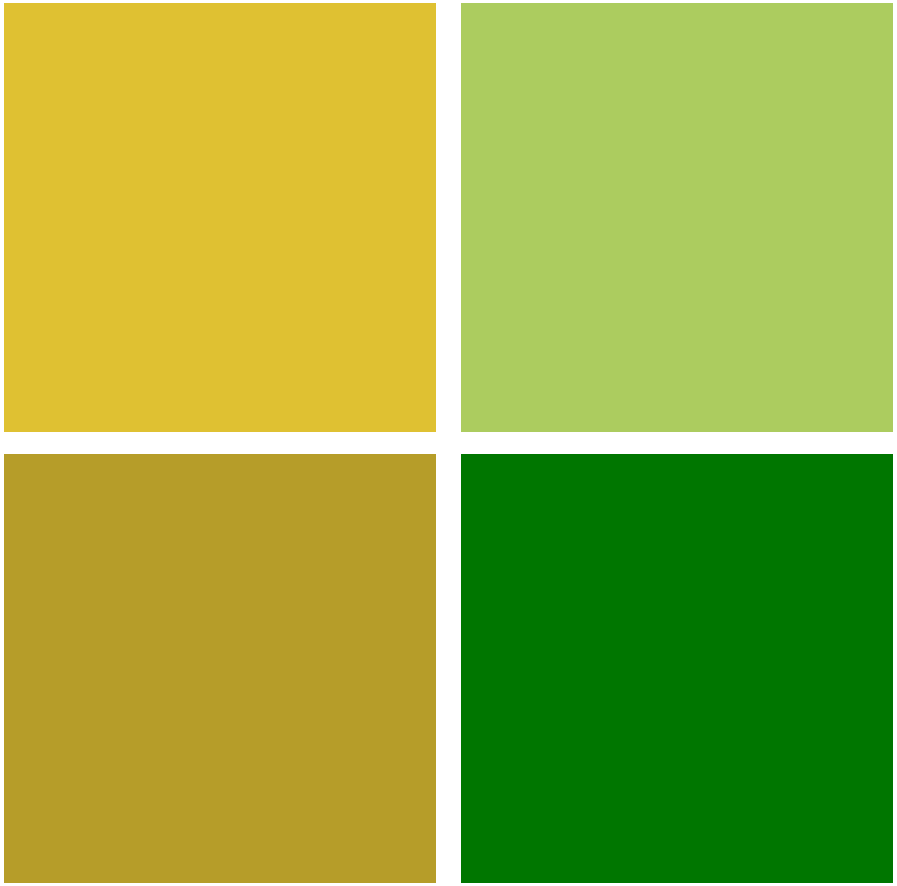
FARM D

Forum for Agricultural Risk Management in Development

WEBINAR SERIES

Strengthening and Enhancing Seed Systems to Better Manage Agricultural Risk

By Dr. Jill Cairns, Physiologist, International maize and Wheat Improvement Center (CIMMYT)



Washington DC, United States, January 14th , 2015

CLIMATE CHANGE AGRICULTURE AND FOOD SECURITY

Strengthening and Enhancing Seed Systems to Better Manage Agricultural Risk

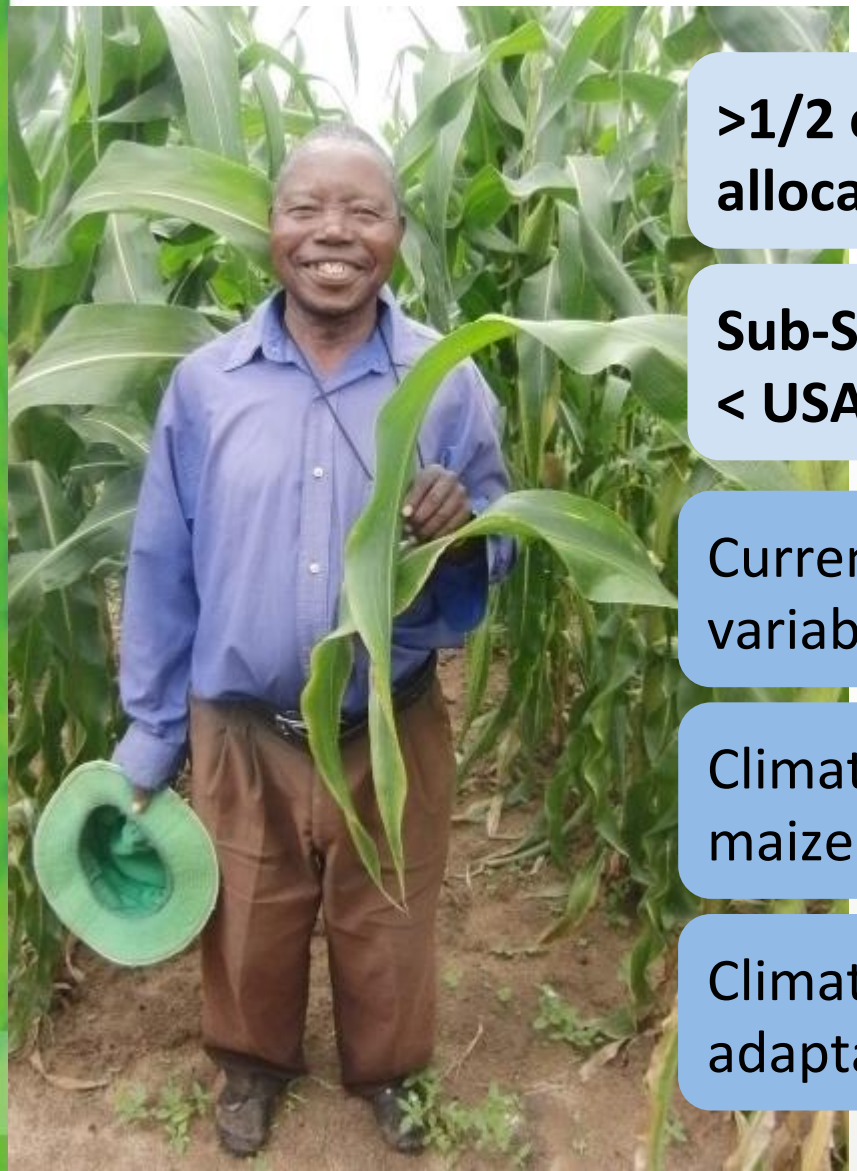
Jill E Cairns, **Tsedeke Abate**, Peter Craufurd, Cosmos Magorokosho, **BM Prasanna**, Peter Setimela, Kai Sonder, **Clare Stirling**, Christian Thierfelder, Mainassara Zaman-Allah &

Marianne Bänziger

January 14th, 2015

CIMMYT

Overview



>1/2 of sub-Saharan Africa countries allocate >50% of cereal area to maize

Sub-Saharan Africa's maize yields today < USA yields in 1936

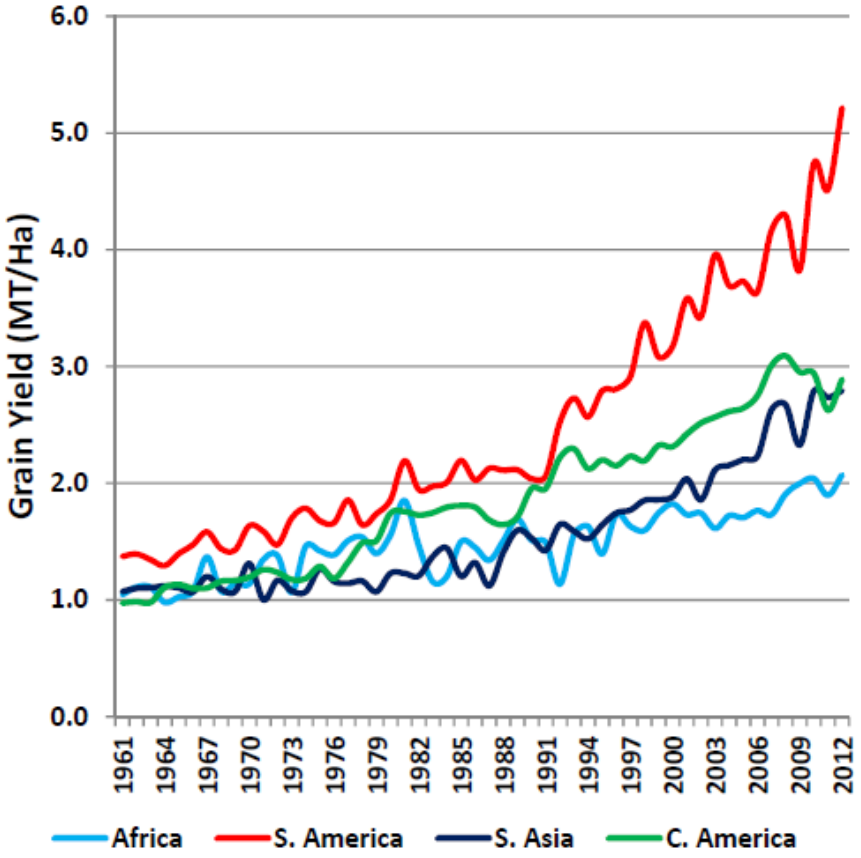
Current maize yields and climatic variability

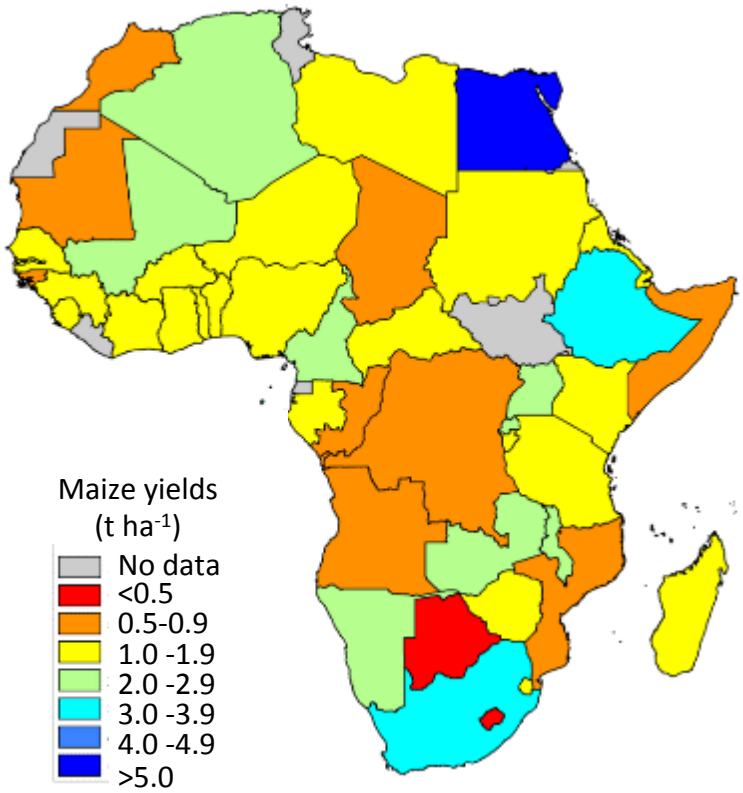
Climate change and potential impacts on maize yields

