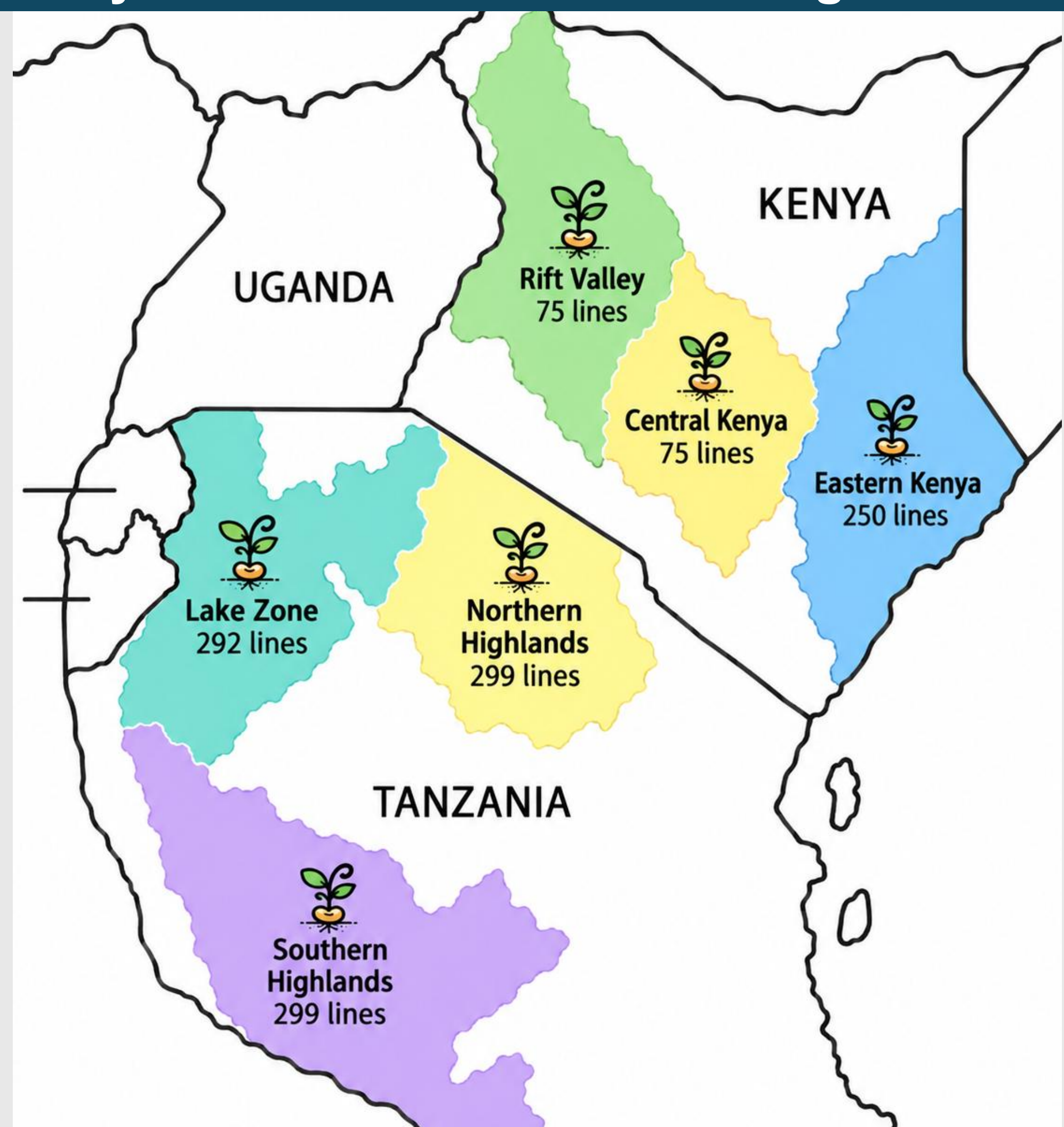
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Introduction

Breeding must work where farmers grow crops.

- ❖ Selection is traditionally concentrated at research stations.
- ❖ Farmer environments and preferences often enter the breeding process relatively late.
- ❖ This can reduce alignment between breeding decisions and conditions experienced by farmers.

Early-Generation On-Farm Testing Network



Our question:

Can existing extension systems bring farmers into early-generation selection at scale?

