From Research to Impact: Utilizing Agricultural technologies, Innovations and practices for Gender and Economic Empowerment in the Dry land areas of Kenya

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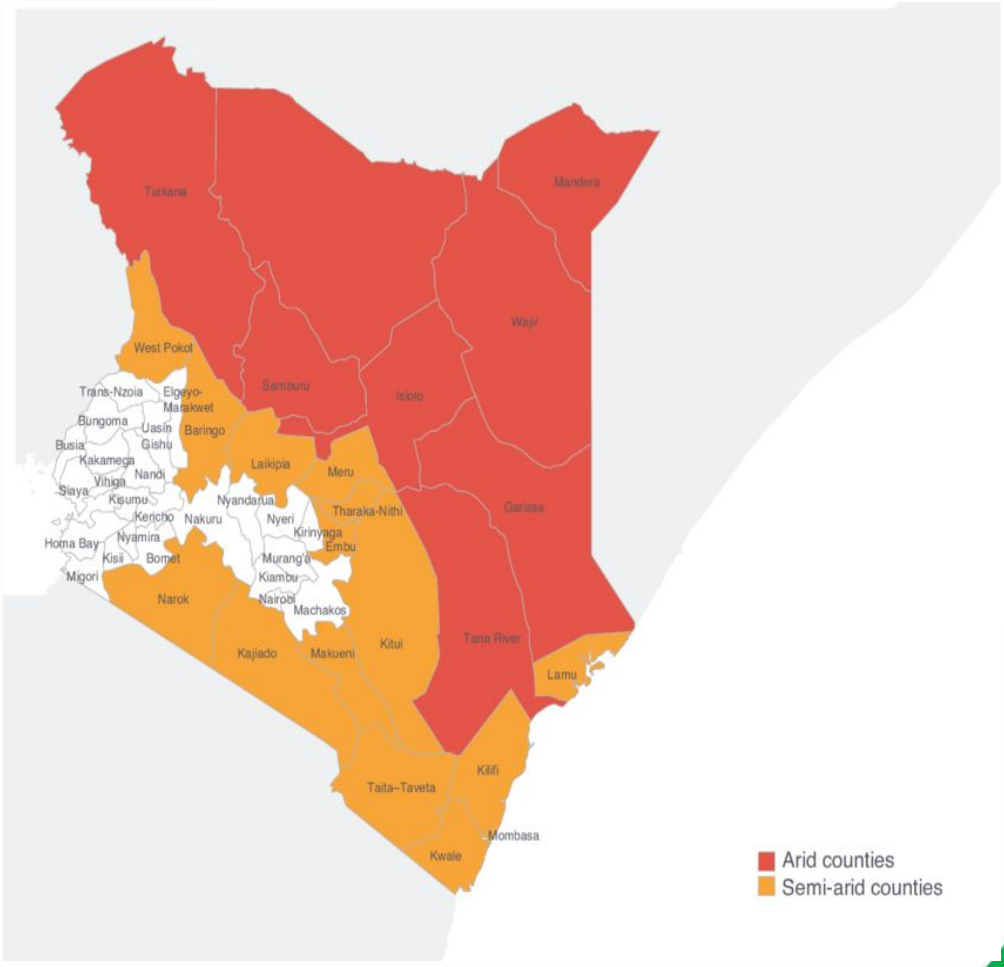
Introduction

- ✔Kenyan drylands comprise 89% of the countries land area (29 counties)
- ✔Approximately, 16 million people live in the arid and semi-arid (ASAL) counties of Kenya
- ✔Face climate variability, drought and land degradation community dependence, water scarcity and economic hardships
- ✔Low precipitation- 200-500 mm per annum; water availability <1,300 cubic meters/ person/year against > 2000 cubic meters/person/year

