



Diversity in Maize Production Environments and Practices in Kenya

Introduction and Conference Overview

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Outline

- Introduction
- Maize Productivity and Input Use
- The Kenya Maize Seed market
- Background on project/study
 - ❖ Project Highlights – objectives, sample, sites, etc
 - ❖ Timelines and Partnership
- Conference objectives and program
- Acknowledgements

Introduction

- About 80% of farmers in Kenya are smallholders
 - With about 75% of agricultural production by smallholder farmers
- However, these farmers face multiple challenges that affect their production, including;
 - Climate change and variability
 - Poor and degraded soils
 - Increasing land constraints
 - Limited access and high costs of key inputs
 - Poor access to agricultural information and other services
 - Low returns to input use
 - Limited investment and constraints in access to finance
 - **Low agricultural productivity**

Introduction contn

Agricultural Productivity

- From the concept of agricultural transformation
 - Increased ag productivity key to food security & poverty reduction
 - Stimulation/development of the non farm sector through growth of linkages
- However, agricultural productivity low/stagnating in Kenya/SSA despite huge potential.
- Major impediment is lack of/low use of productivity-enhancing inputs e.g, chemical fertilizers, improved seed and pesticides due to:
 - Unavailability of liquid capital to finance such expenditure
 - Risk averse nature of small scale farmers
 - Low returns to input use
- Yet both credit and crop insurance markets are lacking/missing

Introduction contd

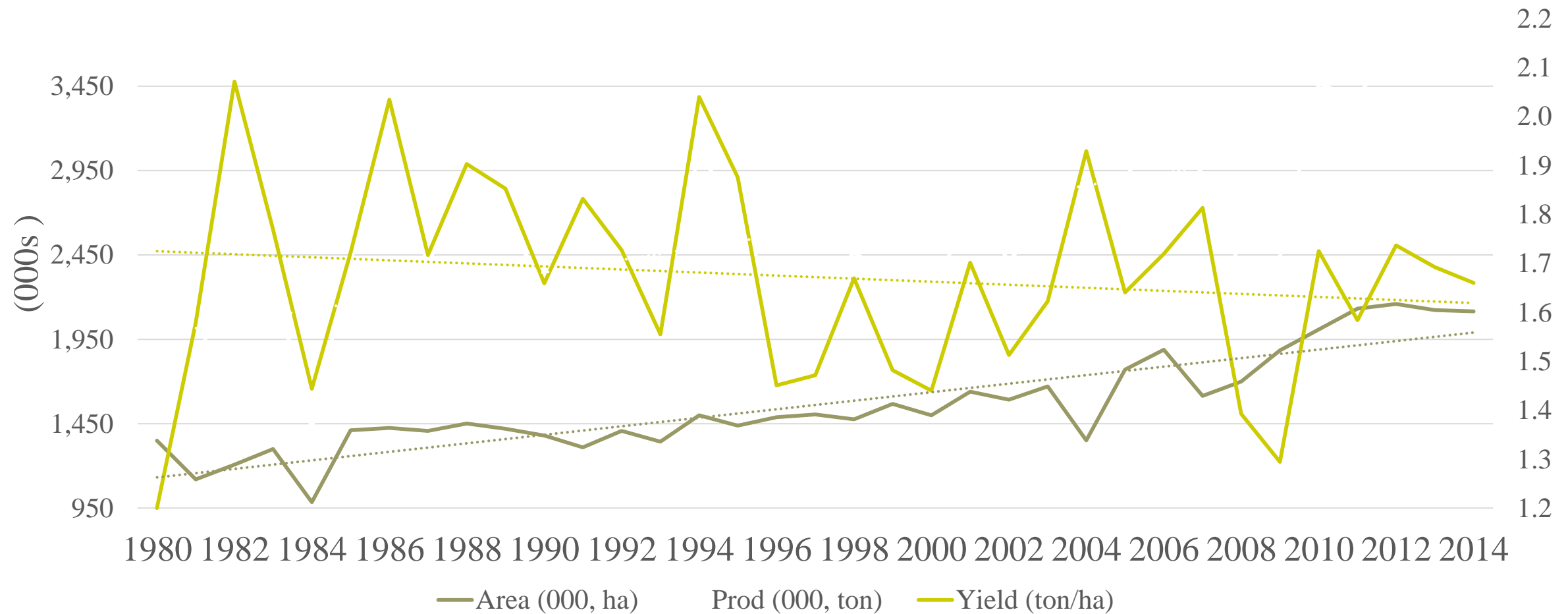
- Most affected are food crops that lack the institutional support sometimes available for cash crops
- Maize is the one of the most important crop in Kenya
 - 40% of total crop area in Kenya (ERA, 2015)
 - Main staple food for most of the population
 - 65% of staple food calories (Mohajan, 2014)
 - Produced by a large majority of smallholder farmers
- Low/stagnating yields
 - Productivity way below potential --- about 1.6 Tonnes/Ha