Climate variability and change adaptation interventions

Current situation…

Maize yields in sub-Saharan Africa

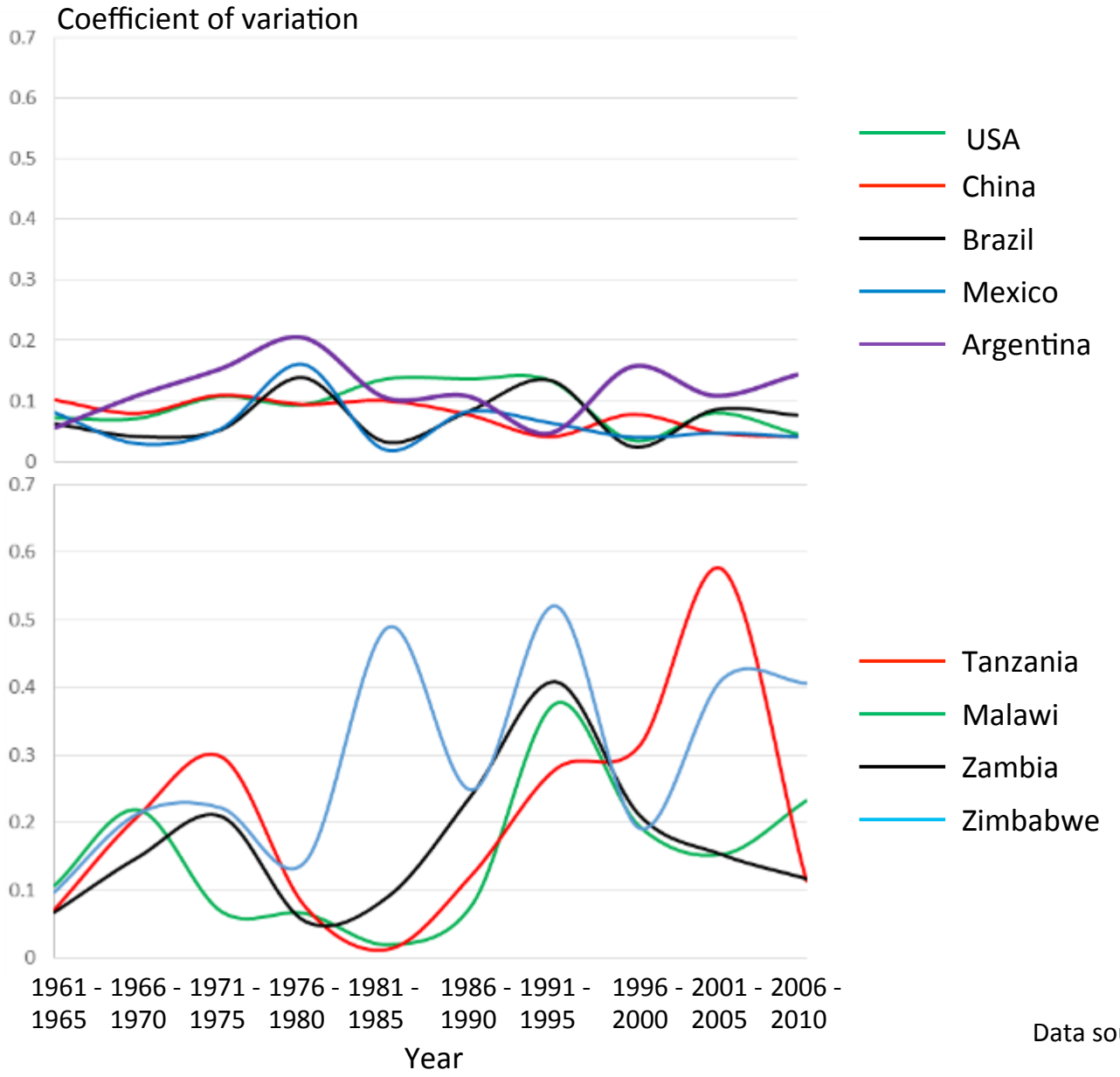




(world average = 4.92 t ha^{-1})

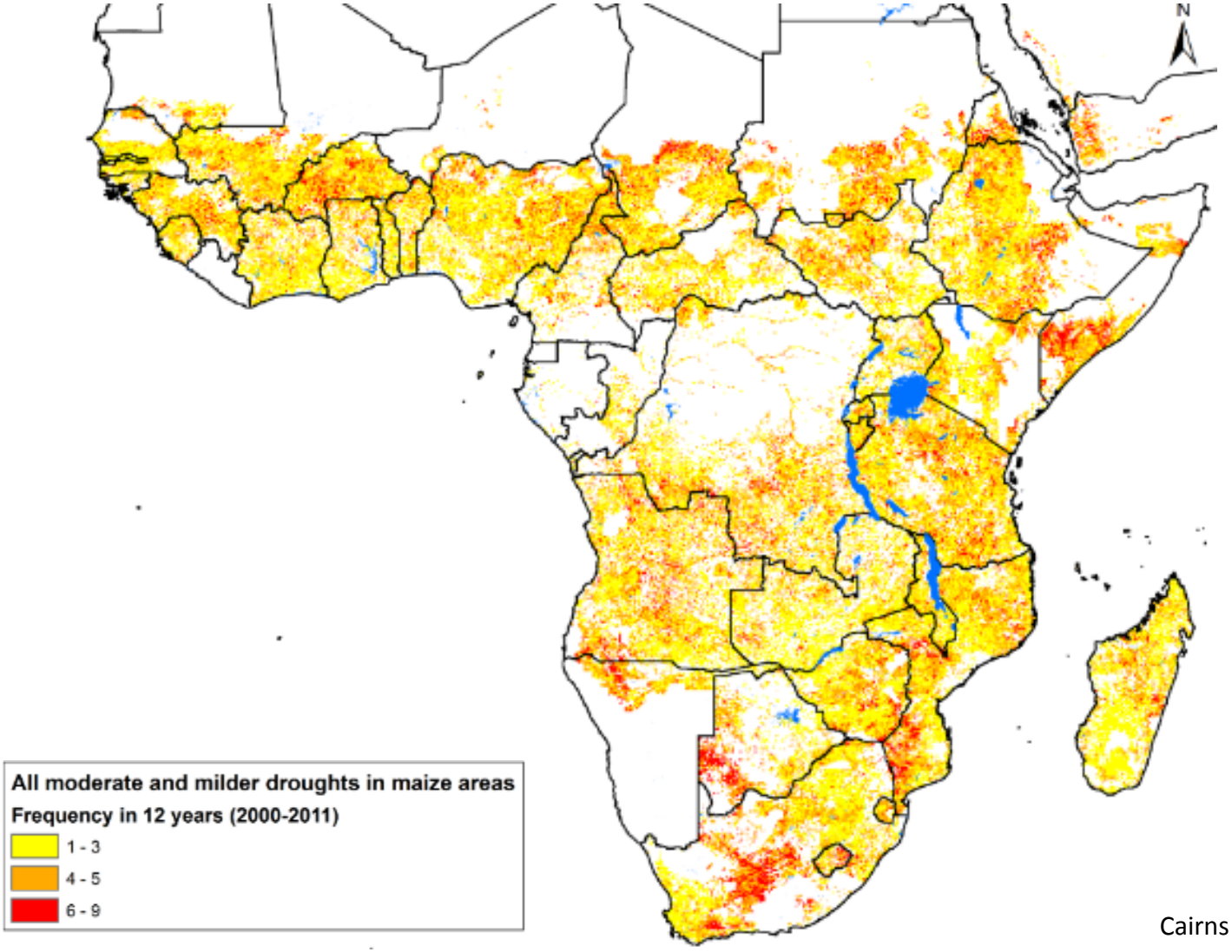
Data source: FAO, 2013

Maize yield variability



Data source: FAO, 2014

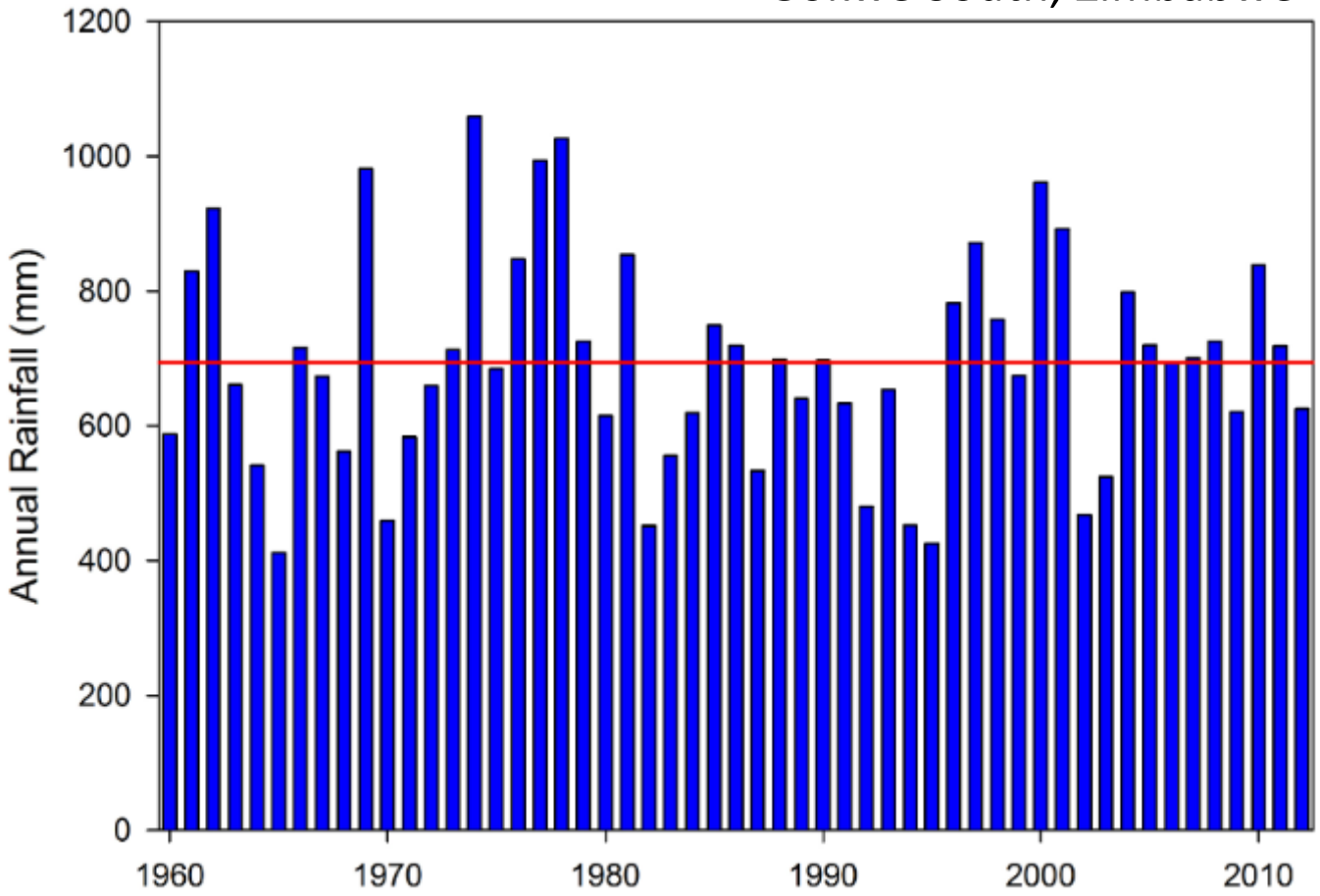
Current climate variability - frequency of droughts in maize areas



