Sustainable intensification of low-input agriculture systems in the Eastern Province of Zambia: implementation progress and achievements

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Africa RISING going to scale in the Eastern Province of Zambia Project Review and End-of-Project Meeting
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Summary of Key activities

Scaling:

- Extension of CA and its components through mother and baby trials
- Promotion of direct seeding, rotation, intercropping and herbicide use
- Scaling green manure cover crops (CRS)
- Seed production of green manure cover crops by CIMMYT
- Breeders seed of QPM hybrids

Summary of key activities

Research:

- Double-up legume systems (ZARI)
- Green manure cover crops (CRS)
- Analysis of the performance of Gliricidia-maize intercropping (COMACO)
- Manure handling (GRT and CRS)
- Evaluation of QPM maize hybrids

- ***Socio-economic studies:***
  - On scaling strategies
  - Adoption monitoring
  - Gross margin analysis

Partnerships

- Zambian Agriculture Research Institute (ZARI)
- Ministry of Agriculture Extension (MoA)
- Total LandCare (TLC)
- Catholic Relief Services (CRS)
- Community Market for Conservation (COMACO)
- Grassroots Trust
- Kamano Seeds
- Klein Karoo
- Advanta

Targets based on FTF indicators

Indicators	Chipata		Sinda		Lundazi		Total	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
# Rural Households benefiting directly	3200	3459	1300	1462	2150	2316	6650	7237
New	960	1012	410	454	645	708	2015	2174
continuing	2240	2447	890	1008	1505	1622	4635	5077
Male	2600	2756	910	1038	1610	1706	5120	5500
Female	600	1003	390	424	540	610	1530	2037

Targets based on FTF indicators

Indicators	Chipata		Sinda		Lundazi		Total	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
# of individuals who have received short-term agricultural sector productivity or food security training	310	295	115	118	300	308	725	721
Male	202	192	85	87	200	203	487	482
Females	108	103	30	31	100	105	238	239

Targets based on FTF indicators

Indicators	Chipata		Sinda		Lundazi		Total	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual
# of farmers who have applied new technologies or management practices as a result of USG Assistance	6500	6764	3500	3744	6300	6453	16300	16961
New	2500	2614	1500	1633	2200	1807	6200	6054
Continuing	4000	4150	2000	2111	4100	4646	10100	10907
Male	5000	5375	2600	2806	4800	4582	12400	12763
female	1500	1389	900	938	1500	1871	3900	4198

Targets based on FTF indicators

# of new technologies or management practices in one of the following phases of development as a result of USG assistance:		
	Target	Actual
Phase 1: under research	8	8
Phase 2: under field testing	40	40
Phase 3: made available for transfer	8	8
Total	56	56

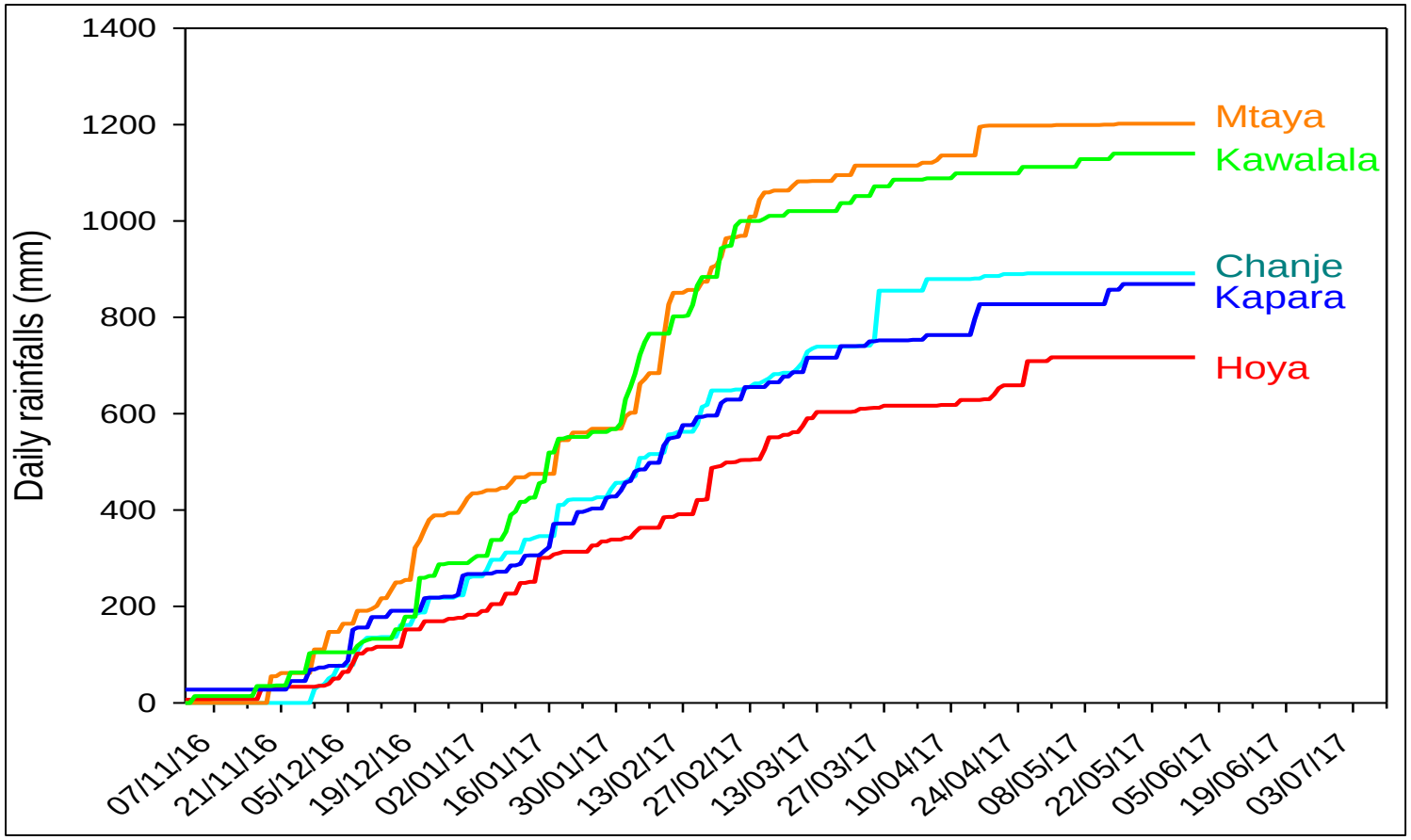
Established work

Trial name	Type	Target	Actual	Achievement
CA mother trials	On-farm	24	24	100%
Baby trials	On-farm	720	719	100%
Double up legume	On-farm	5	5	100%
GMCC trials	On-farm	36	31	86%
Manure trials	On-farm	9	8	89%
Gliricidia/maize	On-farm	108	102	94%
QPM trials	On-station	12	8	67%
GMCC evaluation	On-station	1	1	100%
Gliricidia	On-station	1	1	100%
Expanded step	On-station	1	1	100%
Ratooning trial	On-station	1	1	100%
Long-term	On-station	1	1	100%