Introduction contn

- Technology adoption key to increasing ag productivity
- For maize, improved seed is key
 - Most important input in addition to land
- Kenya with relatively high adoption of improved seed among SSA
 - Expected gains yet to be realized
- Optimal benefits depend on other complementary inputs e.g. fertilizer
 - Complementarity in Production

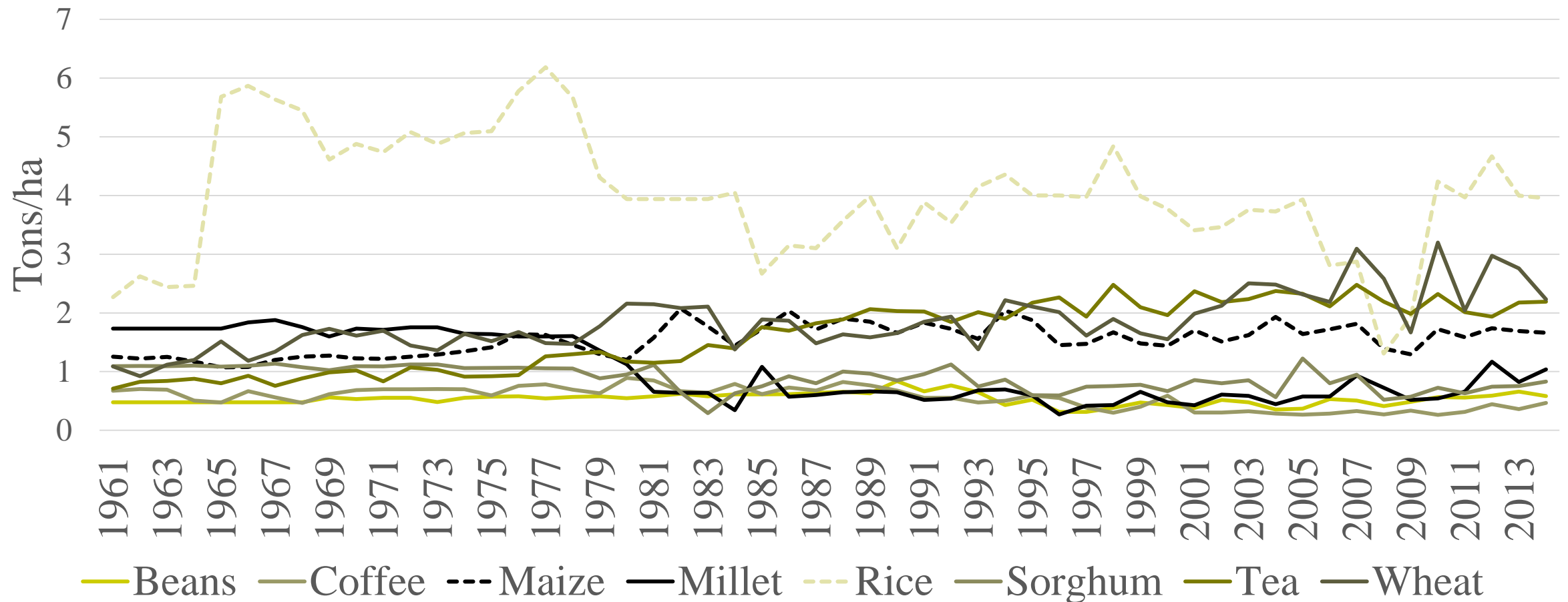
Maize Productivity and Input Use

Trends in maize production in Kenya



Source:
FAOSTAT

Trends in Productivity for Major Crops



Trends in Maize Hybrid Adoption by Agro-Regional Zone

Agro-regional zone	2000	2004	2007	2010
Coastal lowlands	27.7	-	33.8	38.2
Eastern lowlands	35.5	17.1	51.4	84.4
Western lowlands	21.6	16.9	29.7	37.8
Western transitional	75.2	75.0	86.1	89.6
High potential maize zone	89.1	89.4	93.9	97.6
Western highlands	79.7	75.0	82.7	84.4
Central highlands	86.7	78.8	83.3	91.7
Marginal rain shadow	73.5	50.0	61.8	91.2
Overall Sample	68.1	61.1	73.1	82.0