Map of drylands of Kenya



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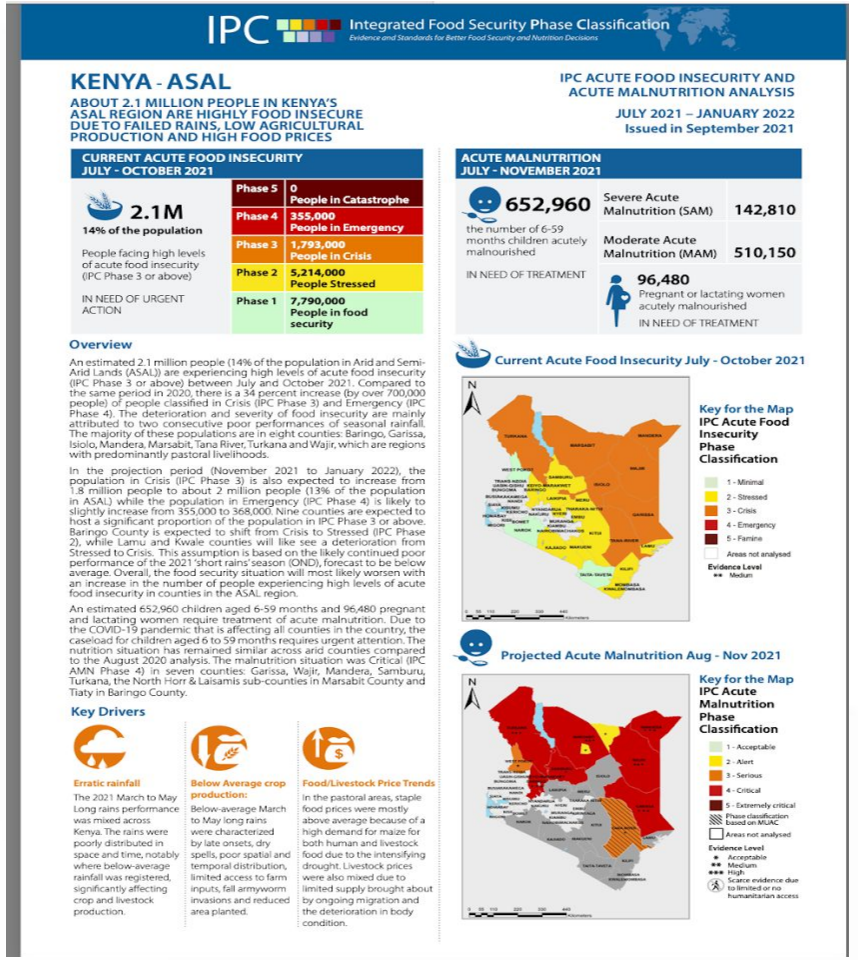
Challenges in Africa Drylands

People in the ASAL areas experience

- ✔Food insecurity and malnutrition: **About 2.1 million people in Kenya's ASAL region are highly food insecure, Over 650,000 children under 5 and over 96,000 pregnant or lactating women are acutely malnourished (IPC 2022);**
- ✔Reduced productivity of croplands
- ✔Adversely impacts on human wellbeing in drylands
- ✔Impacts achievements of Sustainable Development Goals (SDG1, SDG2, SDG3, SDG4,SDG5)



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Our Research Group Overarching Goal to address Food systems production challenges

To carry out Research, extension, outreach and dissemination to build resilience among small-scale farmers

Objectives

✔ Research on Crop improvement and breeding initiatives

- Variety development (key stresses; Abiotic and Biotic); Multi-use end-user preferences; Food, fodder and feed; generate data and knowledge and collaborate with partners to make it available

✔ on-farm innovation/technology testing and validation

- Good agronomic practices and post harvest; Deploy climate Smart Agriculture (CSA) technologies Validated climate-smart agriculture technologies from our partners