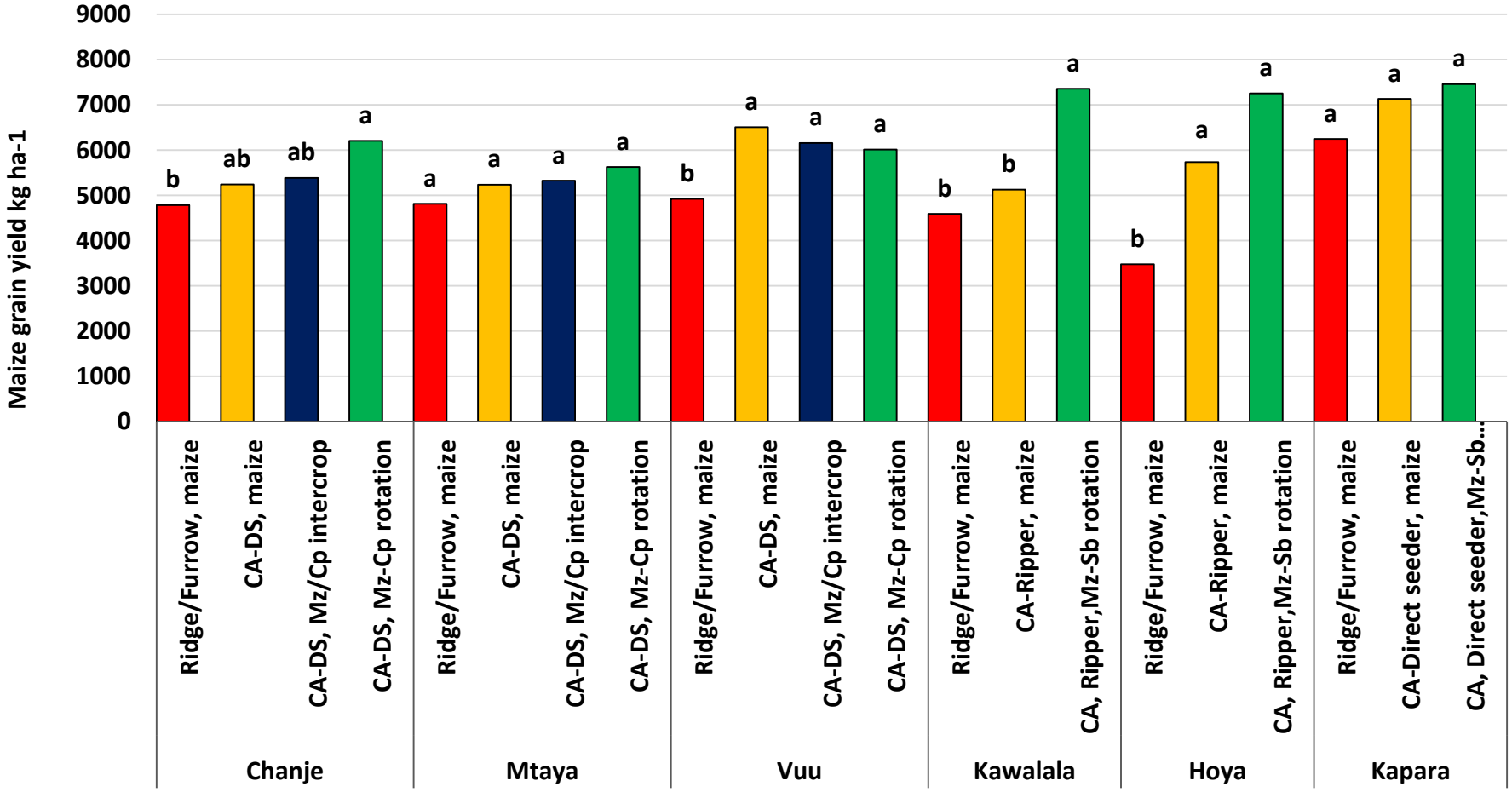
Some key results

Getrude Banda – best Zambian CA farmer in 2016, Kawalala camp

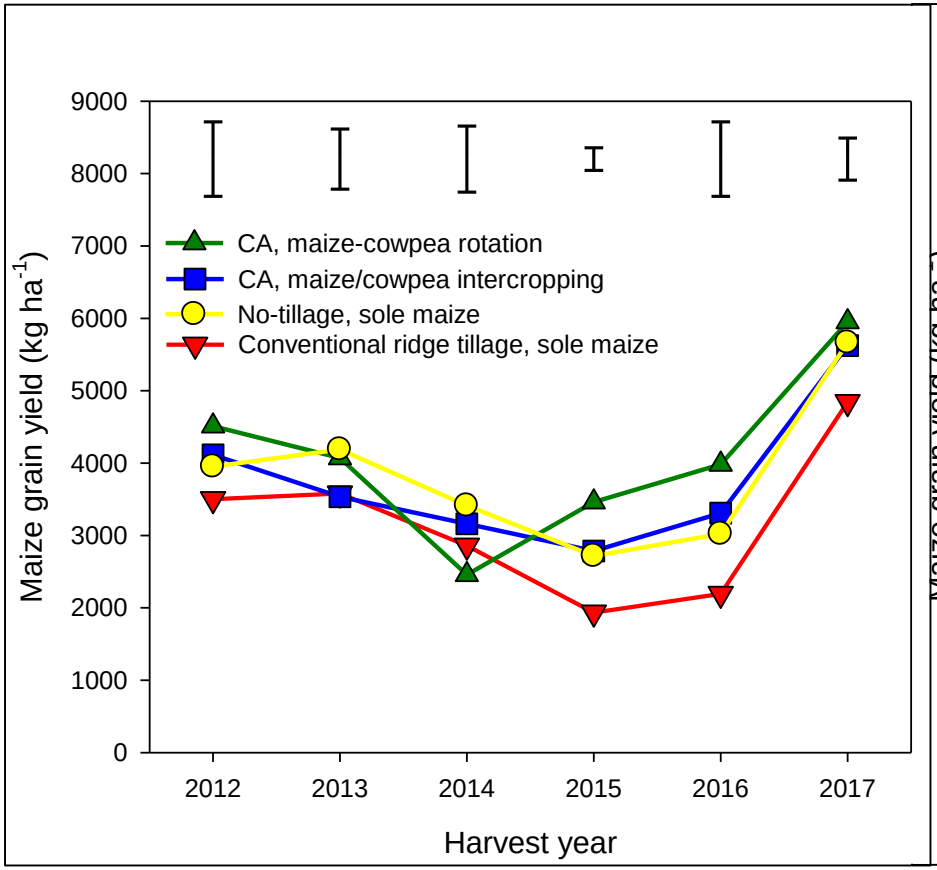
Rainfall season – very good

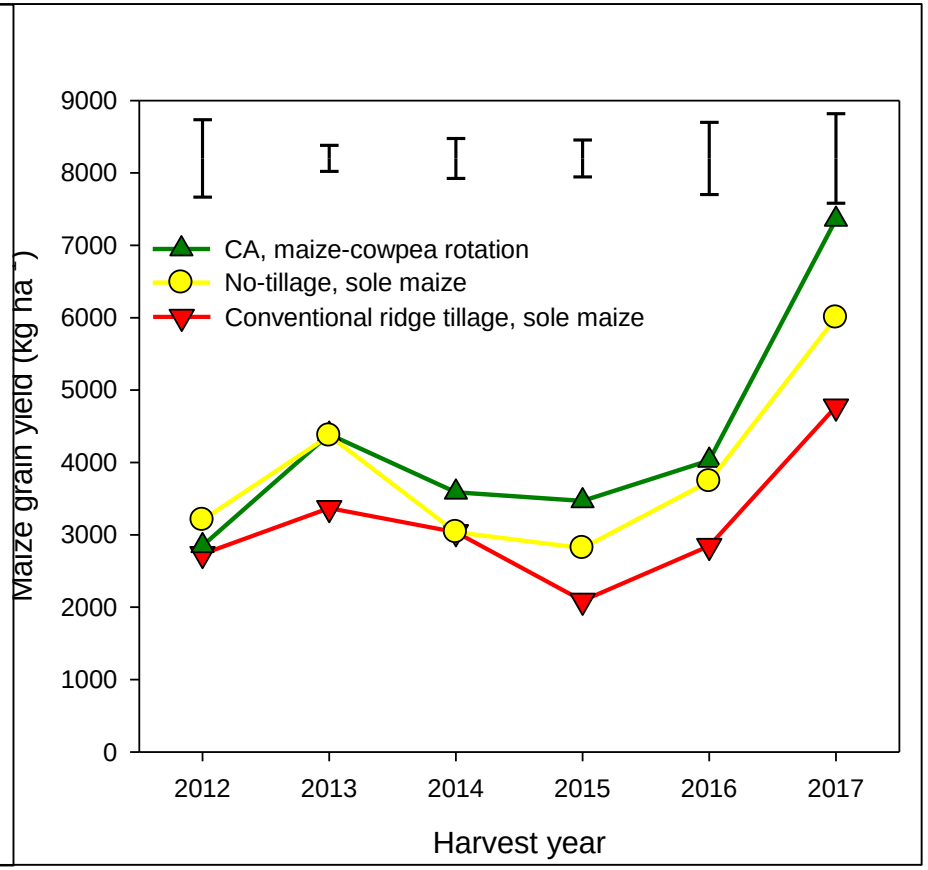


Summary CA, all mother trials, 2016/2017

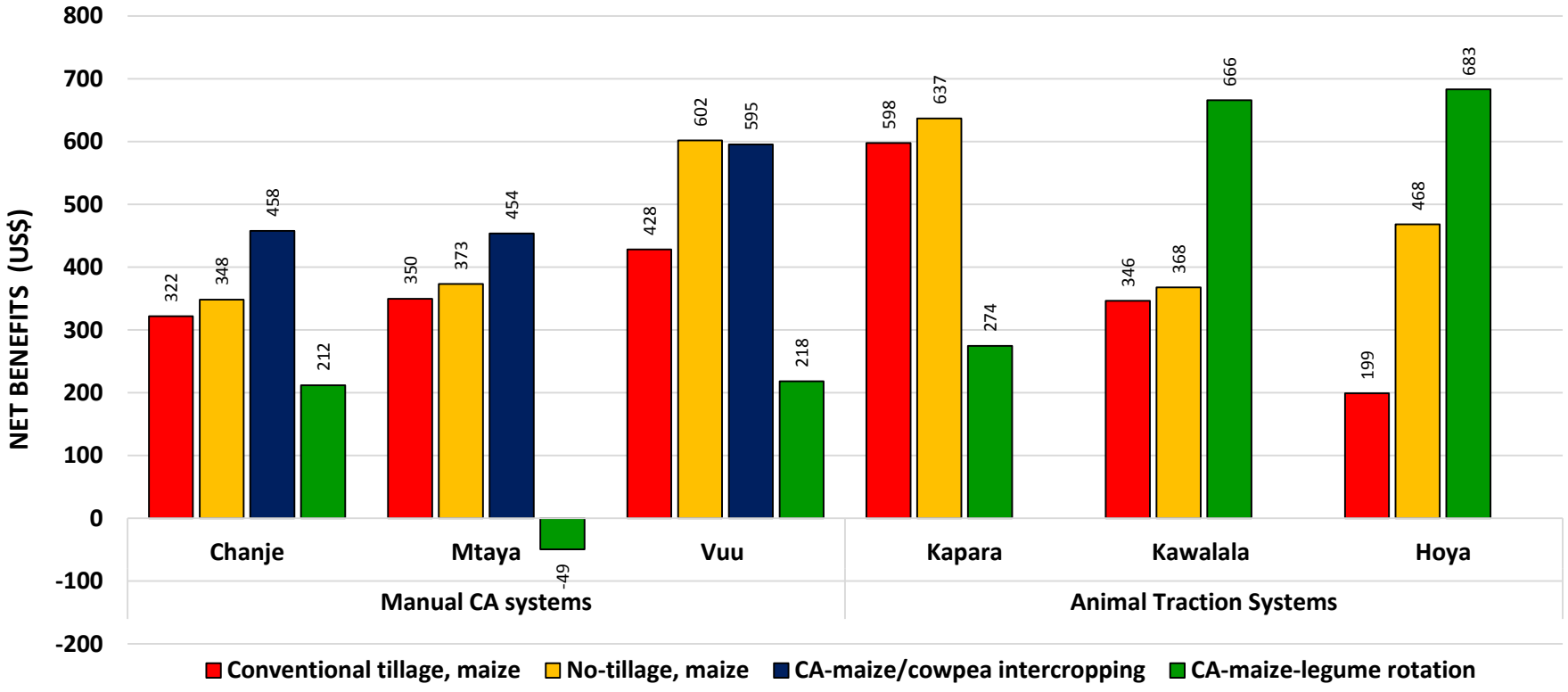


Long term maize grain yield in target communities