Methods

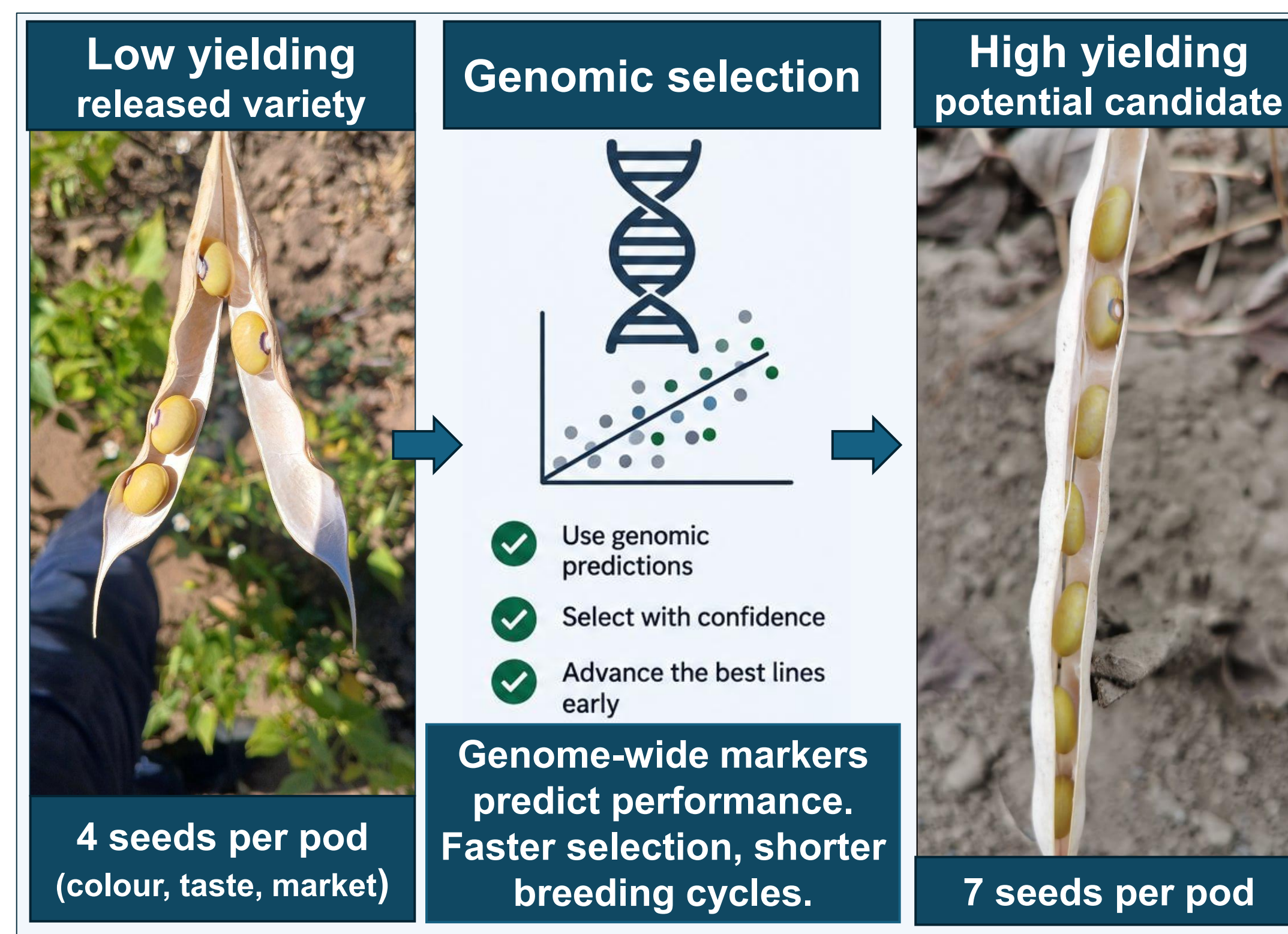
Representative host environments

- ❖ Targeted major **bean-growing zones** and agro-ecologies.
- ❖ **NARS** and **local government** guided district and ward selection.
- ❖ Farmers sampled across multiple villages to capture differences in **soil, topography, climate and management**.
- ❖ Trials remained **under farmer management** to represent real production conditions.