Cairns et al. *submitted*

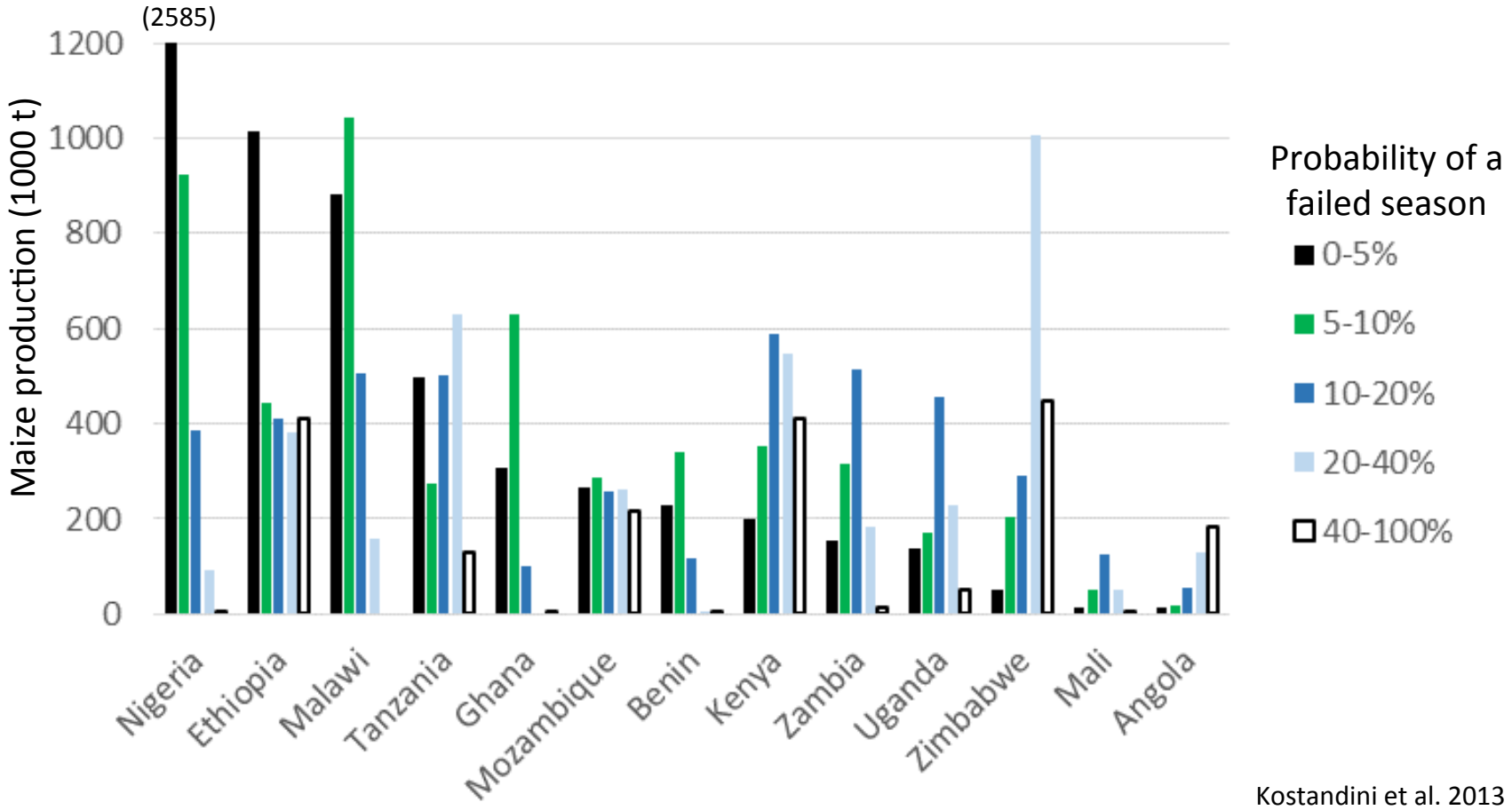
Current climate variability - rainfall variation

Gokwe South, Zimbabwe



Data source: CRU-TS 3.22 (University of East Anglia) and Harvest Choice (rainfall time series tool)