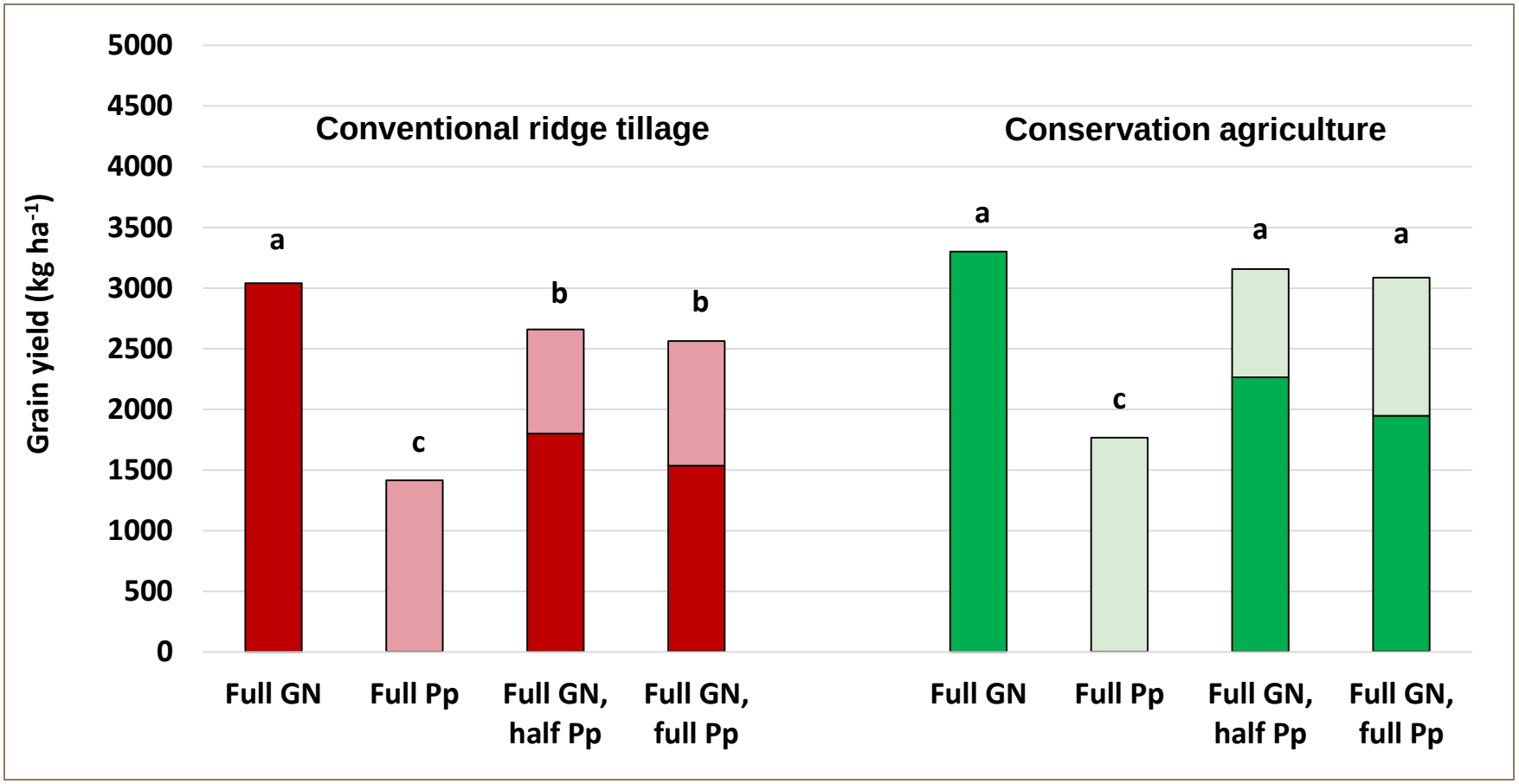
Net benefits (US$), mother trials, 2016/2017



Doubled-up legume trial under CA

- **Sustainable intensification** in reach of farmers
- **Combining CSA options** increases overall resilience
- **Our strategy:** plant Groundnuts and Pigeon pea at optimal spacing under no-tillage and rotate with maize

Doubled up-legume trial under CA