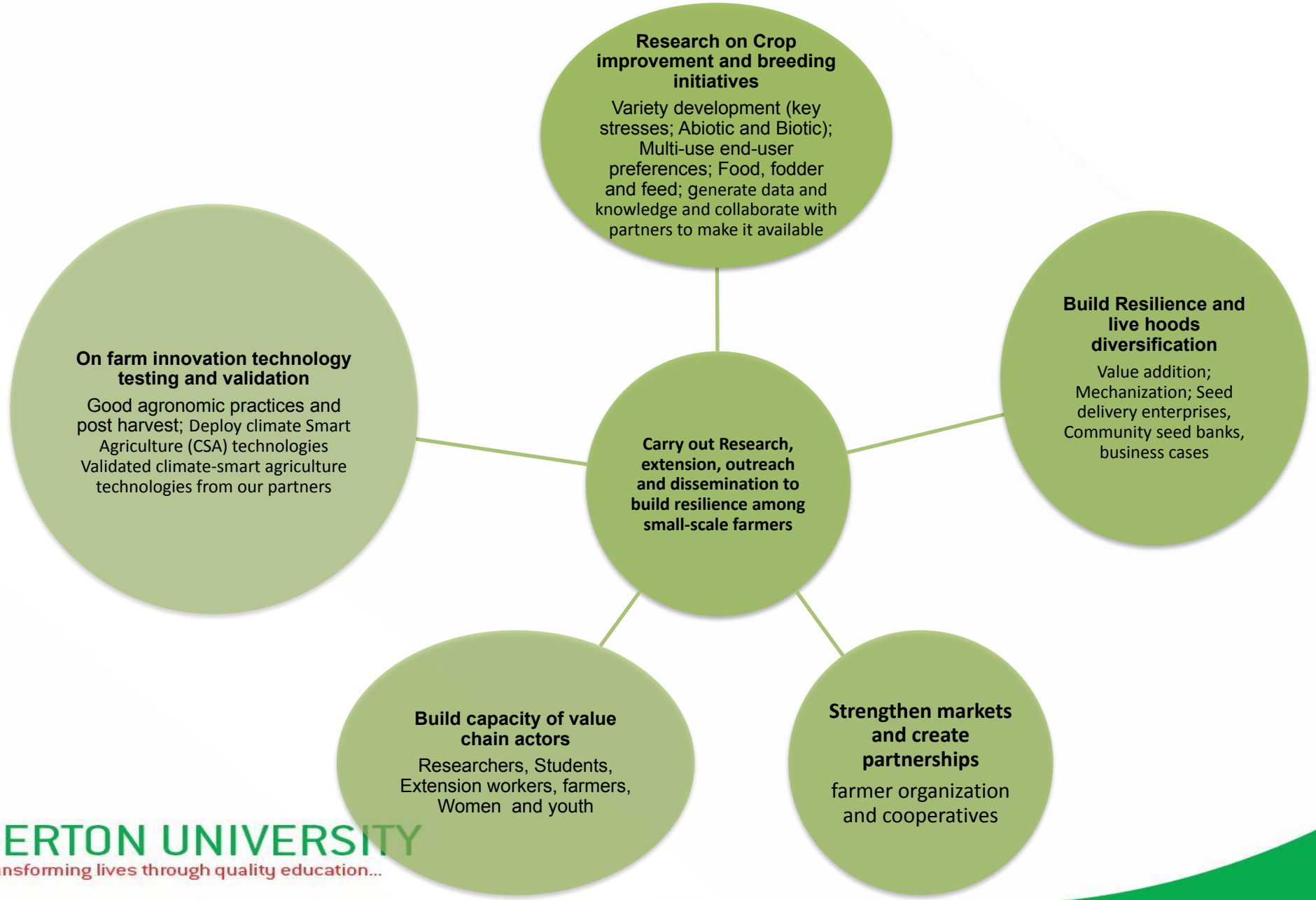
✔ Build up capacity of value chain actors

✔ Researchers, Students, Extension workers, farmers, Women and youth

✔ Resilience and live hoods diversification through product adoption

- Value addition; Mechanization; Seed delivery enterprises (small seed packs donations, Community seed banks);Strengthen markets and reduce inefficiencies through farmer organization; Create partnerships and mobilize resources for Research, extension, outreach and dissemination to promote technology adoption and build resilience

Our Research Group Overarching Goals to address Food systems production challenges



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Our approach to innovative Agricultural Technologies-Selected examples

- **High yielding better-resilient drought tolerant crop varieties**
  - efficient breeding technologies deployed, validated for enhanced productivity through preferred seed systems
- **On-farm and production solutions**:
  - Increased smallholder agricultural productivity and increased incomes
- **Facilitate market linkages**:
  - Facilitated aggregation and end-to-end produce delivery systems and post-harvest losses reduced.
- **Weather Information for early warning and decision support**
  - National weather data delivered and to trigger coordinated responses, decisions and actions about variety, agronomic timing and choices by small holder farmers:
  - Strengthened and enhanced climate information systems through Kenya National Meteorological stations for early warning and decision support reaching the poorest and most vulnerable. Using Digital platforms eg phones
- **Increase resilience;** Food and fodder security among poor households contributing to food, feed and reduced conflicts, reduced migration
- **Target regions** 9 counties in Kenya; Rift valley (Laikipia, Baringo, Elgeyo Marakwet, Turkana,), Central (Nyeri), Eastern (Tharaka Nithi, Makueni and Kitui)