Maize production in drought prone areas

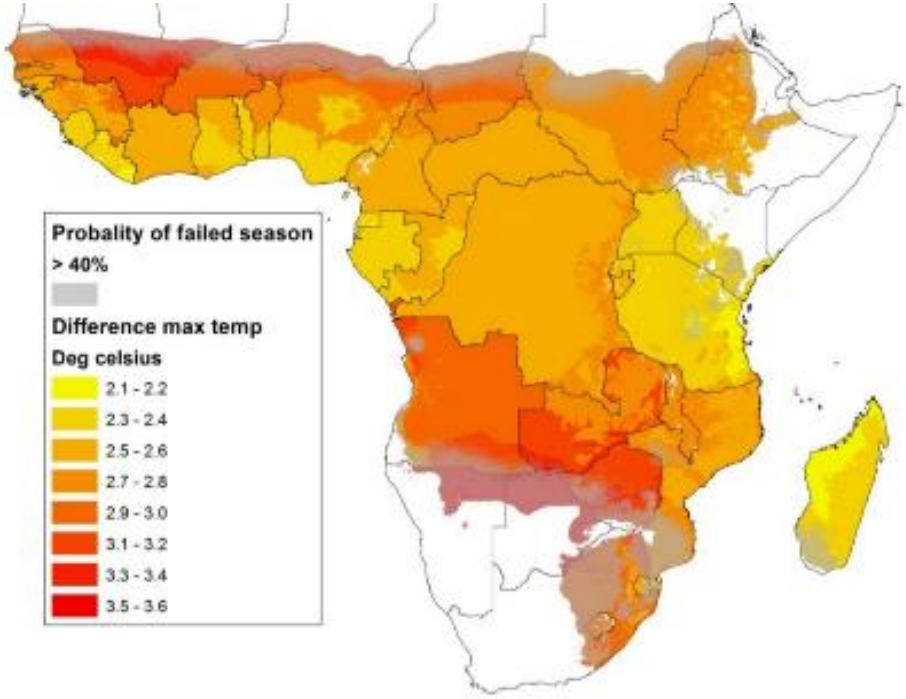


Kostandini et al. 2013

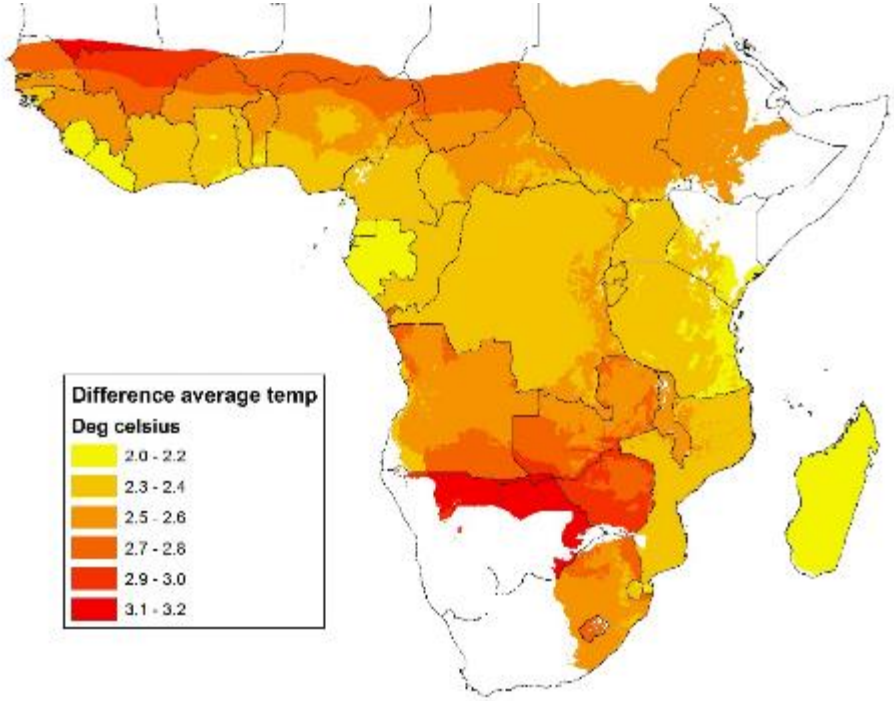
Future scenarios…

Climate projections for 2050

Maximum temperatures

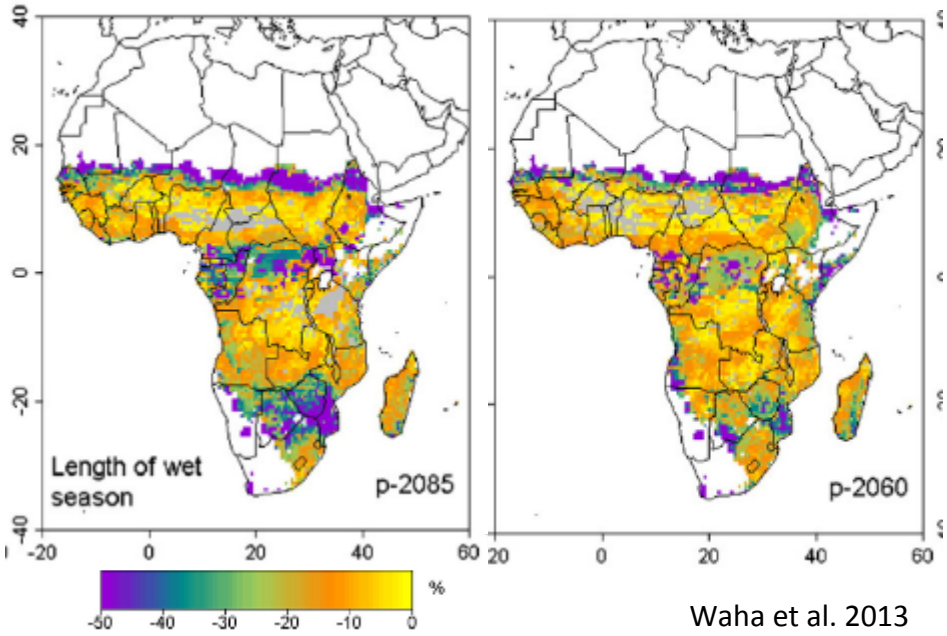


Mean temperatures



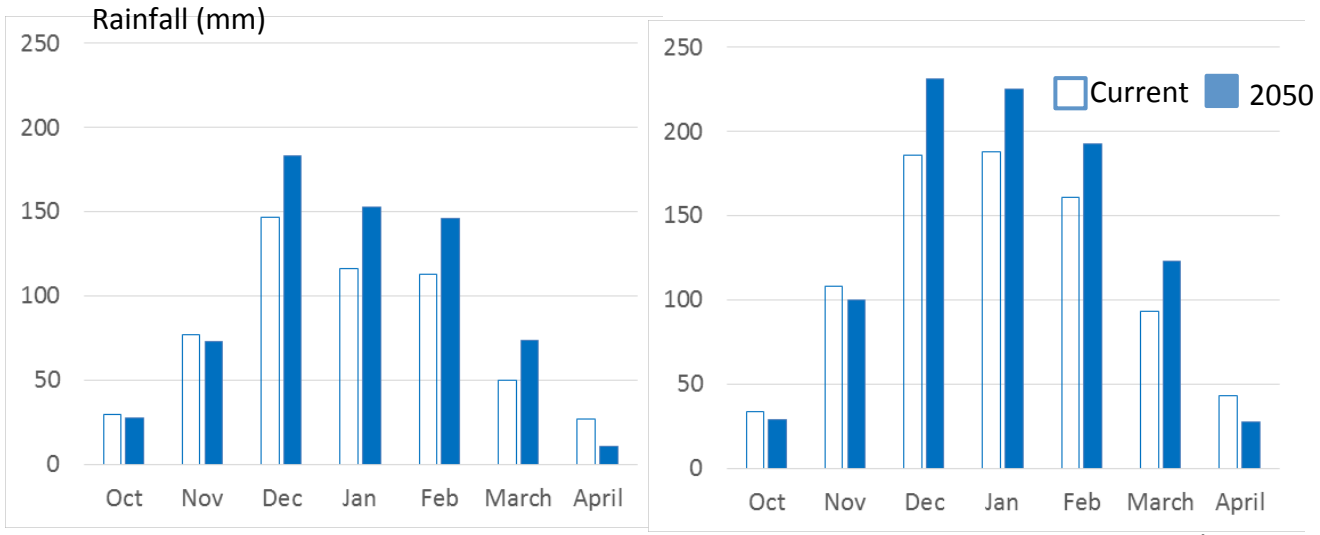
Cairns et al. 2013

Climate change - season length impact



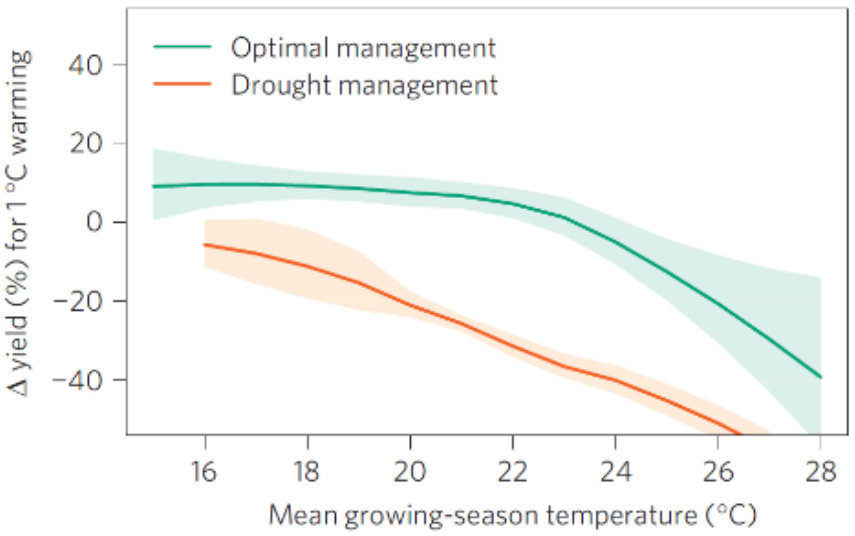
Waha et al. 2013

Gokwe and Bikita, Zimbabwe

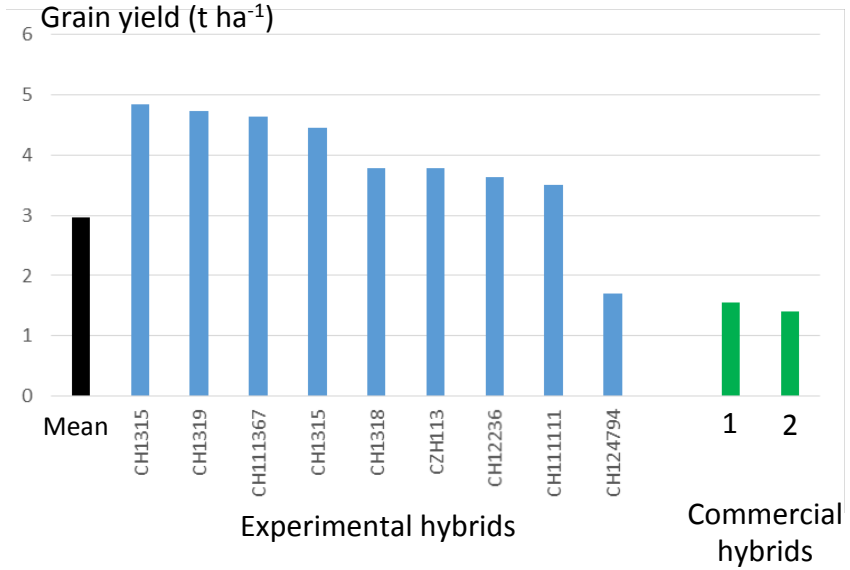


Cairns et al. 2013

Maize yields under climate change

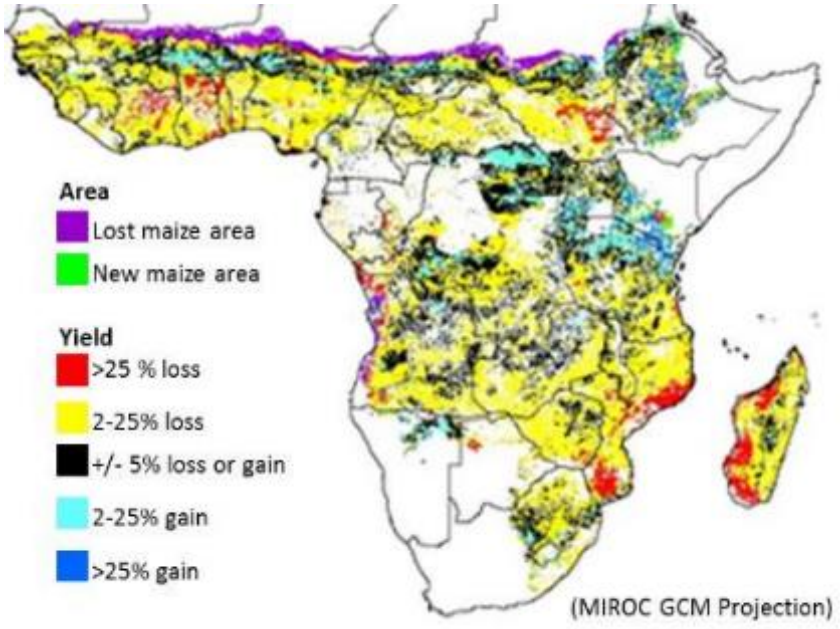


Lobell et al. 2011



Magorokosho *in prep.*

Maize yield losses under climate change



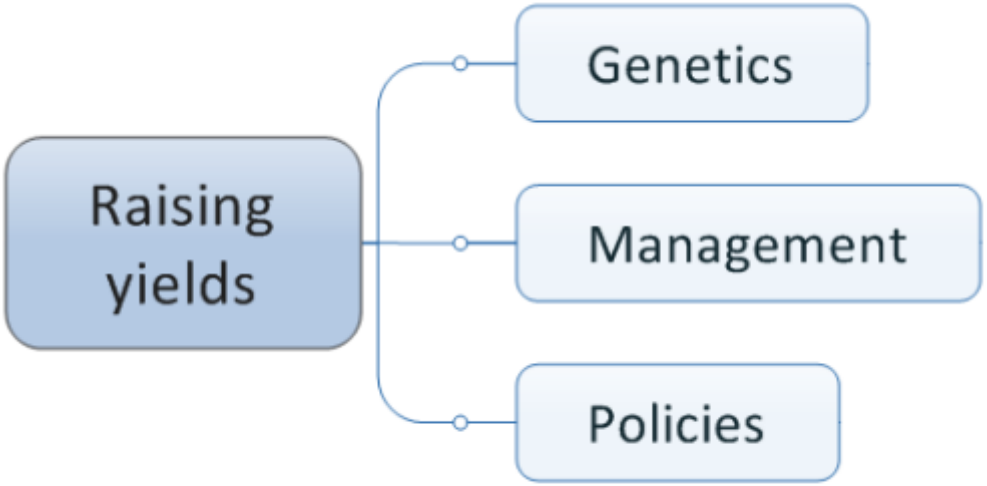
Tesfaye et al. 2015

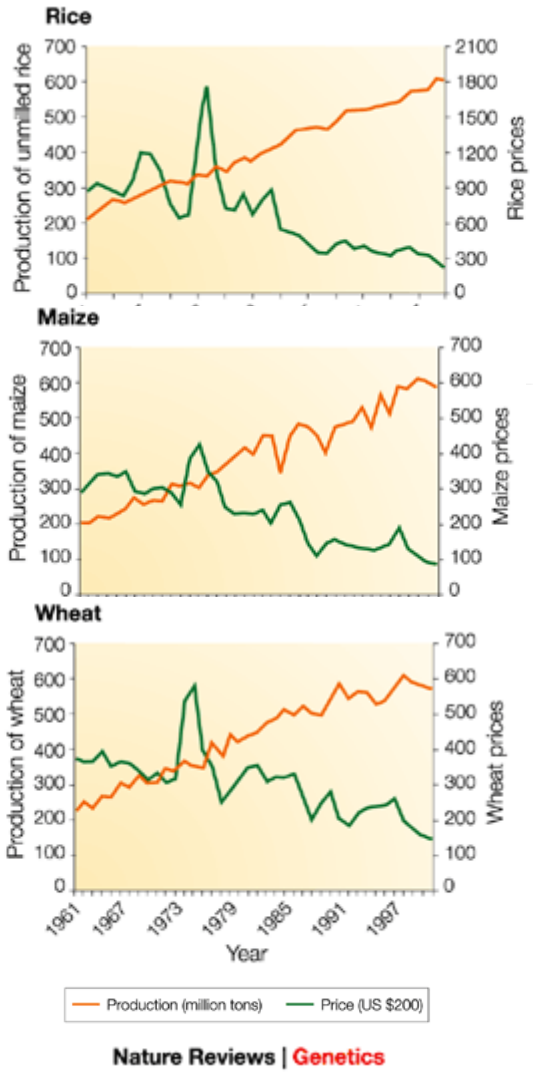
	Cereal area devoted to maize production (%)	Current average yield (t ha^{-1})	Yield change by 2050 (%)
Lesotho	74	0.94	-17
Malawi	74	2.02	-17
Mozambique	63	1.19	-13
Zambia	89	2.59	-6
Zimbabwe	72	0.86	-8