Main findings

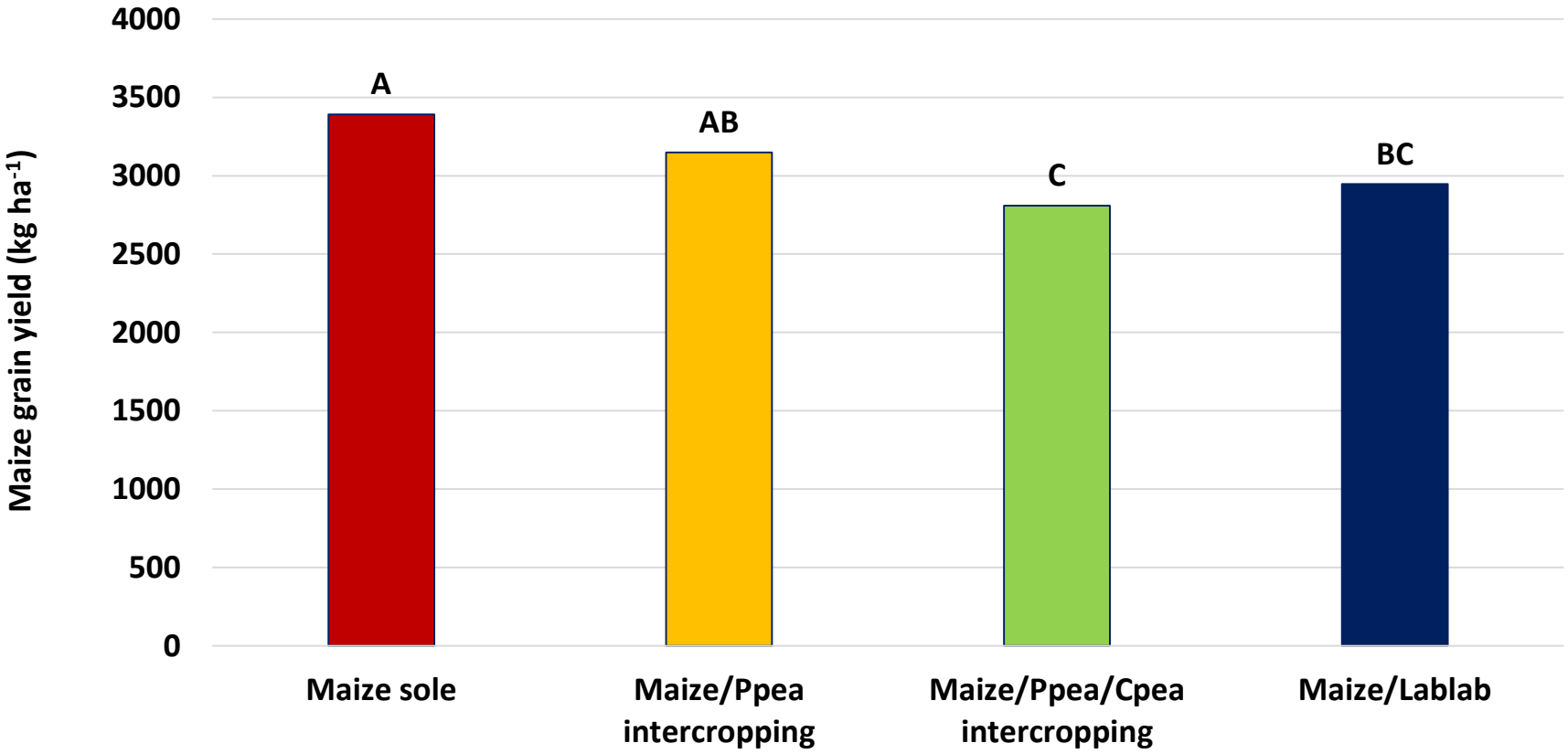
- **Doubled –up legume systems under CA** gave greater yields than under conventional agriculture
- No significant rotation effect on consecutive maize
- **Sole groundnuts** had highest yields in the short term
- **Long-term?** - we don't know
- **Gross margin analysis** of both systems required