Targets crops

Finger millet

Sorghum

Pearl Millets

Pigeon peas

Peanut

Beans

African Indigenous vegetables

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Case 1: Extension and Advisory Services Provision in the Bean Value Chain in Laikipia and Nyeri Counties

Approach

- Introduced high nutritious beans varieties
  - Dual purpose for food and feed
- Drought screening
- Farmer participatory trials under drought
- Demos and on-farm training :
  - Good agronomic practices (Seed rates, innoculants, density, protection)
- Group marketing to reduce broker exploitation.
- Focus on Youth- job creation

Training and establishment of farmer field schools by grassroot partners

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Impact in 3 years

Production

- Improved production from a baseline of 2.25 bags per acre to 6-8 bags per acre
- 20 New and existing improved varieties evaluated and adopted (Nyota, Chelalang, KB1, KK8, KB1)
- 8 Community Seed systems established

Capacity building

- Total number of farmers reached 4,000 directly; 10642 indirectly
- 130 Extension officers trained and 268 community trainers/ToTs (grassroot partners)

Case 2: Support to Capacity Building of Elgeyo Marakwet and Turkana Counties Extension Systems for Strengthening of the Groundnuts, Sorghum, Cowpea and Oil Crops Value Chains

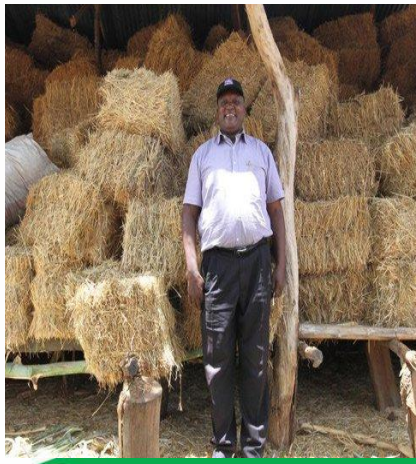
Objectives

- conduct a reconnaissance survey
- Assess the suitability of irrigated/agricultural areas for production of selected crops training to build the capacity of extension staff, conducting crop variety trials, cost benefit analysis of selected agricultural enterprises
- Co-create crop-livestock integration strategy for food security and peace
- Support to the establishment of community-based seed systems and value addition business cases
- Assess agricultural mechanization potential in the target areas
- Support the county government develop a groundnut strategic plan

Adoption of varieties in Turkana, Elgeyo Marakwet and Baringo

- Training of 1500 farmers approximately 3,000 acres established.
- Focusing on youth involvement by creating income generation activities for food, feed and peace
- Preservation and conservation of fodder for drought season
- Dual purpose sorghum-variety IE 12991
- Community enclosure for dry season
- Improved pastures grasses
- Fodder Biomass (2600 bales

Involvement of youth in the groundnut value chain



Conservation for dry season

ELSEVIER

Journal of Arid Environments
Volume 200, May 2022, 104714

Determinants of quality-based payments for livestock in conflict-prone areas in Kenya

John Mugonya [a], Michael Hauser [a, b]

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Food-water nexus: Potential of scaling out for commercialization in Turkana County

Status of the irrigation canals in 2022

Site	Variety	Beneficiaries	Available land (acre)	Targeted acreage for g/nut	amount of seeds required (kg)	Expected yield in tonnes	Type of Irrigation
Katilu	EUGN-1	2000	1800	200	6000	270	Canal
Nadoto	EUGN-2	1500	500	100	3000	135	Canal
Nanyee	EUGN-2	500	250	50	1500	67.5	Canal
Natira	EUGN-2	50	2	1	30	1.35	Drip
Kalobeyei	EUGN-2	1500	20	10	300	13.5	Waterpan-5
Komudei	EUGN-2	2000	100	50	1500	67.5	Waterpan-1
Nasinyono	EUGN-2	750	350	50	1500	67.5	Flood/spate
Lokubae	EUGN-1	4000	2000	50	1500	67.5	Canal
Morulem	EUGN-1	3000	1500	100	3000	135	Canal
Katilia-Elea	EUGN-1	3000	1500	100	3000	135	Canal
TOTAL		**18300**	**8022**	**711**		**110**	

Production under irrigation doubles the impacts in households, Area, yields, reduction conflicts

Impact of the project on the Policy makers and County Governments

- Launch of Turkana county Groundnut strategy

- Contributed to Turkana County first comprehensive Agricultural Policy
- Launch of Turkana county Agricultural training center and Agricultural Mechanization Strategy

Case 3: Addressing food safety challenges in African informal sector through Innovative strategies and use cases

- We are using sustainable aflatoxin management through breeding, capacity strengthening and Food Convergence Innovation approach.