Hellin et al. *submitted*

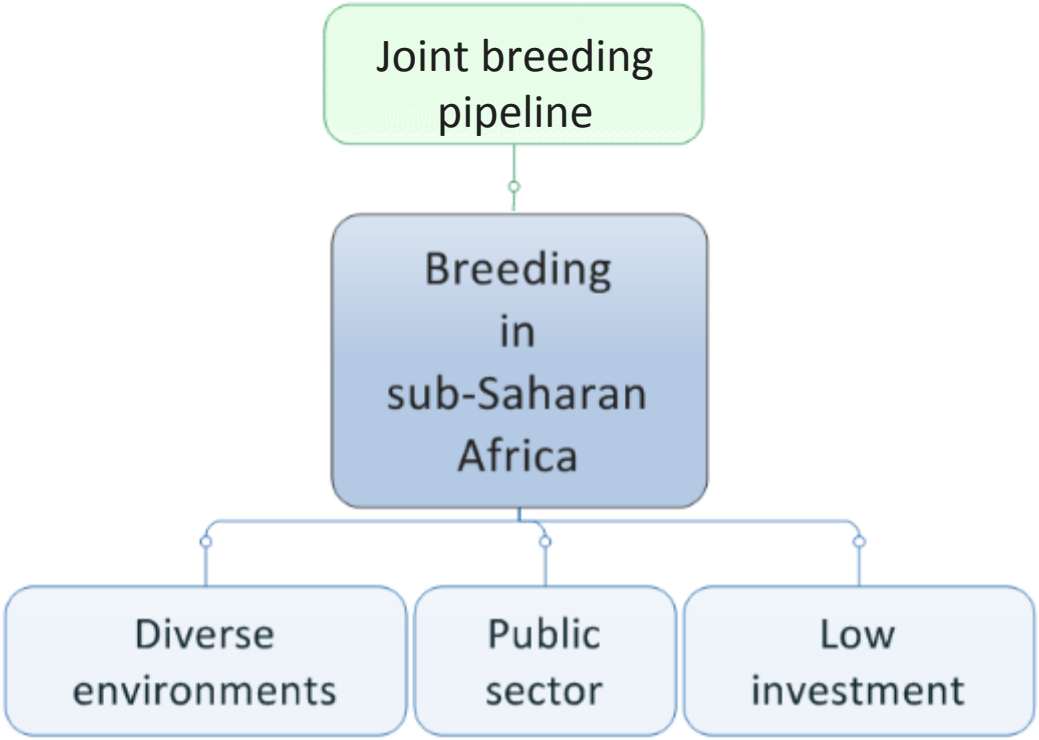
Interventions…

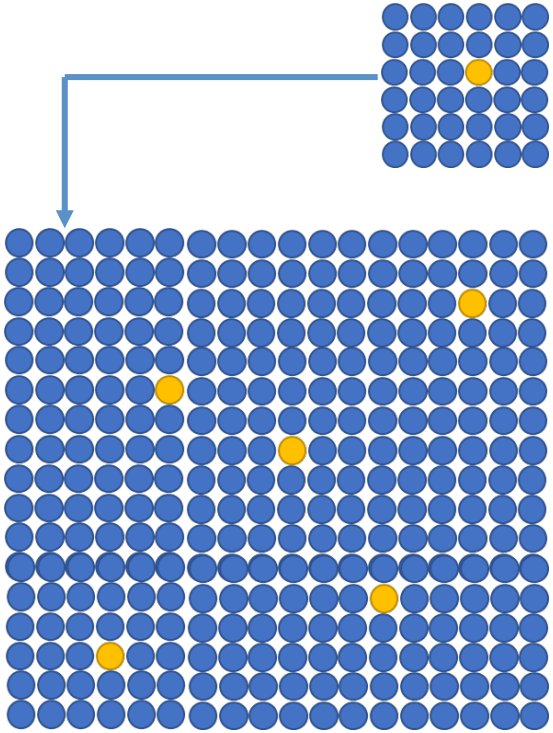
Interventions



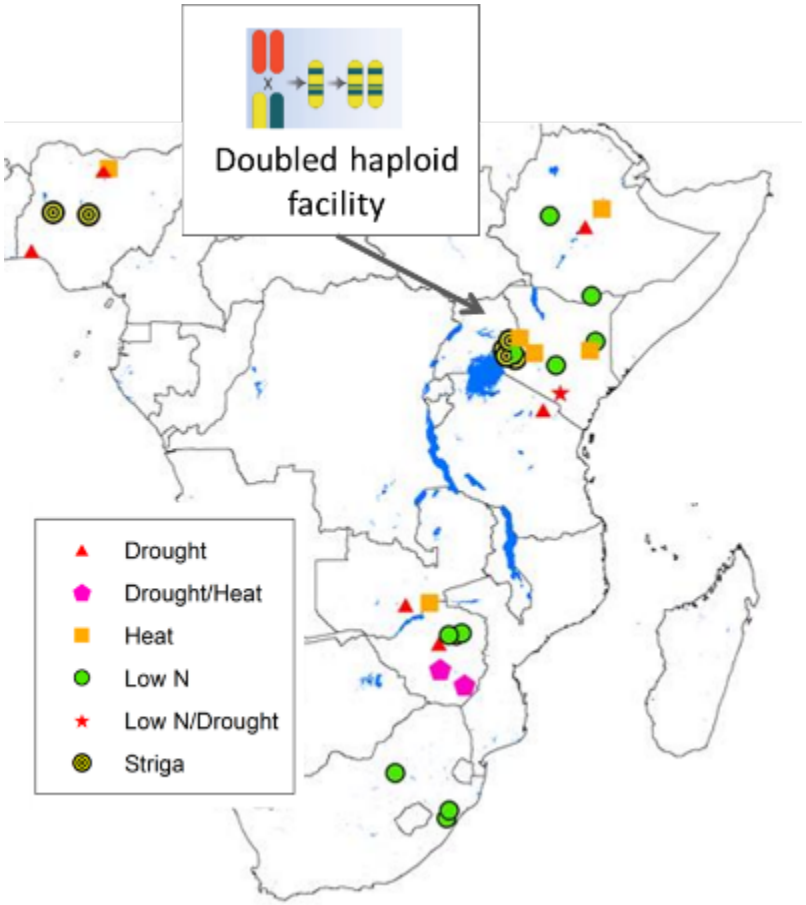


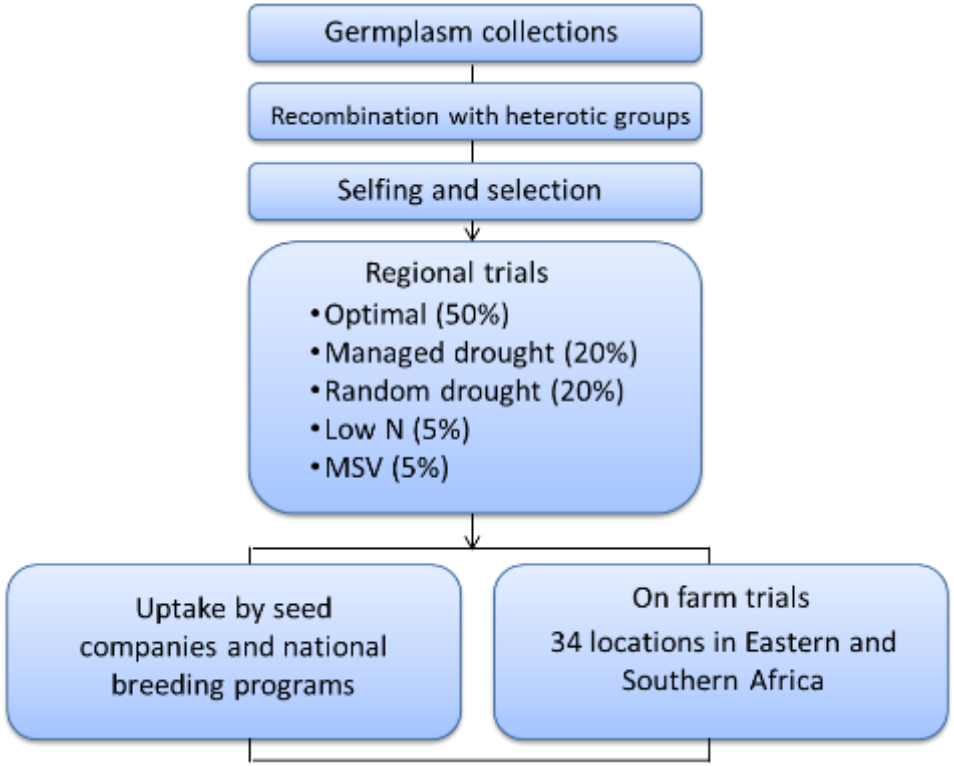
Interventions: Drought Tolerant Seed





Interventions: Drought Tolerant Seed

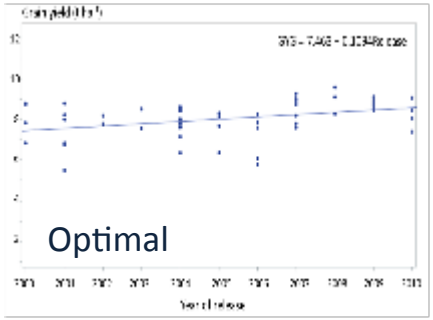


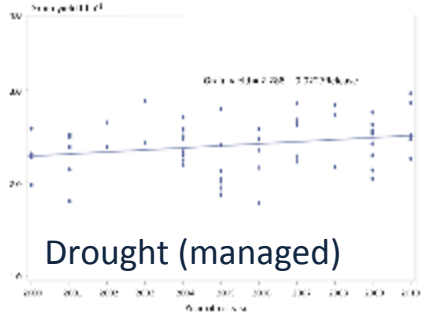


Prasanna et al. 2013

Progress in developing drought tolerant seeds

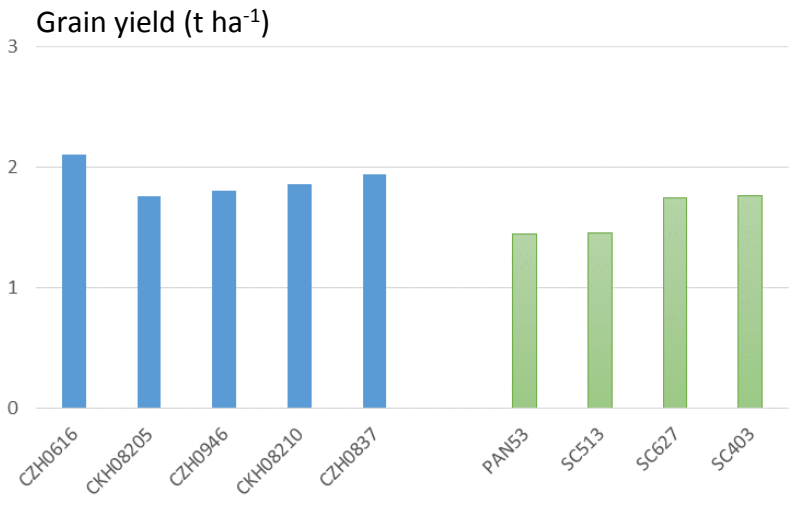
	Grain yield (t ha^{-1})	
	Optimal	Drought
CZH1157	6.70	3.08
CZH10250	6.52	2.79
CZH1237	6.34	3.09
Commercial 1	6.31	2.67
Commercial 2	4.84	1.48