GMCC intercropping trials

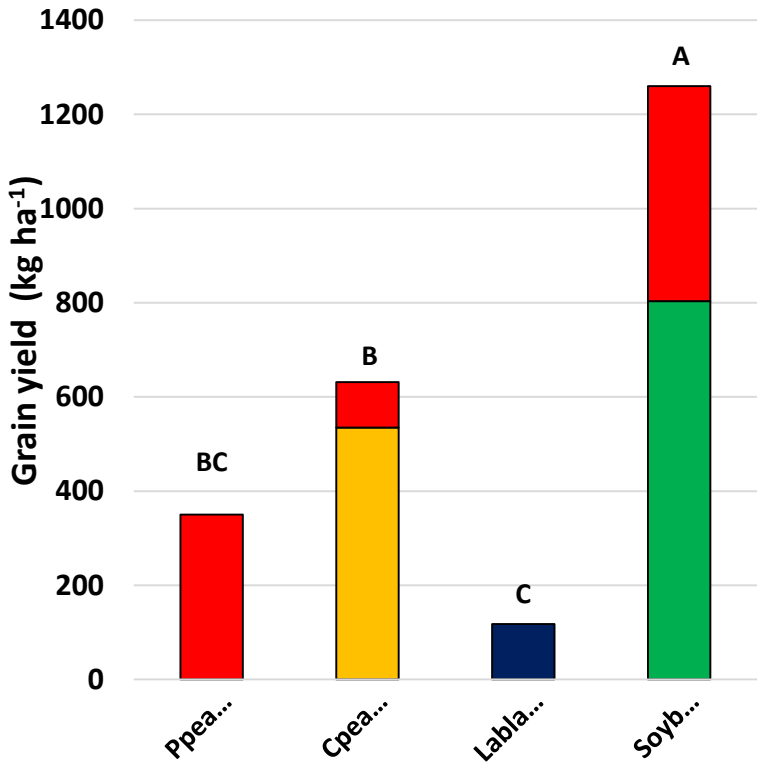
- **GMCC** provide groundcover, weed control, fertility, food, feed and fodder
- The question: how to **intensify and diversify** maize-based low input agriculture systems?

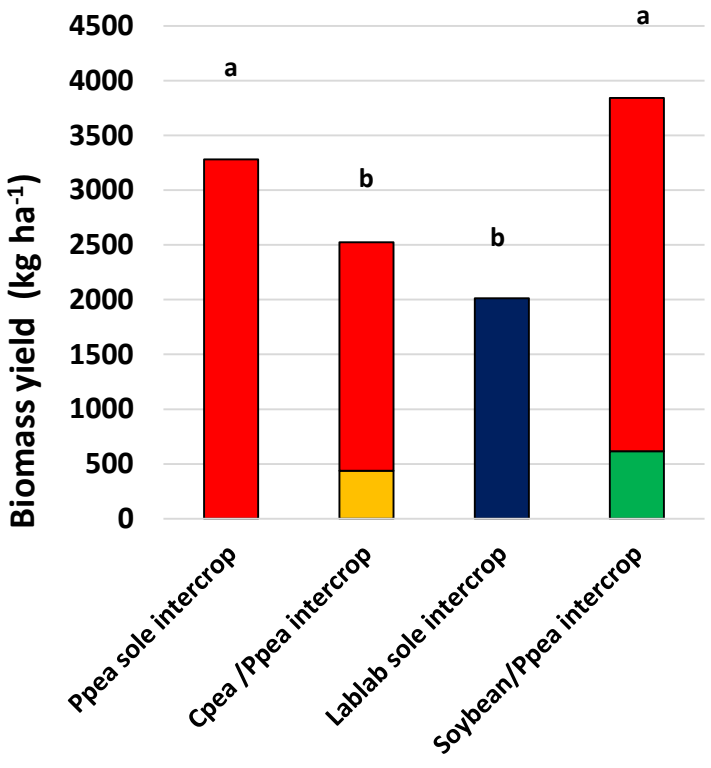
- Men more interested in **cash return** from grain
- Women more interested **in weed control and nutrition**