Source: Tegemeo Panel Data



Maize Seed Type by Agro-ecological zone

Percentage of farmers using

AEZ	Purchased/new			
	hybrid	Retained hybrid	OPV	Local variety
Coastal Lowlands	27.7	3.1	0.2	69.1
Lower Highlands	92.5	1.3	0.2	6.1
Lower Midlands 1-2	65.4	0.9	0.0	33.7
Lower Midlands 3-6	61.7	5.7	0.7	31.8
Upper Highlands	81.8	3.6	0.5	14.1
Upper Midlands 0-1	71.7	0.5	0.0	27.8
Upper Midlands 2-6	87.2	1.7	0.0	11.1
Overall	72.6	2.3	0.2	24.8

Trends in fertilizer use

Agro ecological zone	2000 %using	2004 %using	2007 %using	2010 %using
Coastal Lowlands	4.6	7.4	12.3	14.9
Eastern Lowlands	32.6	49.3	54	57.4
Western Lowlands	5.4	6.1	11.5	14.9
Western Transitional	64.8	72.2	81.8	79.9
High Potential Maize Zone	90	88.4	92	89.3
Western Highlands	85.9	91.3	94.5	93
Central Highlands	90.3	92.1	90	87.6
Marginal Rain Shadow	8.8	2.9	14.7	8.8
Overall	63.1	66.4	70.2	69.3

Source: Tegemeo

Fertilizer use intensity

Agro ecological zone	2000	2004	2007	2010
	Kg/acre	Kg/acre	Kg/acre	Kg/acre
Coastal Lowlands	10.46	2.67	10.74	15.79
Eastern Lowlands	20.6	17.8	19.26	44.57
Western Lowlands	18.25	11.5	16.05	39.46
Western Transitional	77.72	65.34	77.65	74
High Potential Maize Zone	67.15	74.69	75.59	75.91
Western Highlands	41.35	50.28	53.56	75.05
Central Highlands	84.86	91.56	66.87	68.23
Marginal Rain Shadow	19.5	16	37.75	16.39
Overall	66.01	68.58	63.68	68.79

Source: Tegemeo

Classification of Maize Hybrid Use by Region

Agro regional zone	Consistent users	Inconsistent users	Consistent Non-users
Coastal Lowlands	-	72.5	27.5
Eastern Lowlands	5.8	79.9	14.4
Western Lowlands	3.4	53.7	42.9
Western Transitional	61.5	30.8	7.7
High Potential Maize Zone	78.3	21.4	0.3
Western Highlands	60.9	32.0	7.0
Central Highlands	68.6	27.6	3.8
Marginal Rain Shadow	29.4	64.7	5.9
Total	49.6	39.4	11.0

Source: Tegemeo Panel Data

Classification of Fertilizer Use by Region

Agro regional zone	Consistent users	Inconsistent users	Consistent Non-users
Coastal Lowlands	-	42.0	58.0
Eastern Lowlands	28.1	36.7	35.3
Western Lowlands	1.4	21.1	77.6
Western Transitional	49.0	44.1	7.0
High Potential Maize Zone	80.5	16.1	3.4
Western Highlands	77.3	21.9	0.8
Central Highlands	77.8	20.5	1.7
Marginal Rain Shadow	-	35.3	64.7
Overall	53.7	25.8	20.5

Source: Tegemeo Panel Data

Classification of both Maize Hybrid & Fertilizer use by Region

Agro regional zone	Consistent users	Inconsistent users	Consistent Non-users
Coastal Lowlands	-	37.7	62.3
Eastern Lowlands	3.6	53.2	43.2
Western Lowlands	-	13.6	86.4
Western Transitional	39.2	49.0	11.9
High Potential Maize Zone	68.4	26.6	5.0
Western Highlands	60.2	31.3	8.6
Central Highlands	59.0	35.1	5.9
Marginal Rain Shadow	0.0	23.5	76.5
Overall	40.9	33.4	25.7