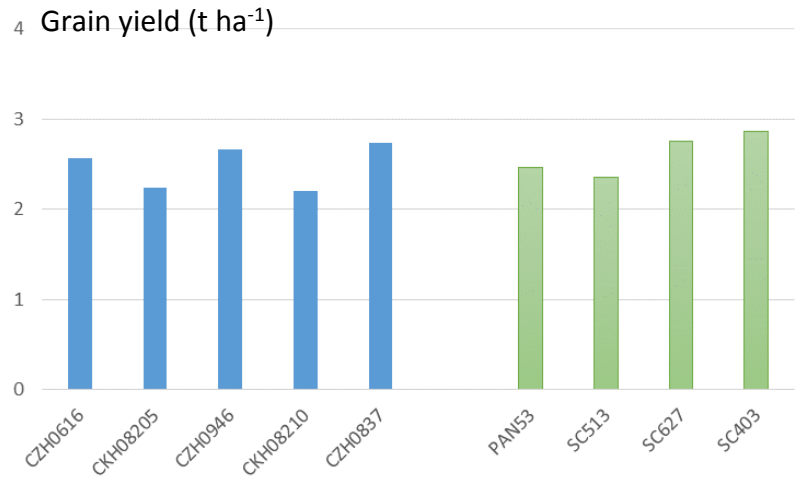


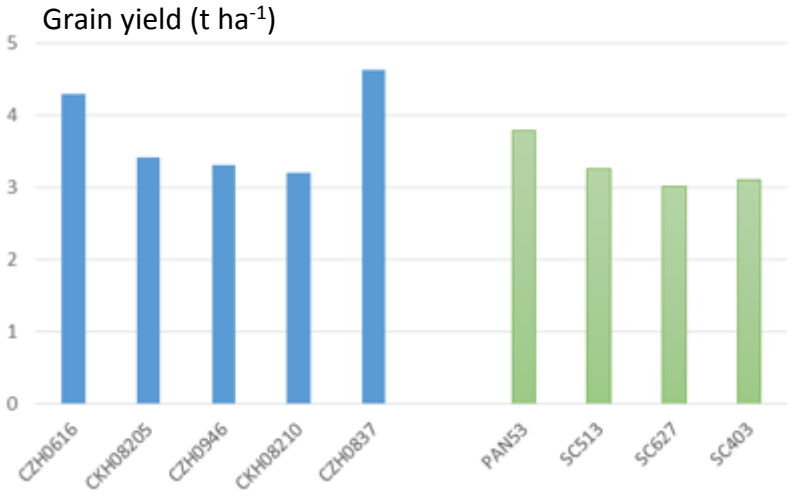


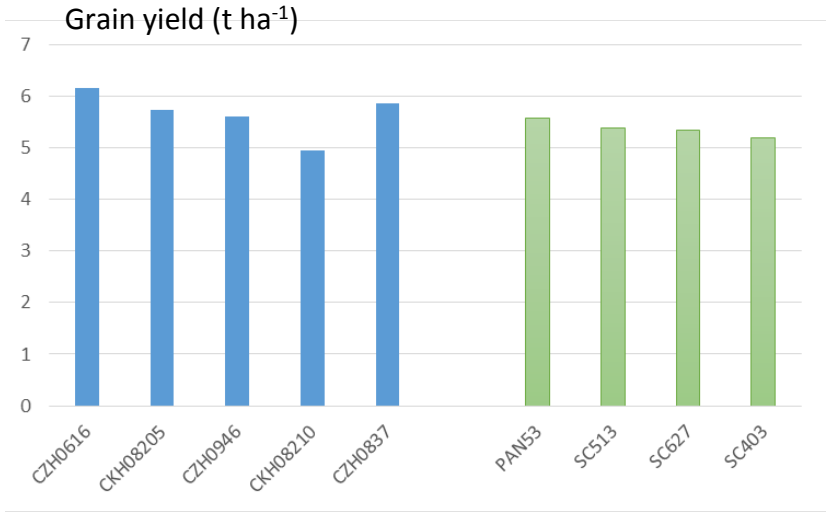
Stress	Gains per year	
	kg ha^{-1}	%
Optimal	109.4	1.40
Drought (managed)	32.5	0.85
Drought (random)	22.7	0.85
Low N	20.9	0.62
MSV	141.3	2.20

Drought Tolerant Seed: on-farm performance



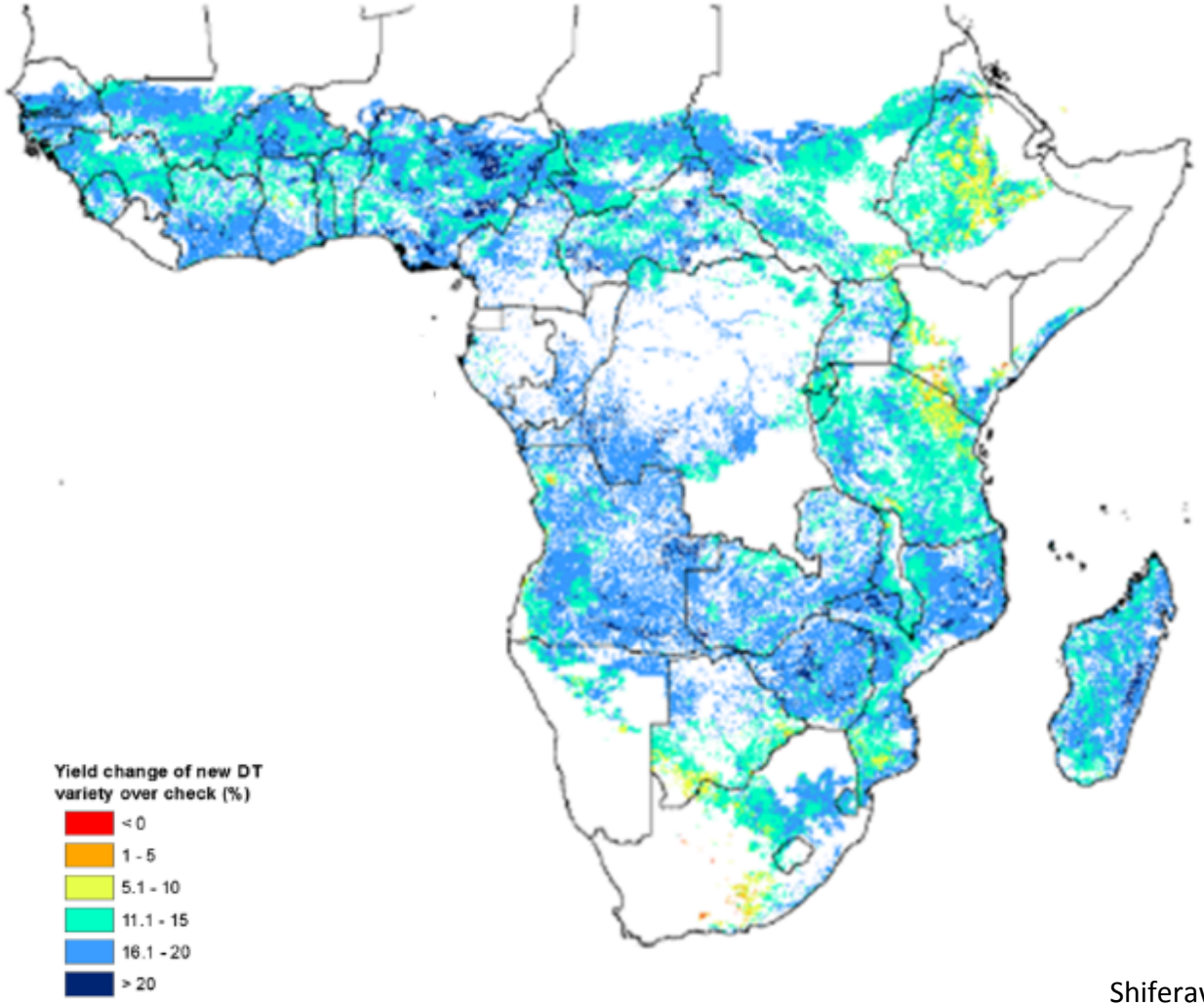






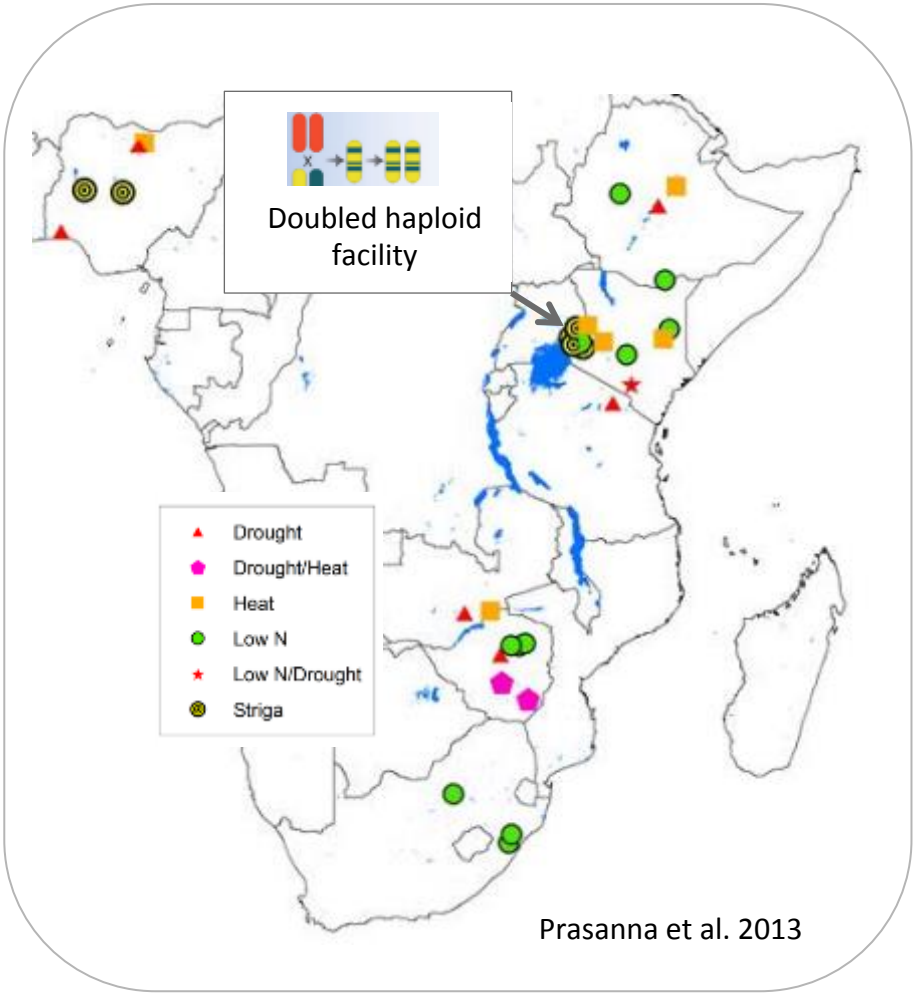
Adapted from Setimela et al. *submitted*

Potential impact of drought tolerant seed

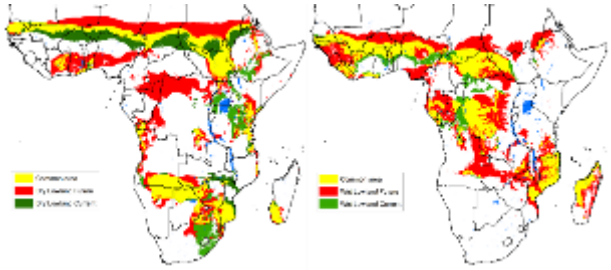


Shiferaw et al. 2014

Building National Capacity



Prasanna et al. 2013



Sonder et al. *submitted*

Training

Heat stress phenotyping capacity (Nigeria, Ethiopia, Kenya and Zimbabwe)