GMCC intercropping trials

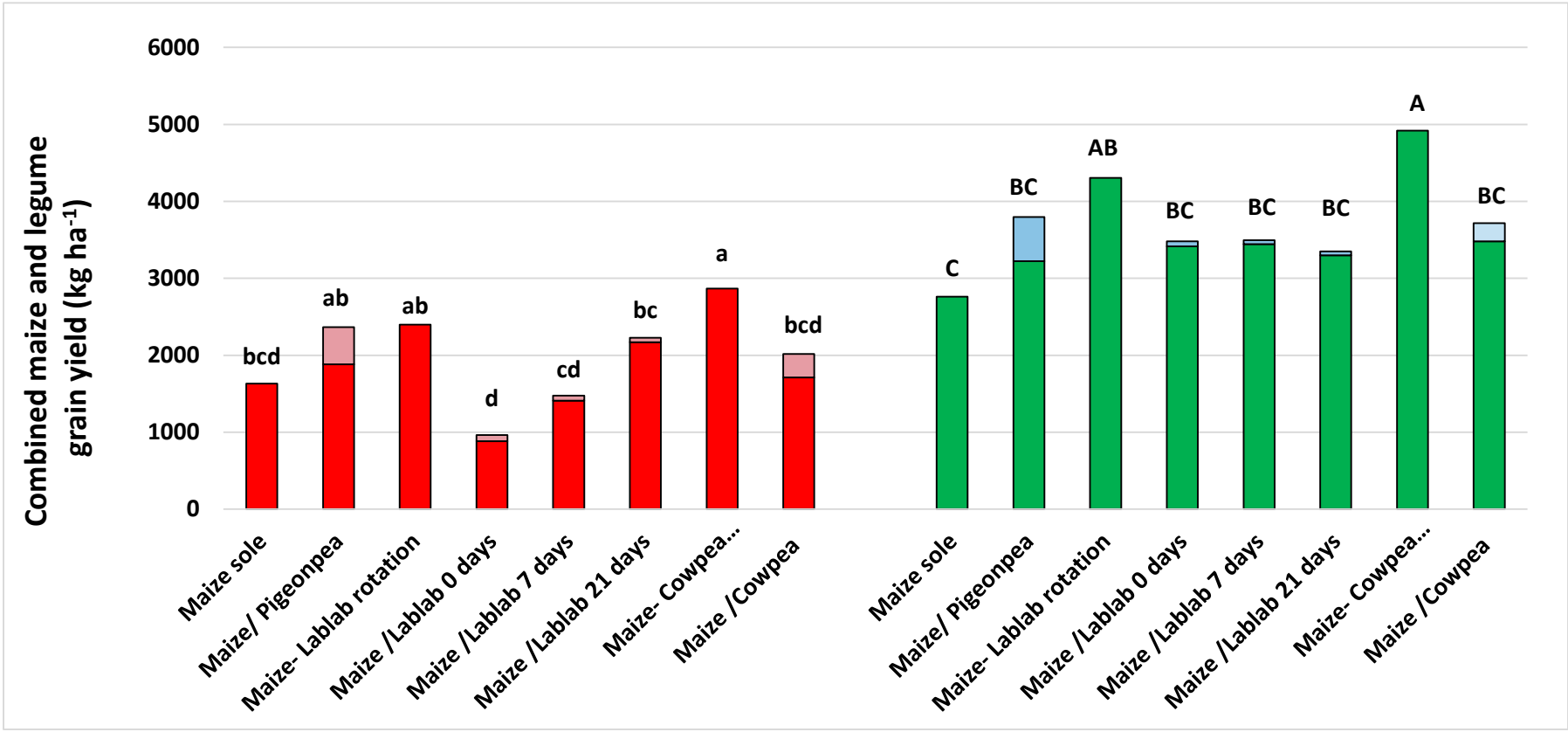


GMCC intercropping trials





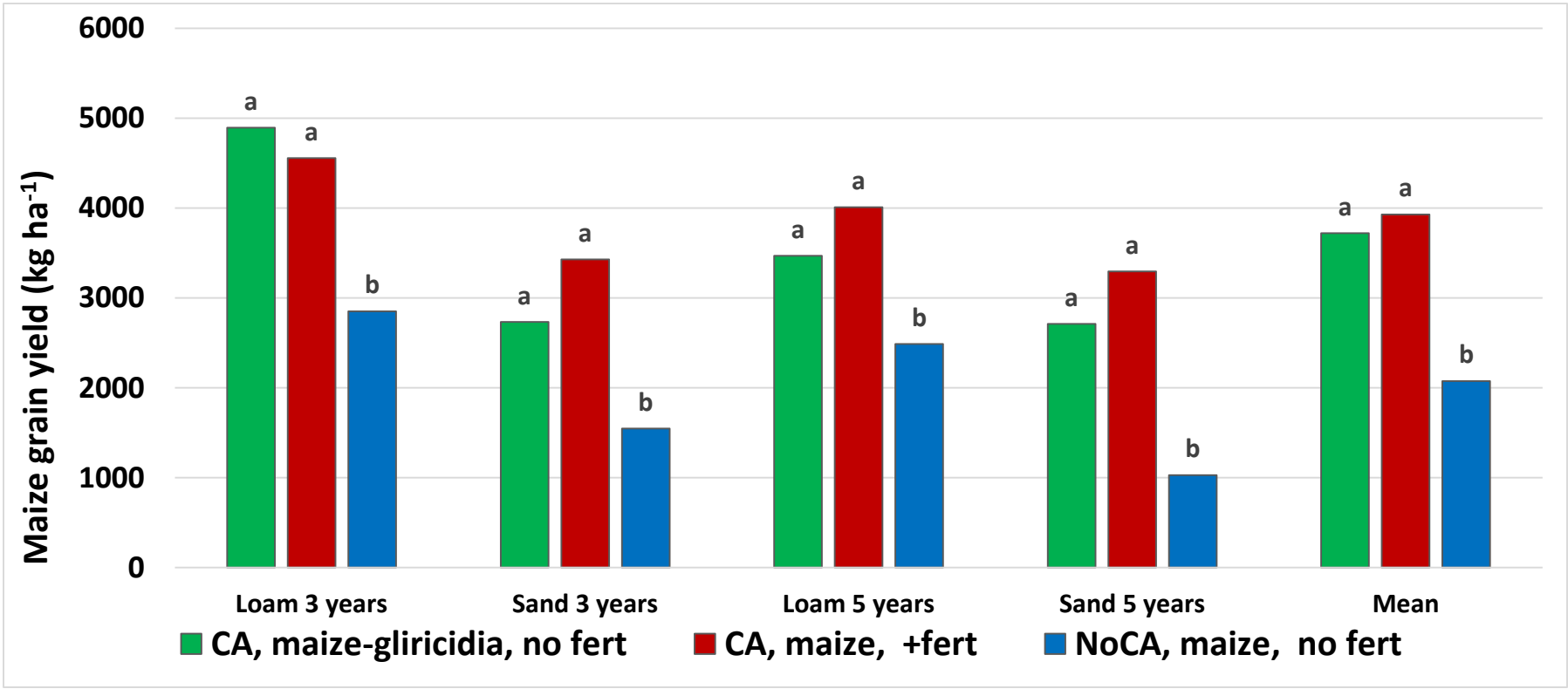
GMCC on-station trial



Maize-Gliricidia intercropping

- **Low cost option** for maize farmers who are not able to buy mineral fertilizer
- **Regional study** on 102 farmer's fields on 2 different soil types
- Gliricidia stand of different age **(3 and 5 years)**