Source: Tegemeo Panel Data

Improved maize seed use by AEZ

	% using improved seed	Intensity of improved seed use (Kgs/acre)	% of acreage under improved seed
Coastal Lowlands	28.1	4.4	25.4
Lower Highlands	94.2	9.9	93.7
Lower Midlands 1-2	65.1	9.0	62.9
Lower Midlands 3-6	67.2	6.9	64.7
Upper Highlands	79.3	10.5	78.2
Upper Midlands 0-1	66.6	9.8	64.9
Upper Midlands 2-6	89.4	8.6	88.3
Overall	76.7	8.8	75.2

Source: Tegemeo, 2014

Maize hybrid seed market

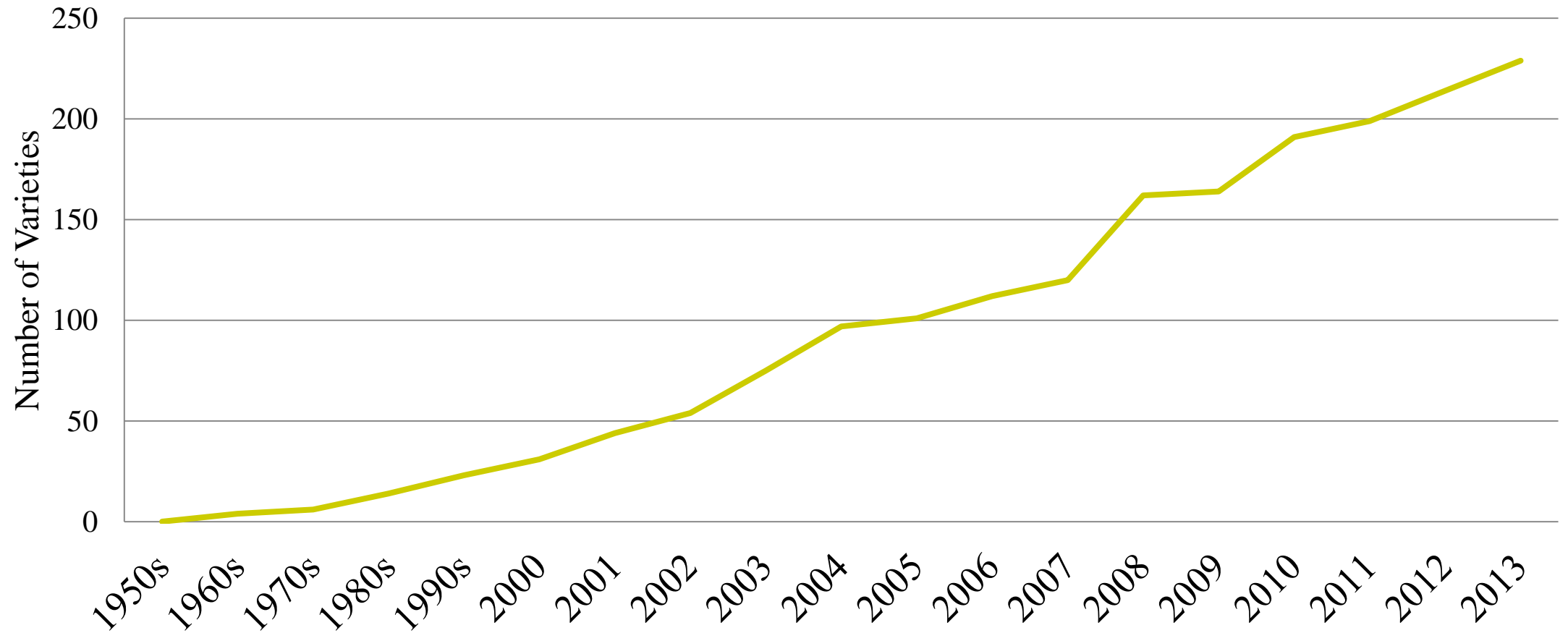
Popular varieties among smallholder farmers

Maize hybrid	Year of release
614	1986
513	1995
Duma 43	2004
Pioneer	2002/03 ?
6213	2001