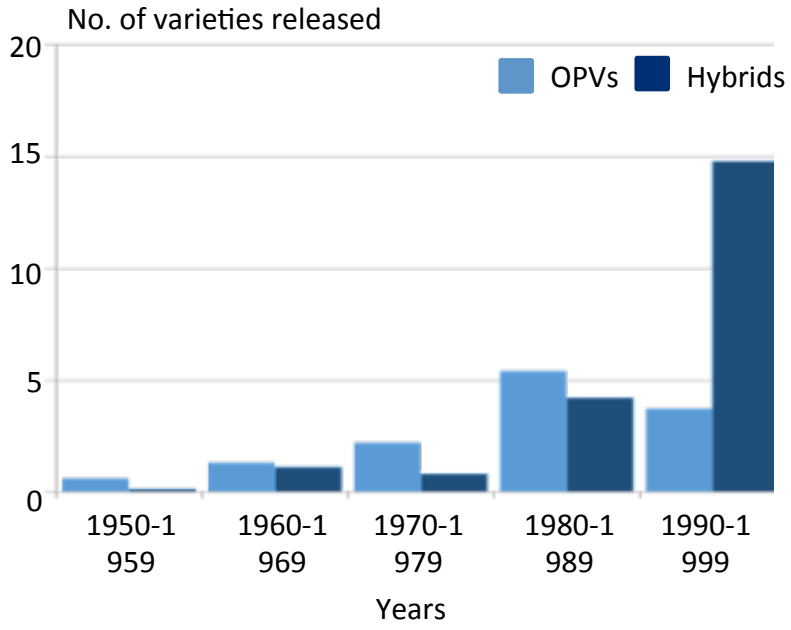
Interventions: Improved Seed

Variety development

Dissemination and uptake

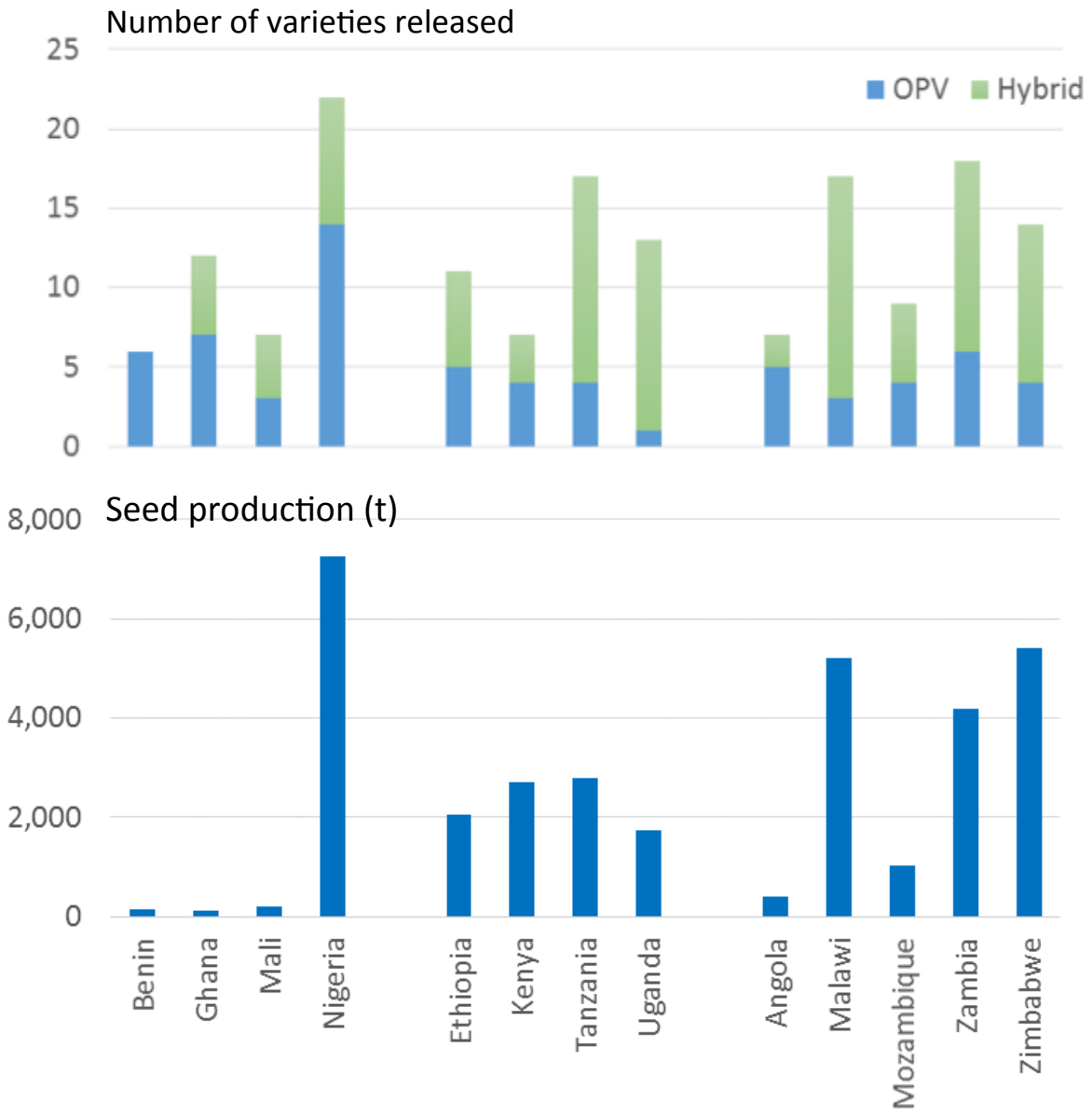
Langyintuo et al. 2010

Region	Number of countries	Seed Companies				
		Small	Medium	Large	Regional	Global
West	4	13	1	0	2	1
East	5	33	6	1	12	3
Southern	4	27	5	0	8	4