- The most aflatoxin-contaminated products are maize and peanuts.

- A large proportion of peanuts in the country (44%) are traded through informal markets which are not easily regulated by KEBS.
- 71.8% of products from formal markets (supermarkets) are safe according to KEBS and the EU regulatory limits, while only 52% from informal markets met this threshold

Occurrence of Aflatoxins in Groundnuts (Arachis hypogaea L.): A Case Study of Four Counties in Kenya

Philip Sitienei, Paul Kimurto, Isabel Wagara, and Meshack Obonyo

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Article In Press Abstract

Aflatoxins are highly toxic compounds produced mainly by Aspergillus section Flavi on a wide range of food commodities, including groundnuts. Infestation occurs during both the pre-harvest and post-harvest stages of crop production, which has affected the quality and safety of groundnuts and groundnut-based products. The objective of this study was to determine total aflatoxin concentration in groundnut samples collected from farmers in four major groundnut growing regions of Kenya, the Rift Valley (Baringo and Elgeyo-Marakwet Counties) and Western region (Bungoma and Siaya Counties). A total of forty groundnut samples were evaluated for total aflatoxin concentration using an enzyme linked immunosorbent assay (ELISA). Data were analyzed using one-way analysis of variance (ANOVA) and means separated by Duncan's Multiple Range Test. All samples except one were positive for aflatoxin contamination. The total aflatoxin levels in the positive samples ranged between 0-113 ppb. Results indicated relatively low levels of total aflatoxin in samples from Baringo and Elgeyo-Marakwet Counties (2.12 ppb on average) that are fit for human consumption based on 10 ppb required by Kenya Bureau of Standards (KEBS) guidelines. However, high levels of total aflatoxin (12.88 ppb on average) were detected in samples from Bungoma and Siaya Counties. There was significant

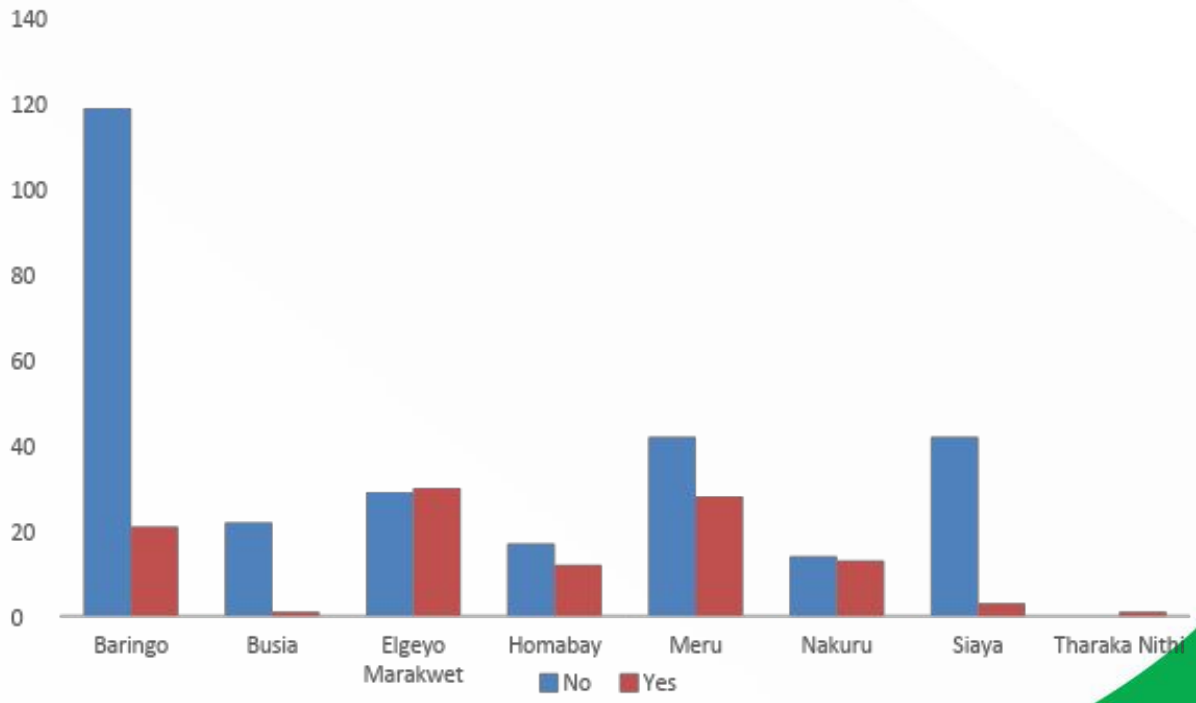
Farmer Knowledge and utilization of Aflatoxin reduction strategies