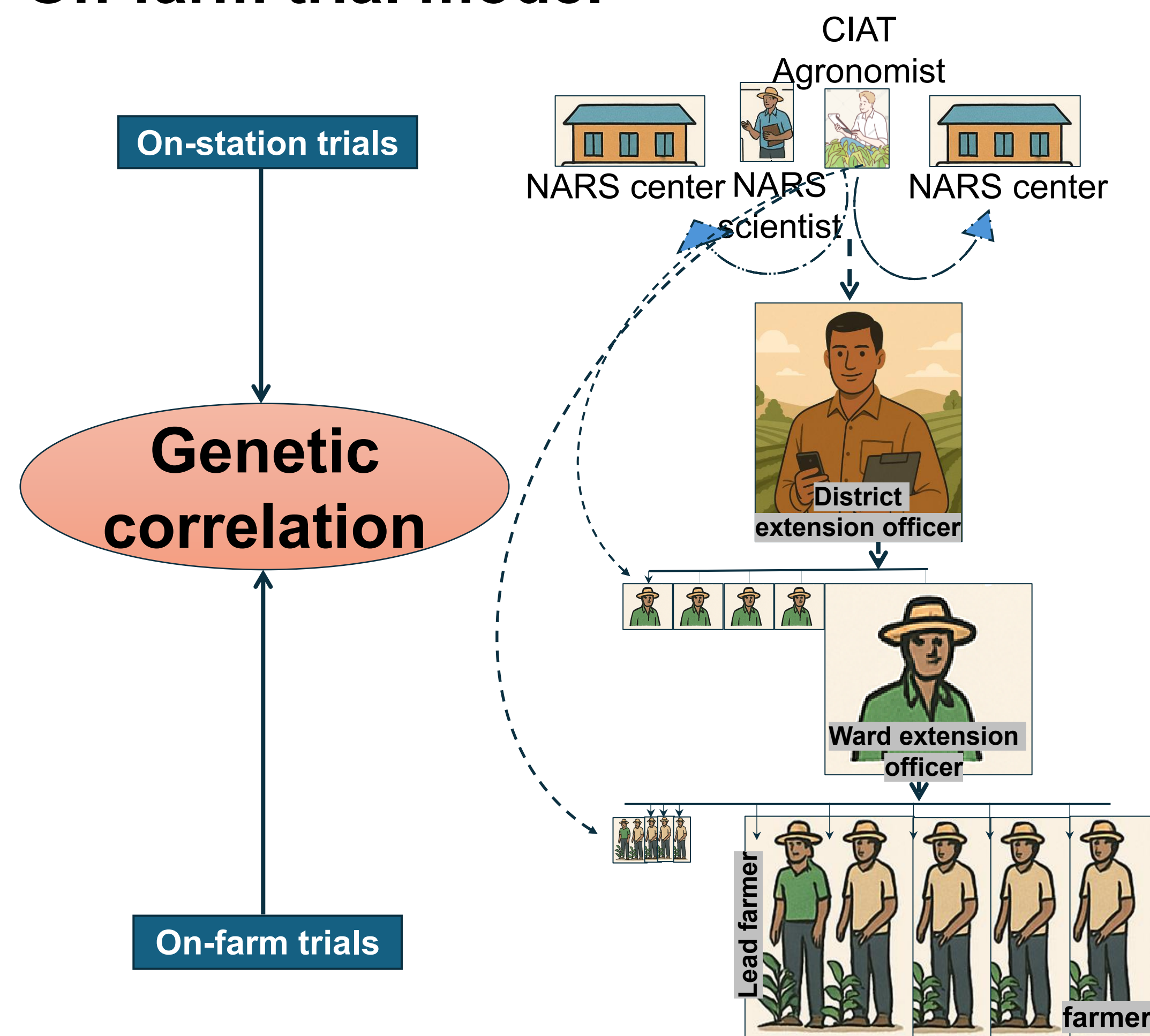
Farmer engagement



Farmers were not recipients at the end of the breeding cycle; they became part of the selection process from the field to the final product profile



On-farm trial model



Bringing farmers into the breeding equation earlier can shorten the breeding cycle and accelerate adoption.



Designing for heterogeneity

- ❖ Farms treated as **incomplete blocks** with only a few breeding lines per farmer.
- ❖ Related lines distributed **across different farms** and connected through genomic relationships.
- ❖ Rather than standardizing farms, we deliberately sampled variability across the **Target Population of Environments (TPE)**.
- ❖ **On-station trials** remained as the controlled reference for **estimating genetic correlations** and traits difficult to measure on-farm.
- ❖ Data were recorded digitally using **Kobo/ODK**, GPS coordinates and field photographs.