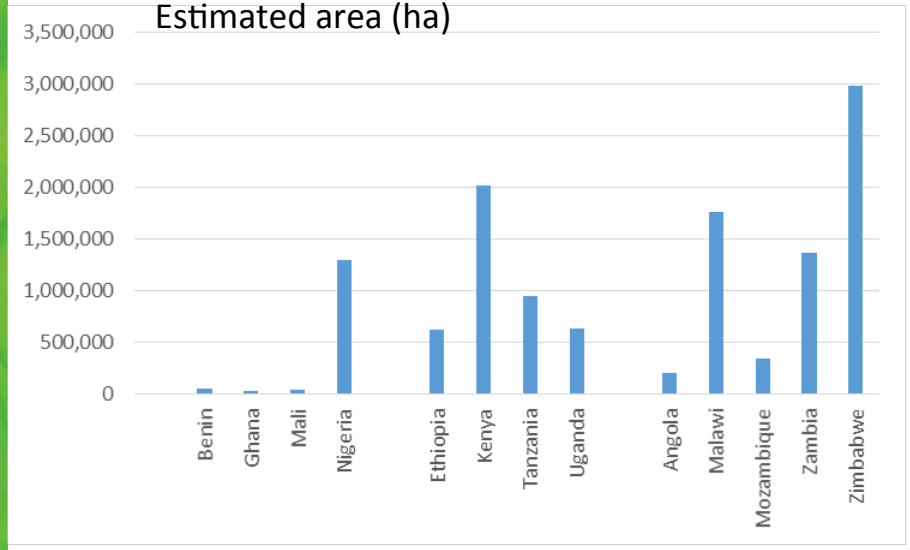
T. Abate

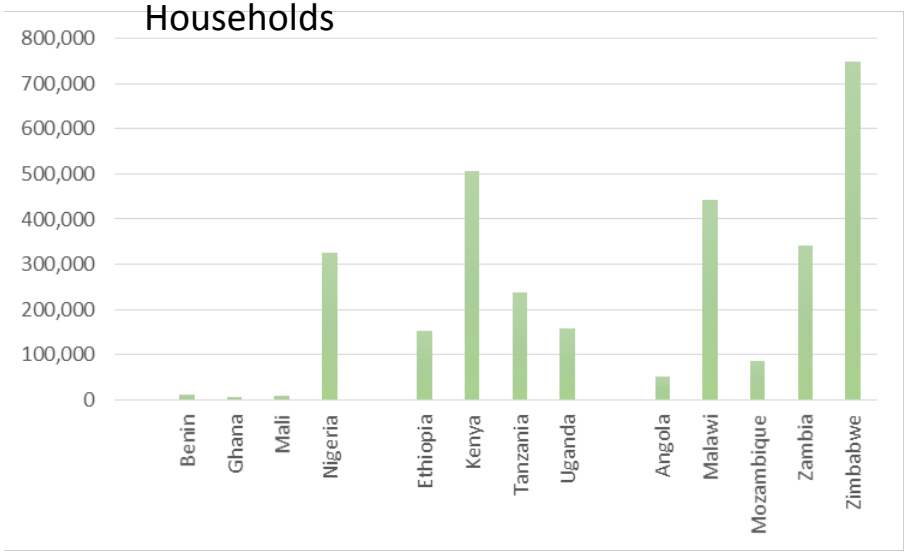
Scaling up

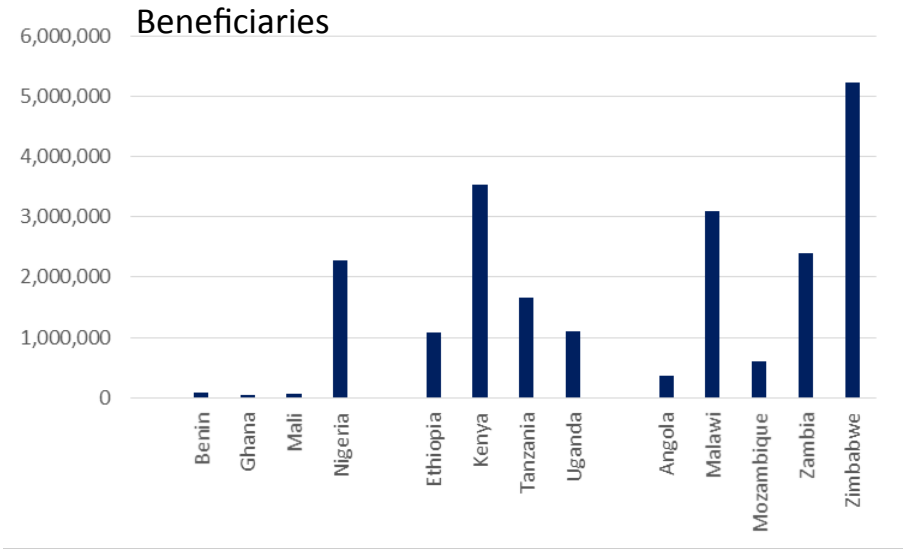


T. Abate

Scaling up



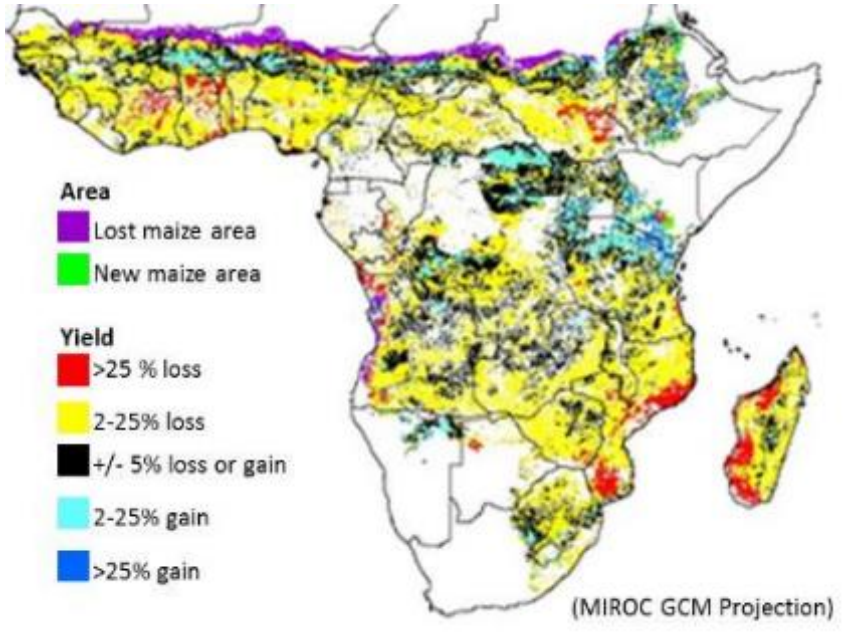




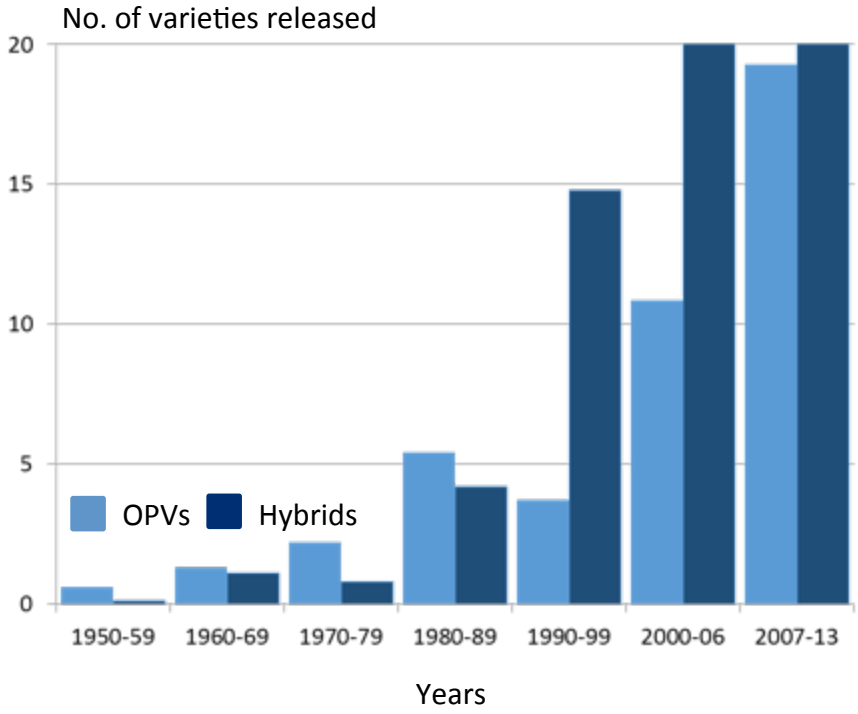
Shiferaw et al. 2014

Changing the system

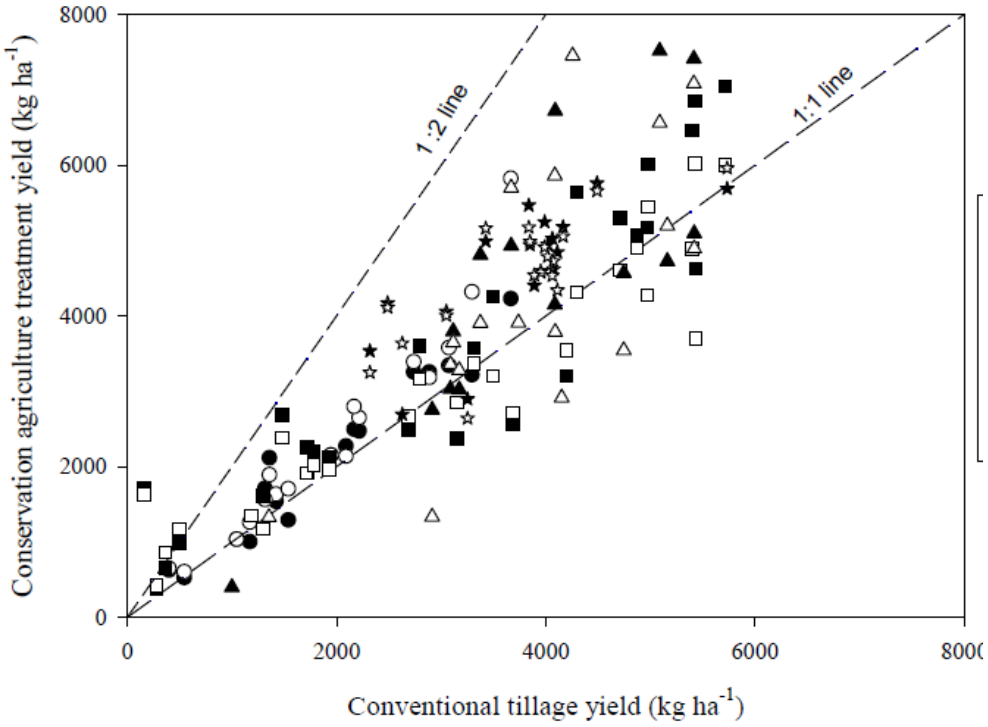
Potential yield losses under climate change…



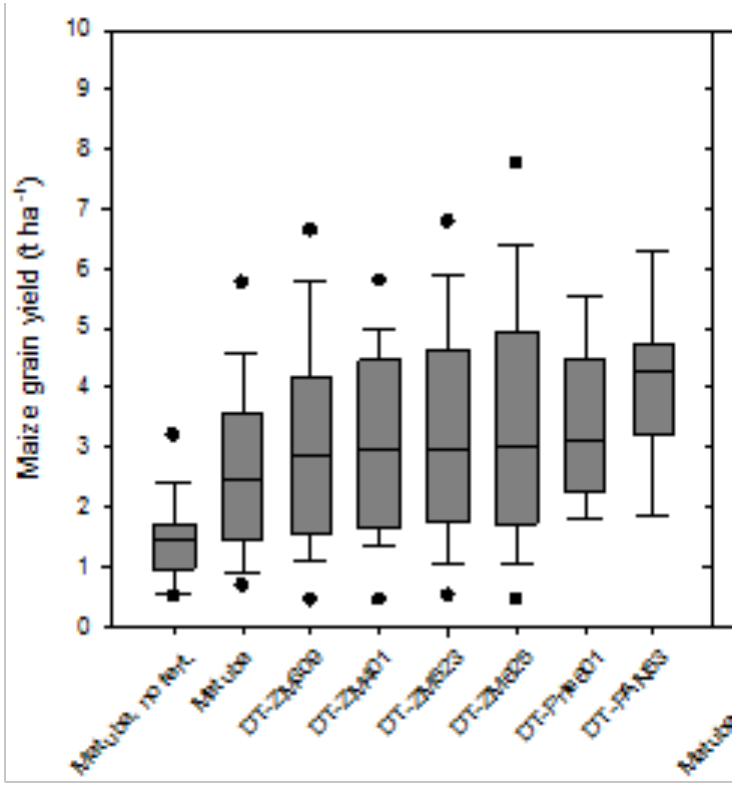
Tesfaye et al. 2015



Sustainable Intensification

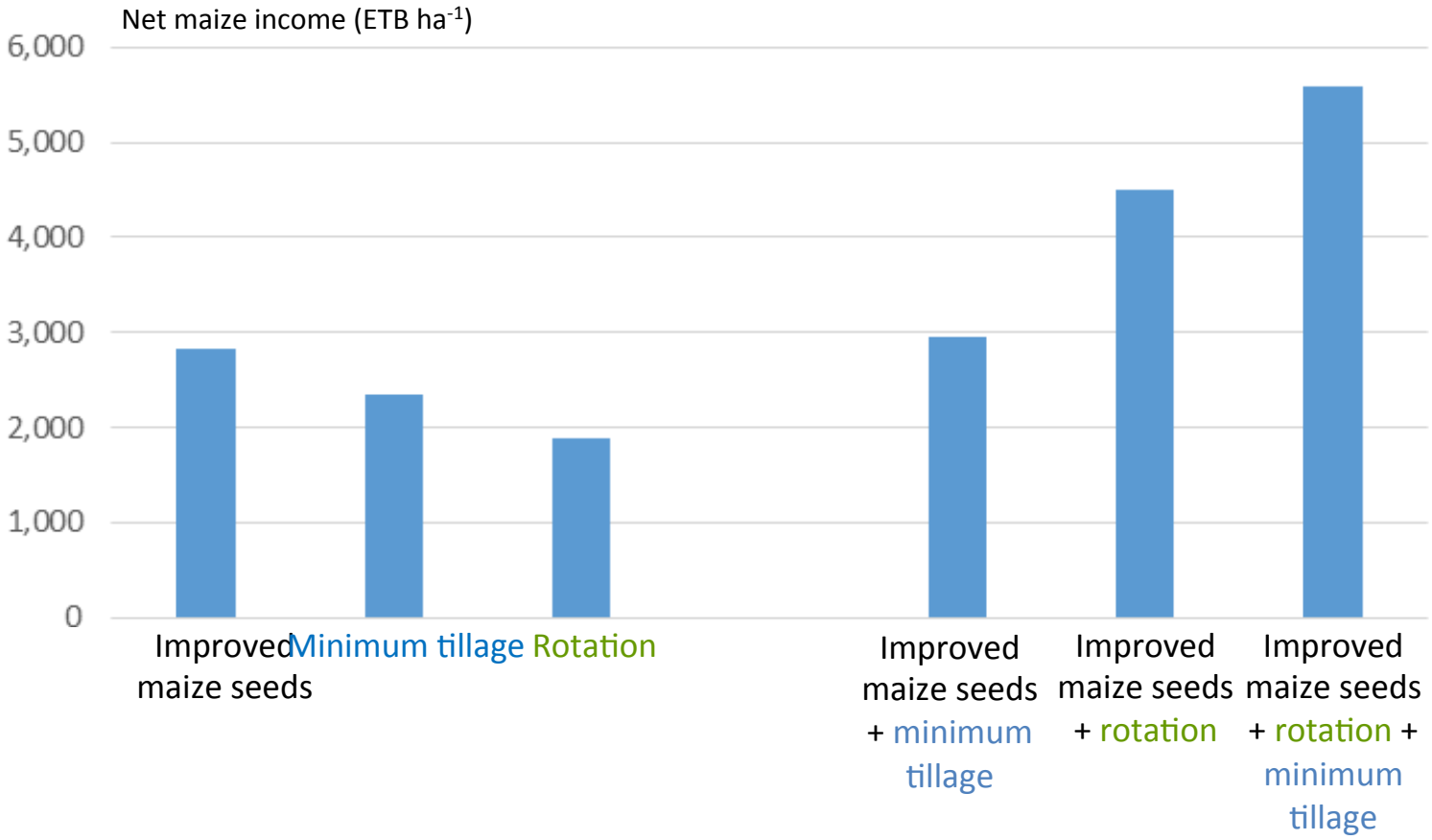


Rusinamhodzi and Thierfelder, 2014



Thierfelder et al, 2014

Combining technologies – genetics and sustainable intensification

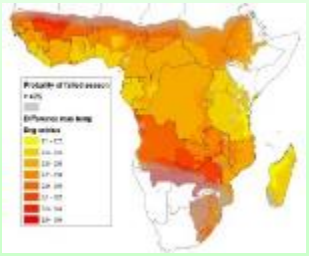


SIMLESA Sustainable Intensification of Maize-Legume Systems for Food Security in Eastern and Southern Africa

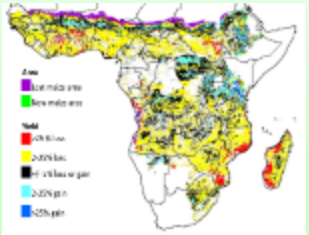
Shiferaw et al. 2014

Combining technologies: targeted action

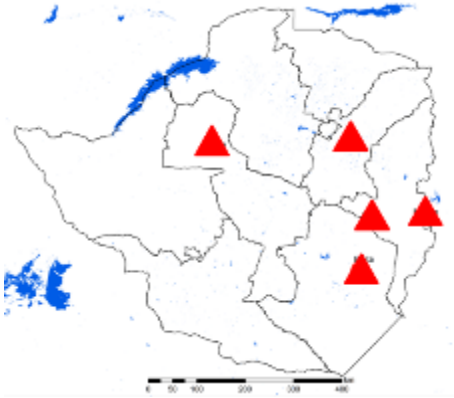
Hotspots of climate vulnerability



Climate change scenarios



Modeling yield changes



Conclusions

Maize yields in sub-Saharan Africa are low and likely to further decrease under climate change without appropriate interventions

Near and long term adaptation strategies, based on climate projections, will be essential to offset potential losses in maize production

Genetic and management interventions are being used to raise yields and reduce yield variability

CCAFS

BILL & MELINDA GATES foundation

USAID FROM THE AMERICAN PEOPLE

CGIAR RESEARCH PROGRAM ON Maize

FARM D

Forum for Agricultural Risk Management in Development

WEBINAR SERIES

Q&A

Strengthening and Enhancing Seed Systems to Better Manage Agricultural Risk

Washington DC, United States, January 14th , 2015