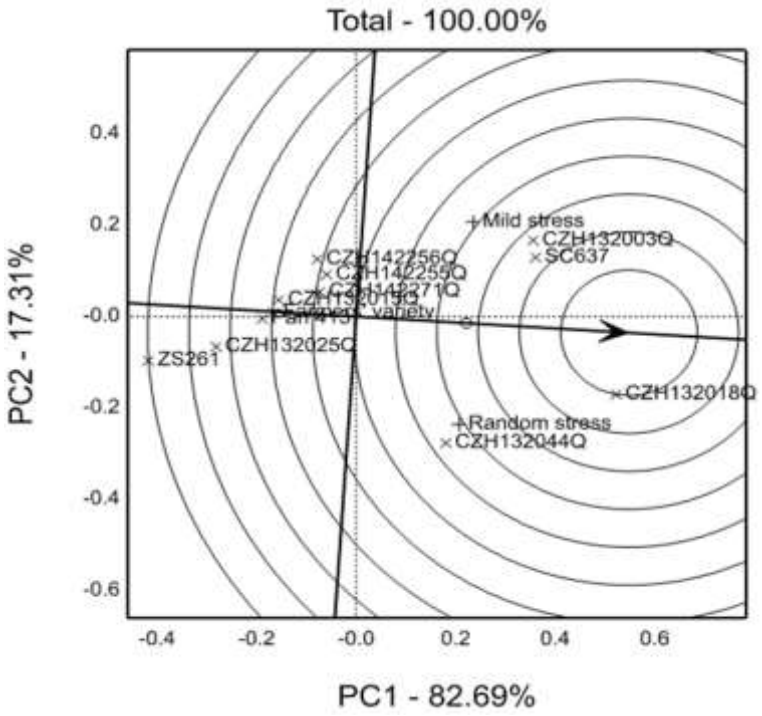
Maize-Gliricidia intercropping



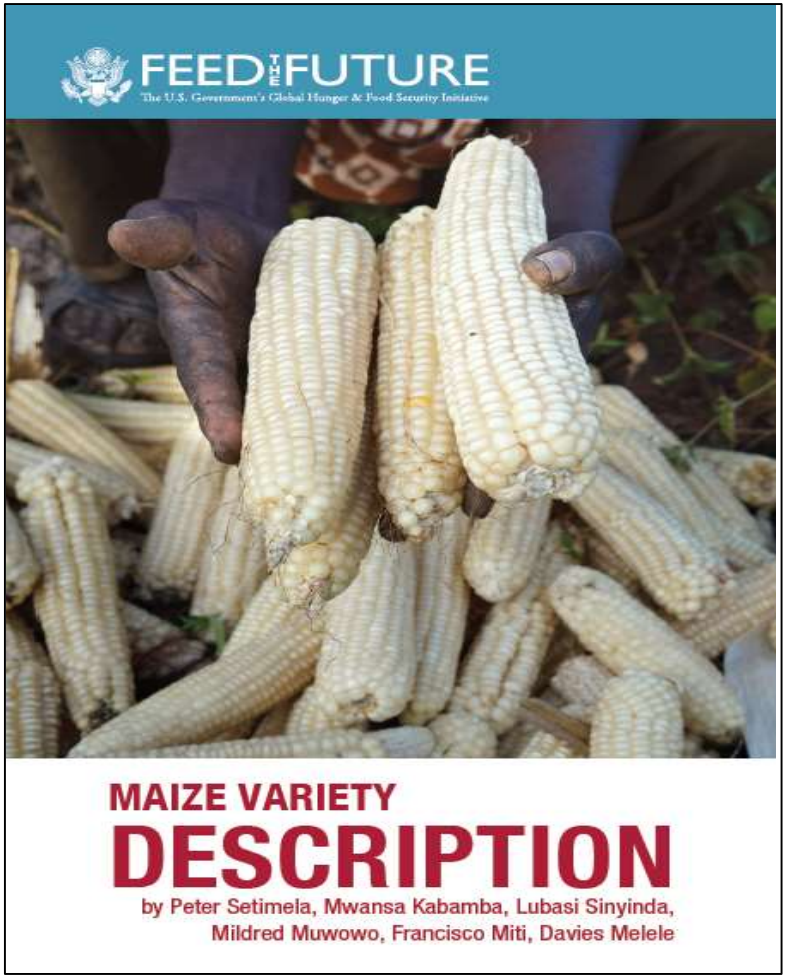
Main findings

- Gliricidia-maize is a **viable** option
- Farmers can safe the cost of **70 USD/ha** on fertilizer by applying Gliricidia leaves
- **Rainfall distribution and soil type** favored the performance of the system – not so much the age
- **Gross margin analysis** is need to discover the real benefit of the system

Quality protein maize (QPM)

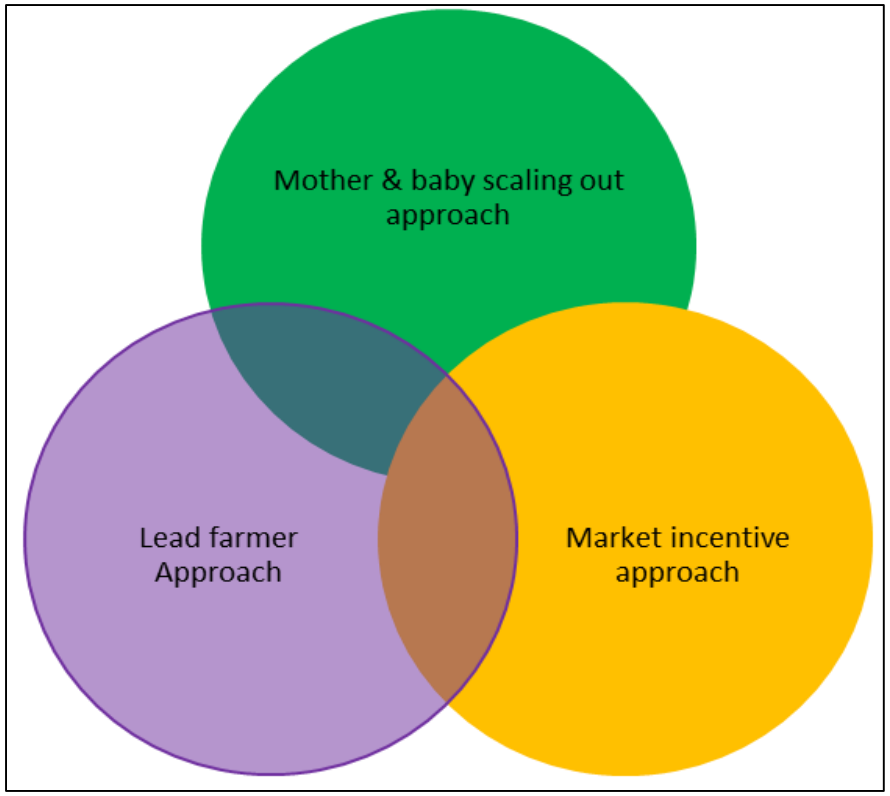


Genotype	Mild stress yield (kg/ha)	Random stress yield (kg/ha
CZH132044Q	5.0	2.9
CZH132018Q	5.3	3.0
CZH142255Q	5.0	2.4
CZH142256Q	5.1	2.4
CZH132003Q	5.4	2.7
CZH132015Q	4.9	2.4
CZH132025Q	4.8	2.4
CZH142271Q	5.0	2.5
ZS261	4.7	2.3
Pan 413	4.9	2.4
SC637	5.4	2.7
Farmers' variety	4.9	2.4
Mean	**5.0**	**2.5**
P (0.01)	**0.01**	**0.10**



