

Productivity potential and nutritional quality of Quality Protein Maize (QPM) hybrids in Kongwa and Kiteto Districts, Tanzania

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Challenges & Study objective

- ✓ Frequent droughts and erratic rains in Kongwa and Kiteto limiting crop productivity demonstrating the need for crop varieties adaptable to these negative effects of climate change
- ✓ Poor nutrition (protein content) in maize based diets of majority poor in Kongwa and Kiteto farming communities demand for search for nutrient dense maize varieties with high levels of Lysine and Tryptophan, precursors for protein synthesis

Main study objective: Investigate the potential of new Quality Protein Maize for productivity, adaptability, nutritional benefits & profitability in Kongwa and Kiteto.

Introduced technologies

(i) New Stress Resilient Quality Protein Hybrids

Evidence

- QPM hybrids have 5 times higher grain yield advantage over the farmer preferred and non QPM maize, (**Figures 1 & 2**) and drought tolerant (DT) QPM hybrids have higher productivity benefits over non QPM & Non DT maize (**Table 1**).
- New QPM hybrids are more stable and adaptable in Kongwa and Kiteto compared to Lishe2 and Kilima (old QPM), (**Figure 3**)
- QPM grain have higher human nutrition benefits (lysine and tryptophan) than non QPM (**Table 1**).
- QPM hybrids have higher economic returns, (**Table 1**)

Table 1. QPM & Non QPM hybrids productivity potential, human nutrition benefits & gross margins

Productivity						
Indicator change	Grain yield (t ha ⁻¹) under Optimal conditions			Grain yield (t ha ⁻¹) under random drought conditions		
	Hybrid	QPM	Local Check (LISHE2)	Indicator Change (%)	QPM	Local Check (LISHE2)
CZH132019Q	8.8	7.2	22	1.77	0.91	94
CZH132003Q	9.24	7.2	31	2.03	0.91	123
CZH132015Q				2.4	0.9	43

Human (Nutrition)						
Hybrid Name	QPM	Non QPM (PAN53)	Indicator Change (%)	Lysine (%)		Indicator Change (%)
				QPM	Non QPM(PAN53)	
CZH132019Q	0.39	0.24	0.15	0.30	0.04	0.257
CZH132003Q	0.33	0.24	0.09	0.09	0.04	0.041

Economic (Gross Margins)						
Variety	Total production (kg)	Value of Sales (USD)	Quantity sold (Kg)	Production Unit/ hectare	Input cost (all costs \$)	Gross margin (\$)
CZH132019Q	1770	244.26	1062	3	100	102.37
CZH132003Q	2030	280.14	1218	3	100	122.30
Local Preferred	500	69	300	3	100	5.00

Approaches of taking the technologies to scale

CZH132019Q and CZH132003Q, the best performing QPM hybrids, have since been released. Meru Agro Tours & Consultants, a private seed company has been involved to multiply and commercialize the released QPM hybrids. Seed of hybrid parents has been multiplied in 2018 to produce foundation seed. Promotion through demo plots with engagement of district agricultural officers & extension is planned.

Partners



We thank farmers and local partners in Africa RISING sites for their contributions to this work. We also acknowledge the support of all donors which globally support the work of the CGIAR centers and their partners through their contributions to the [CGIAR system](http://www.cgiar.org)

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Fig. 1. New Stress Tolerant Quality Protein maize (Left & Right Pic.) and Non QPM, Non DT Maize (Center Pic.)