Source: Tegemeo, 2010

Source: KEPHIS, 2014

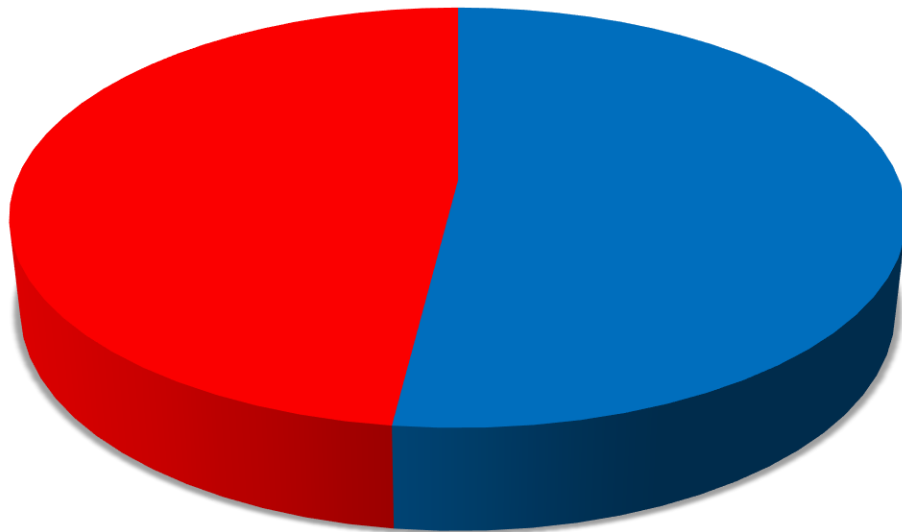
Maize varieties released to the market



Source: KEPHIS, 2014

Maize seed market

Source of maize hybrids



■ Public Sector ■ Others

- Public sector (KSC) controls a large share of the seed market
- Incentives/support by govt e.g. subsidies

The RCT Maize Project

- Gap/why ?
 - Low use of maize hybrids/productivity in mid altitude
 - Unmet demand?
 - Supply side constraints?
 - Low returns ?
- WSC developed a maize hybrid for mid-altitude
- The study components/objectives included:
 - Track adoption behavior of smallholder farmers
 - Identify constraints to adoption
 - Use of complementary inputs e.g. fertilizer
 - Credit constraints
 - Soil quality
 - Productivity gains due to adoption
 - Performance in different mid altitude zones
 - Effects on household welfare

Sample and Study Areas

County	Central	Western
Homabay		200
Kakamega		200
Siaya		500
Migori		200
Nakuru		100
Kiambu	50	
Kirinyaga	200	
Meru	100	
Embu	100	
Muranga	150	
Total	600	1200

Timelines & activities

- Project period: 2012 to 2016
- Data Collection (Surveys):
 - Baseline – 2013
 - Midline – 2015
 - Endline – 2016
 - Phone surveys (in between the household surveys)
- Key components/treatment
 - Seed information
 - Soil test (soil quality information)
 - Fertilizer (blended)
 - Seed access/distribution

Project Partners

- Research team:
 - Tegemeo Institute –Egerton University
 - University of California, Davis
- Seed company: Western Seed Company
- Partners/Donors:
 - ACUMEN FUND
 - USAID (BASIS Innovation Lab)
 - BMGF (ATAI)

Conference Objectives

- Present research findings to stakeholders
 - Elicit debate and feedback from the participants
 - Provide a forum for open discussions

- Lay some background for a wider discussion on policy options/interventions
 - Increase adoption of technology
 - Improve maize productivity for food security and hh welfare

Program

Theme: *“Enhancing Smallholder Productivity in Kenya: Evidence From a Randomized Controlled Trial of New Seed Varieties”*

Morning Session	Opening
	Session I: Maize Production Environments & Practices
	Session II: Technology Adoption among Smallholder Farmers
	Session III: Panel Discussion: Agricultural Innovations
Lunch Break	
Afternoon Session	Session IV: Constraints to Maize Productivity
	Session V: Round table: Improving Precision & Efficiency of Ag Data

Acknowledgements

- Support from various organization and institutions are recognized
 - Research Partners
 - UC Davis
 - Acumen Fund
 - WSC
 - Donors – USAID (BASIS), BMGF (ATAI), among others
 - Farmers who provided information/data
 - Government of Kenya --MoAL&F, County Governments, KSC
 - Other Universities/ Research organizations
 - Private sector – MEA Ltd, CropNuts, etc
 - Civil Society esp farmer organizations Farmers & other actors
- Most of all appreciation to you all for being part of this important conference



Thank You