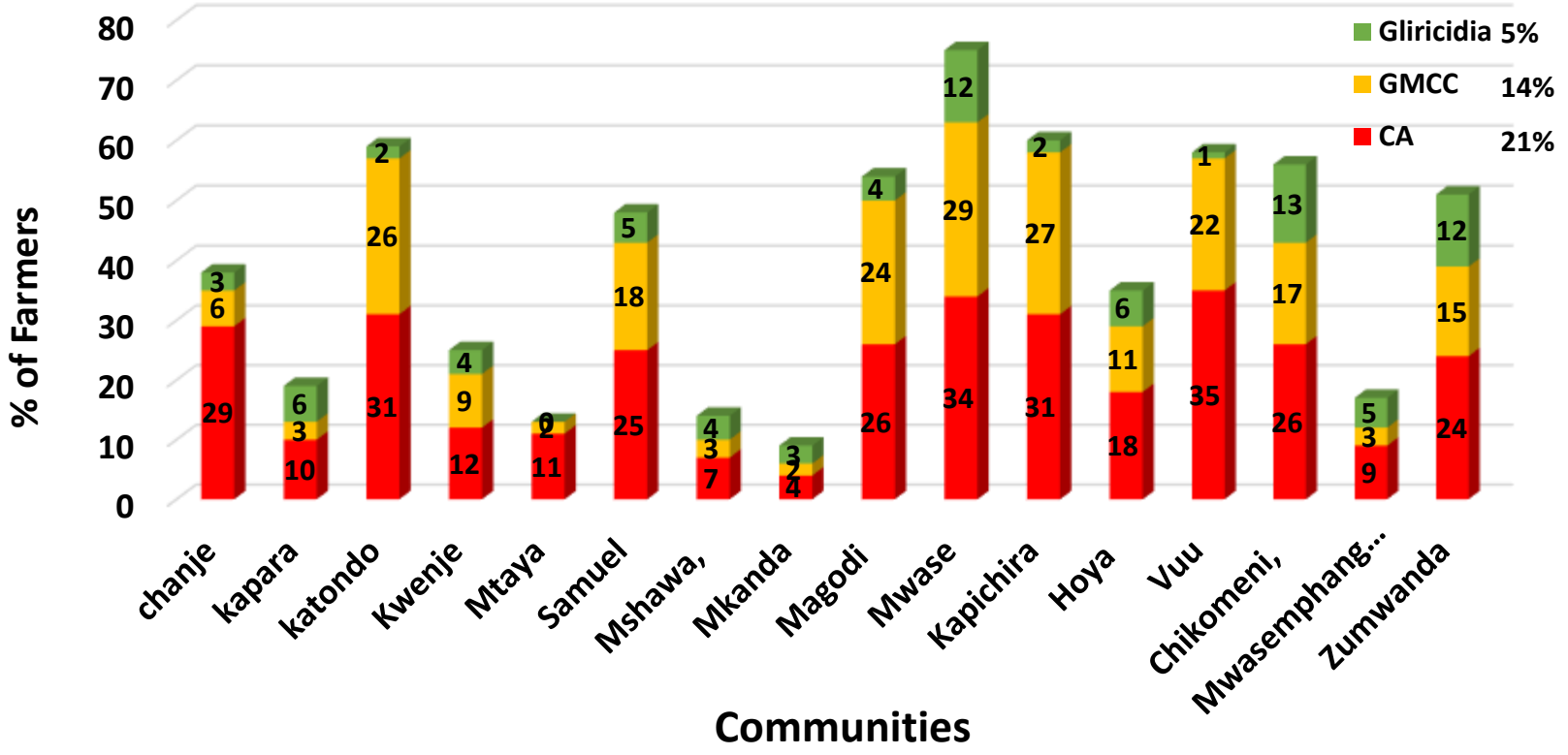
Maize variety description for Zambia

Study on scaling strategies



- **Scaling** strategies studied
- Only **preliminary** results yet
- **Combining** of all scaling approaches seems to work best

Adoption patters of SI technologies



Products?

- **Two QPM hybrids** were chosen by Kamano Seeds in Zambia for release in September
- **Doubled-up** legume system under CA and **Gliricidia-maize** intercropping are ready for further scaling
- **GMCC intercropping** is already going to scale with CRS

Products?

Publications:

- **Mupangwa** et al. 2017. Productivity and profitability of manual and mechanized conservation agriculture (CA) systems in Eastern Zambia. Renewable Agr. and Food Syst. Under final review.

- **Setimela** et al., 2017. Evaluation of grain yield and related agronomic traits performance of quality protein maize hybrids in southern Africa. Accepted Euphytica.

- **Success story:** on doubled-up legume under CA
  https://africa-rising.net/2017/05/18/double-up-legume-technologies-in-conservation-agriculture-show-potential-for-scale-up-in-zambia/
  https://www.daily-mail.co.zm/zambia-poised-for-bumper-harvest/

List challenges and constraints faced

- **Very few challenges**:
  - the program was running smoothly
  - constraints in manpower/resources

- **Fall armyworm** affected some maize but not significantly

- **Indian market** for Pigeon pea collapsed

Ideas to address them in future

- Projects to **address FAW** are underway
  - Key elements: foresight and early warning, IPM, diversification/agronomy, tolerant varieties

- Successful project require good planning, sufficient **human and financial** resources

- Engagement with the private sector on pigeon pea – **cooking classes** dramatically increased acceptance

Key Lessons learned

- Doubled-up legume systems perform better **under CA**
- Gliricidia-maize intercropping saves farmers **resources**
- **Combinations** of different CSA practices are most efficient
- Research trials have given interesting results that now **need to be published** – consolidated evidence took time

Loose ends……..!

- The work on scaling needs to **continue!**
  - Green manures – CA
  - Mechanization (animal traction – 2-wheel tractors)
  - QPM, DTM, Orange maize
  - Private sector engagement just started to blossom
  - Commercialization and new ways of extension
  - Understanding farmers rationale and decision making

- Work on soil fertility is a long term **process** and requires **long-term commitment**

Thank You

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