Gender integration

- ❖ 30% female managed farms
- ❖ 30% male managed farms
- ❖ 40% jointly managed farms

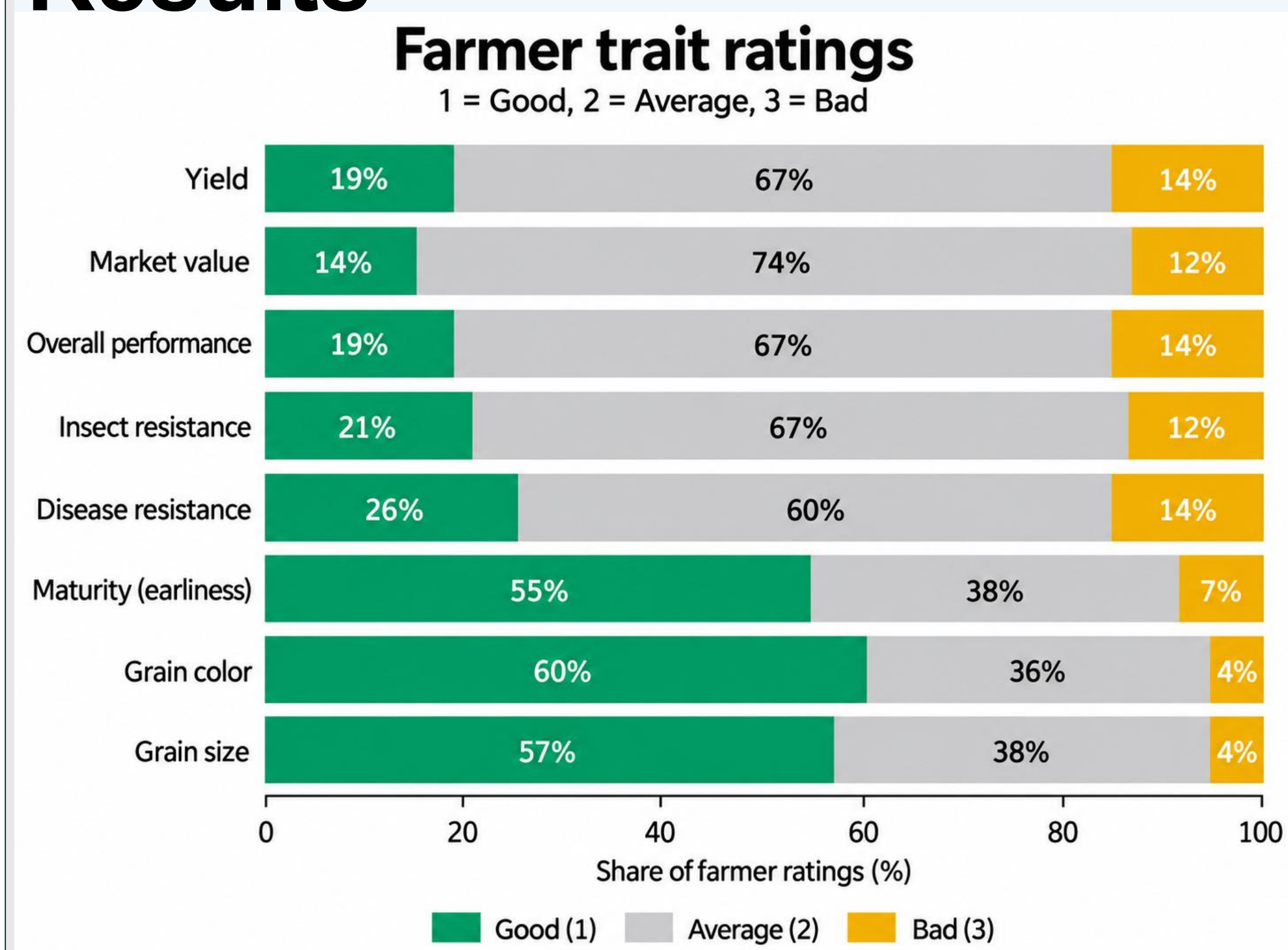


Systematic farmer feedback

- ❖ Feedback collected at key crop stages.
- ❖ Farmers used standardized scoring for all lines.
- ❖ Traits included vigor, maturity, pests, diseases, grain quality, marketability and cooking time.
- ❖ Farmer preferences informed TPPs and selection decisions.

Planting → Emergence → Flowering → Maturity → Harvest → Cooking/Market

Results



- ❖ Early-generation testing moved to farmers' fields
- ❖ Extension networks enabled testing at scale
- ❖ TRICOT made large-scale testing manageable
- ❖ Farmer preference was linked to performance
- ❖ Genomics and farmer testing worked together

Conclusion

- ❖ Genomics + TRICOT + extension networks can accelerate selection & shorten breeding cycles.
- ❖ Farmer feedback can influence which genotypes advance.
- ❖ Yield must be combined with farmer-preferred traits to deliver varieties farmers want.