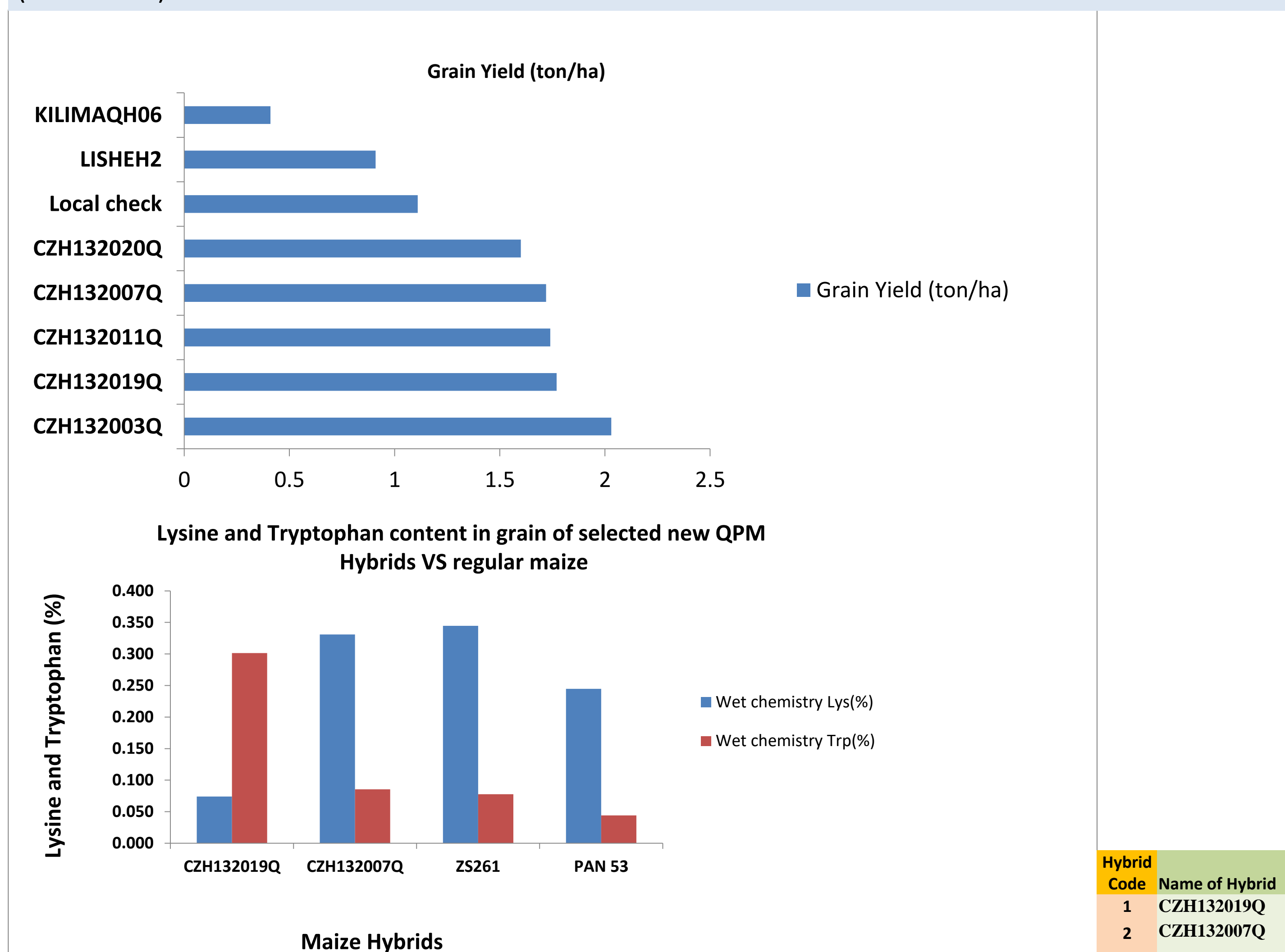


Fig. 2. Productivity, Lysine & Tryptophan Content

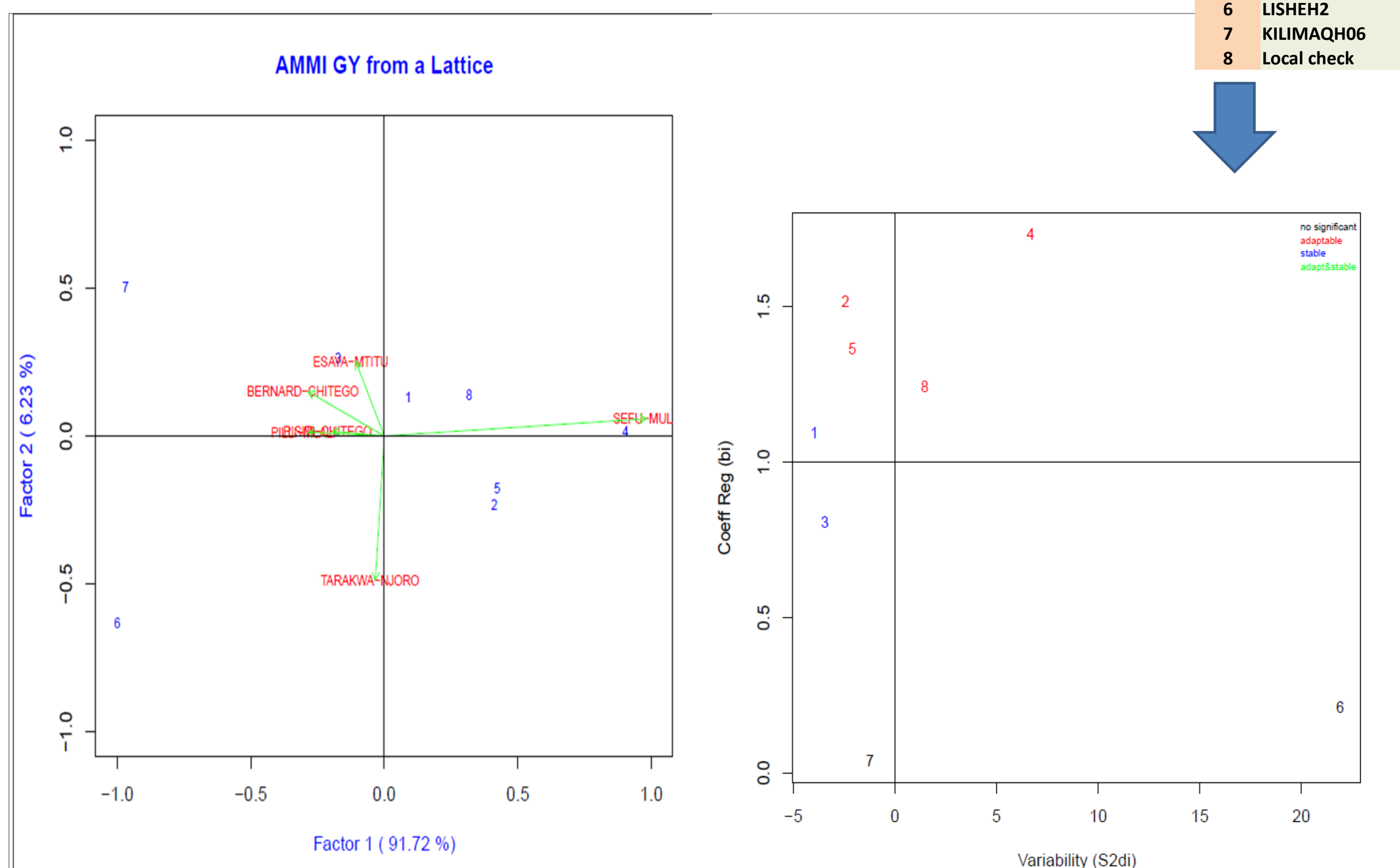


Fig. 3. Adaptability and stability of new QPM in 5 sites in Kongwa and Kiteto

Proposals for the future

Research: Optimize planting spacing to enhance productivity by comparing high density planting vs traditional 90 cm x 60 cm, and 90 x 30 cm spacing under both sole cropping and intercropping with legume (pigeon pea).

Scaling: Strengthen engagement with private sector (Meru Agro) to produce certified seed in 2019/2020 and link with agro-dealers in Kongwa & Kiteto. Conduct field demos through agric. extension