- 63.3% reported to have knowledge on the practices to reduce exposure to aflatoxins.

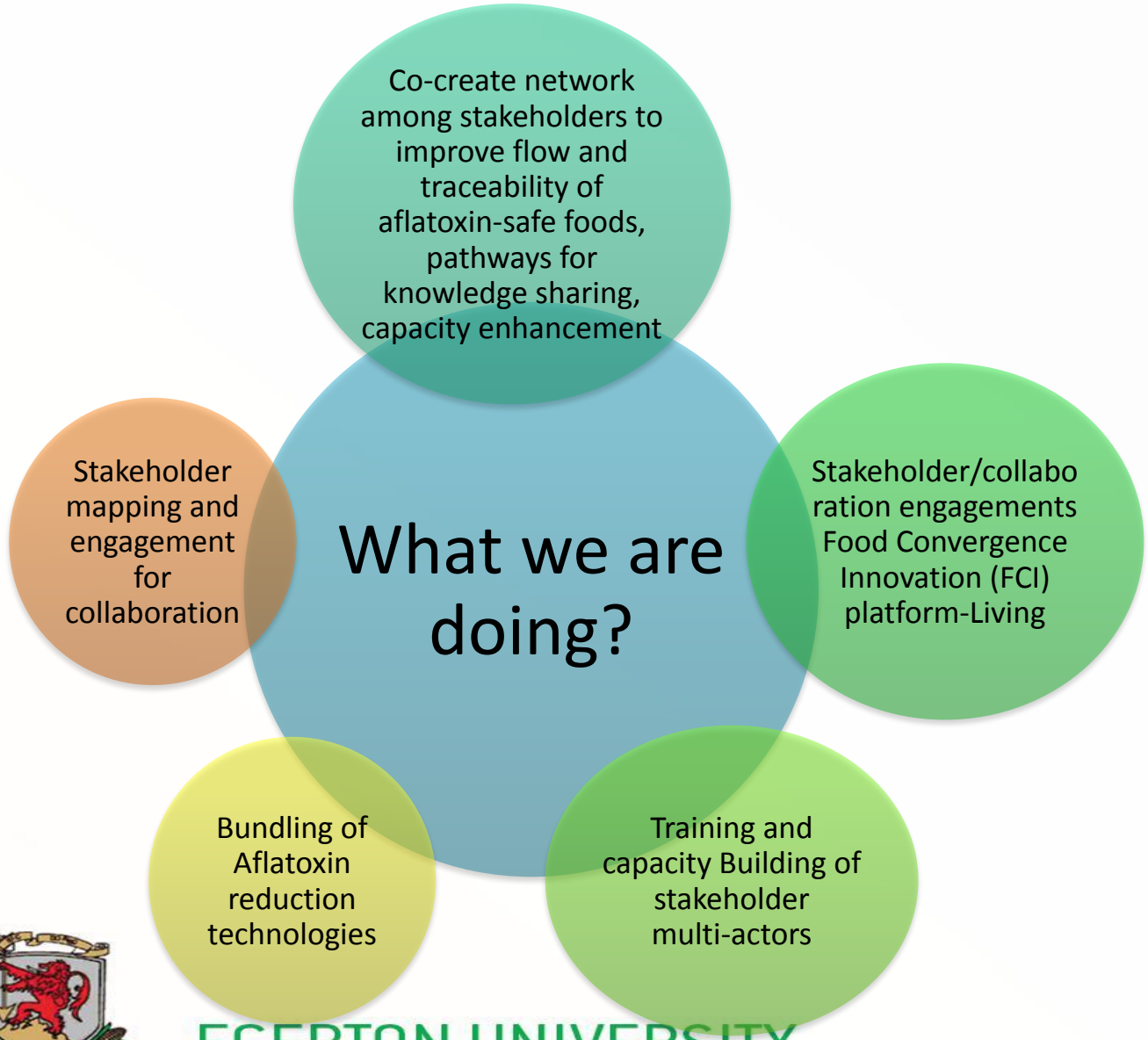
County	%
Baringo	62.4
Elgeyo Marakwet	54.8
Meru	72.9
Homabay	80
Nakuru	77.8
Siaya	48.9
Busia	52.2
Tharaka Nithi	Repeating the survey

Farmer knowledge on Aflatoxin Management strategies

% No. of farmers utilizing Aflatoxin reduction technologies, innovation and practices



What we are doing?



Stakeholder engagement, technology distribution and demonstration

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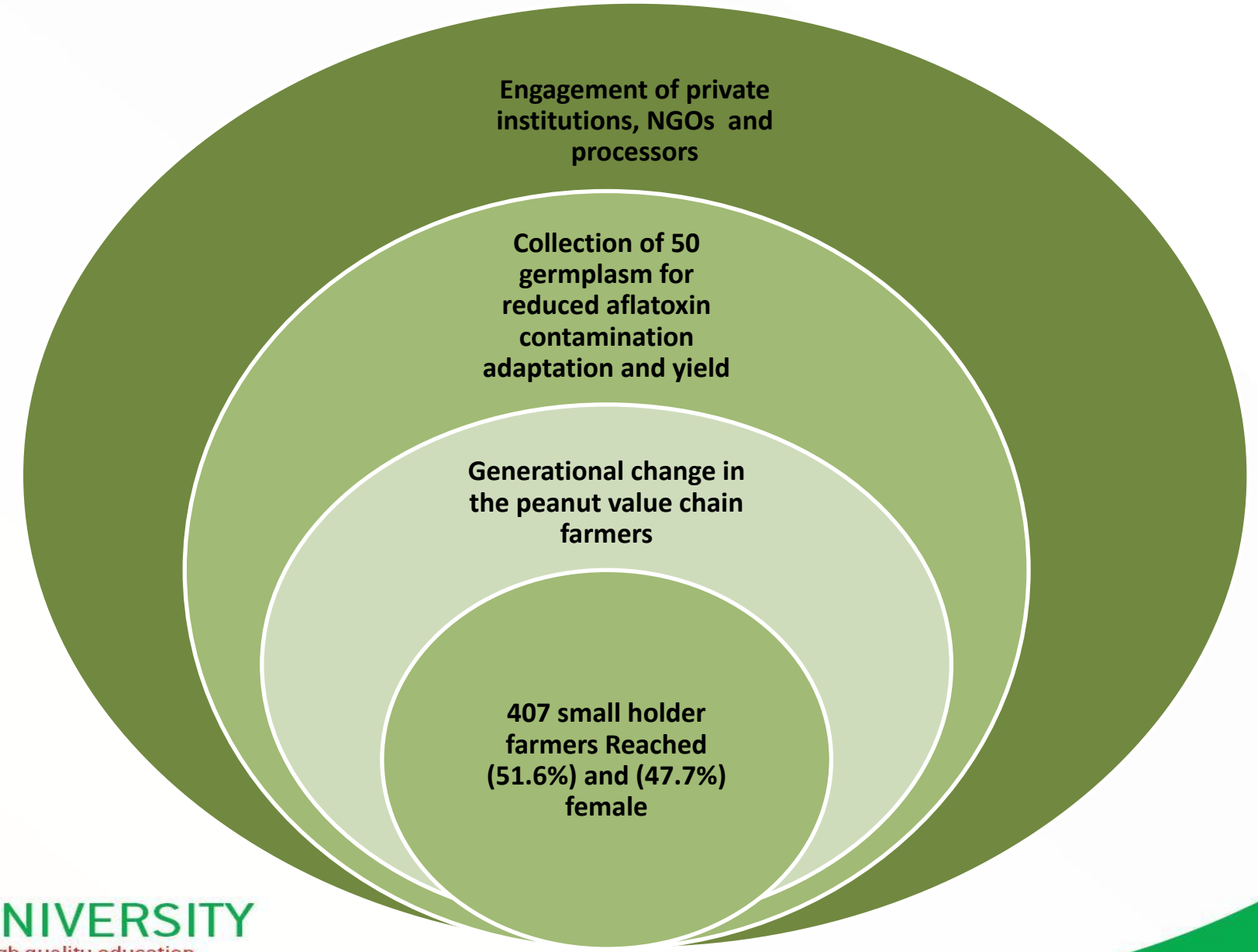
Project Outcomes



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Women economic empowerment through livelihood diversification

- All women trainings on value addition and product development
- Certified seed producers
- Packaged and branded food and feed products
- Group organization for women groups for wellbeing, financial literacy and economic growth
- Formation of women led producer organization

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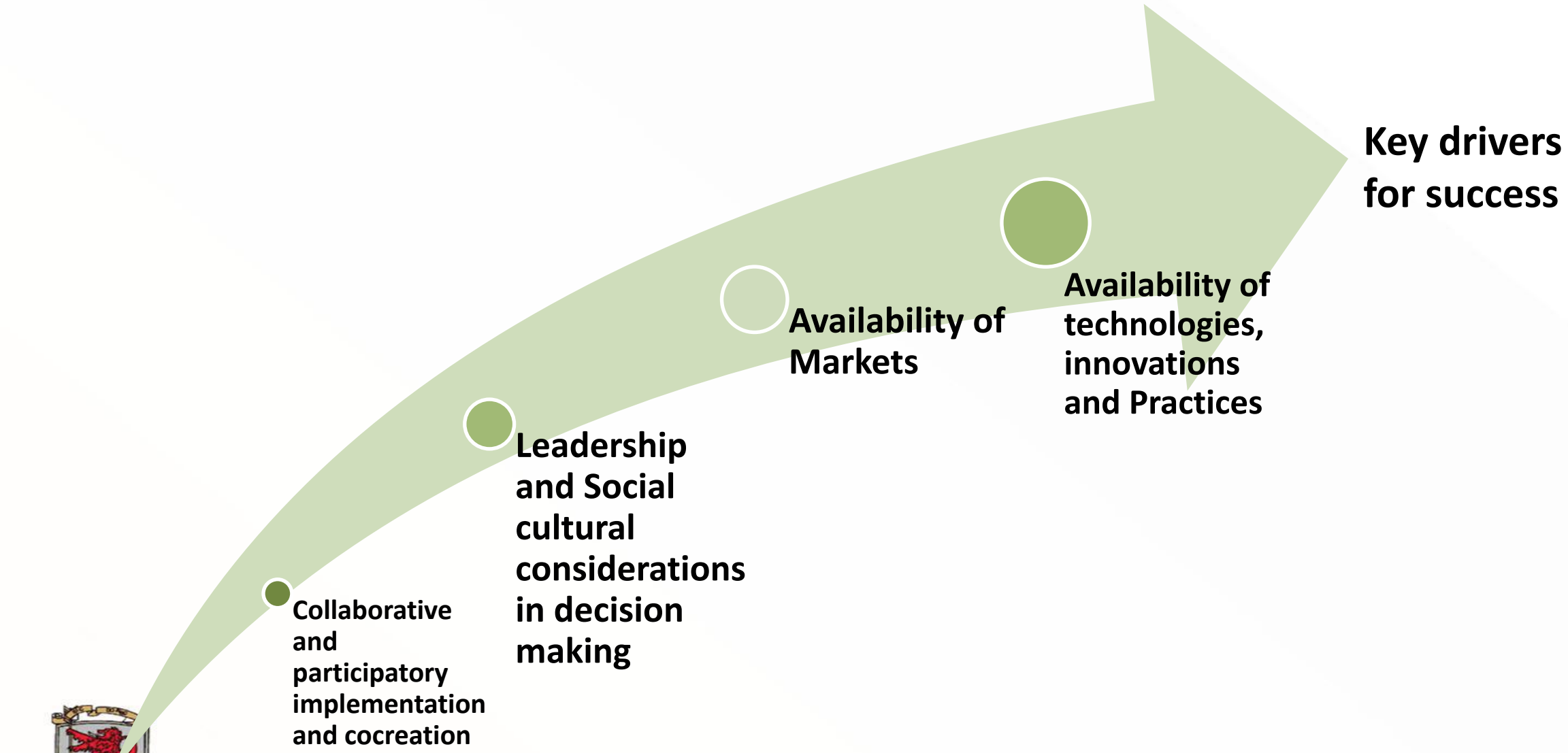
Conclusion



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Our research team

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Paul Kimurto (team leader)
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Thank you!