KALRO
Kenya Agricultural & Livestock Research Organization

1st KALRO Socio-Economics and Policy Development (SEPD) Conference & Exhibition

Building Resilient Agri-food Systems through Socio-economic and Policy Research

BOOK OF ABSTRACTS

KAFACI | AWARD African Women in Agricultural Research and Development | SAF AFRICA Sustainable Agriculture Foundation | NUTRITION in CITY ECOSYSTEMS

10-12 June 2025 | KALRO Headquarters | Hybrid Conference

1st KALRO Socio-Economics and Policy Development (SEPD) Conference & Exhibition

Building Resilient Agri-food Systems through Socio-economic and Policy Research

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DISCLAIMER

The views expressed herein are those of the authors and not those of the Kenya Agricultural and Livestock Research Organization, its partners and collaborators.

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Preface

The Kenya Agricultural and Livestock Research Organisation (KALRO) is pleased to present the Book of Abstracts for the inaugural Socio-Economics and Policy Development (SEPD) Conference, held from June 10 to 12, 2025, at the KALRO Headquarters in Nairobi, Kenya. This landmark event, themed **"Building Resilient Agri-food Systems through Socio-economic and Policy Research,"** brings together a diverse array of stakeholders committed to transforming Kenya's agri-food systems.

The conference serves as a platform for researchers, policymakers, development partners, and practitioners to exchange knowledge, forge collaborations, and propose actionable strategies aimed at enhancing the resilience and sustainability of agri-food systems. The hybrid format—combining in-person and virtual participation—ensures broad accessibility and inclusivity, reflecting our commitment to fostering comprehensive dialogue and engagement.

The abstracts compiled herein span a wide range of thematic areas, including:

- **Socio-economic Dynamics and Equity**: Exploring the roles of gender, social equity, and community engagement in shaping resilient food systems.
- **Policy and Institutional Frameworks**: Analyzing agricultural policies, market systems, and institutional behaviors that influence agri-food systems.
- **Innovations and Technological Advancements**: Investigating digital innovations, novel research methodologies, and analytical tools driving agricultural transformation.
- **Climate Change and Environmental Sustainability**: Addressing strategies for adaptation, mitigation, and sustainable resource management in the face of climate variability.
- **Agri-business and Market Development**: Examining models and strategies that enhance agricultural financing, investment, and market access.

These thematic areas reflect the multifaceted challenges and opportunities within the agricultural sector, emphasizing the critical role of socio-economic and policy research in driving sustainable development. The insights and findings presented are expected to inform policy decisions, guide future research, and inspire innovative solutions tailored to the unique contexts of our agri-food systems.

We extend our sincere gratitude to all contributors, reviewers, and participants whose dedication and expertise have made this conference a success. Special thanks to our partners and stakeholders for their unwavering support and collaboration.

As we navigate the complexities of agricultural transformation, we hope this compilation serves as a valuable resource for advancing knowledge, shaping policy, and fostering resilience within our agri-food systems.

Conference Organizing Committee
First KALRO Socio-Economics and Policy Development Conference
Kenya Agricultural and Livestock Research Organisation (KALRO)
Nairobi, Kenya
June 2025

About KALRO

KALRO brings together 17 agricultural research institutions and aligns their priorities to respond to national development goals, market demands and client needs. The organization also promotes and coordinates all agricultural research in Kenya. Its mandate is also to streamline research in crops, livestock, genetic resources and biotechnology in Kenya; and expedite equitable access to knowledge, information and technologies in agriculture.

KALRO, through its mandate, significantly contributes to the national economy by driving advancements in agricultural development. As the premier agricultural and livestock research organization in Kenya and the region, KALRO provides visionary leadership and demand-driven solutions to agricultural challenges at local, regional, and international levels. KALRO not only addresses national challenges through cutting-edge research but also leads globally through partnerships, collaboration, and networking. KALRO's Vision is 'to *be globally centre of excellence for research in agriculture and livestock*. The Mission is '*to generate and promote knowledge, technologies and innovations for sustainability of the agriculture and livestock sector for the wellbeing of Kenyans and beyond'* with goal of *'steering the growth of the agricultural sector through research, technology transfer and catalysing utilization of innovations'.*

This is achieved by upholding the organization's core values, which include customer orientation and timeliness; professionalism, integrity, ethics, and excellence; innovation; collaboration and partnerships; and environmental consciousness. Since agriculture is a devolved sector in Kenya, KALRO collaborates with counties to contribute to the development of County Integrated Development Plans (CIDPs) and agricultural department strategies

The KALRO strategy framework outlines the national priorities for agricultural research development. The following key areas of focus were identified as crucial in the strategic planning of agricultural research for development by the organization - food and nutrition security; agribusiness and wealth creation; sustainable healthy environment and ecosystems; climate change; mechanization and modernization of agriculture; gender equity and youth involvement; knowledge sharing and technology transfer; organization capacity strengthening; and socio-economics, marketing and policy.

Objectives

1. To provide a forum for sharing transformative agricultural research products and services.
2. To share innovative approaches and strategies for technology transfer and uptake.
3. To enhance partnerships and strengthen linkages among stakeholders.
4. To exhibit technologies, products and services of KALRO, partners and stakeholders.

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Conference Sub-Themes

The Conference will be structured into the following sub-thematic areas:

- Economic Analysis, Adoption and Impact Assessment
- Agricultural Digitalization Innovations
- Agricultural Financing and Investment
- Agricultural Marketing and Market Systems
- Agricultural Policy Research
- Agricultural Research Methods and Analytics
- Agribusiness Models in Agri-Food Systems
- Climate Change Adaptation and Mitigation Strategies
- Dissemination of Agricultural Research Outputs
- Gender and Social Inclusion in Agri-Food Systems Research
- Institutional and Behavioral Studies in Agriculture
- Novel Approaches in Agri-Food Systems Research and Policy
- Sociology and Anthropology in Agri-Food Systems Research

Key Note Presenters

Guest of Honour

Dr. Eliud Kireger (Phd OGW)

Director General, Kenya Agricultural & Livestock Research Organization (KALRO)

Keynote Speakers

Dr. Adiel Mbabu - Setting the scene: Bridging biophysical and socio-economic research for resilient food systems: Towards integrated solutions for sustainable agricultural transformation

Prof. Gideon Obare - Harnessing Research Methods and Data-driven Analytics for Evidence-based Decision-making in Building Resilient Food Systems

Dr Joseph Karugia - Strengthening policy responses for resilient food systems: Insights from NARS-CGIAR collaborative research and impact Contribution of Crop

Dr. Annet Abenakyo Mulema

Senior Program Officer, International Development Research Centre

Dr. Lusike Wasilwa - Contribution of Crop Research to National Policy and Food System Resilience: Socio-Economic Impact and Lessons for Scaling

Dr. David Changwony - Impact of KALRO Livestock Research on Food System Resilience: Pathways to Socio-Economic Transformation and Policy Influence

Dr. David Kamau - Integrating NRM Research Outputs into National Policy for Resilient Food Systems: KALRO's Impact and Socio-Economic Contributions

Dr. Mumina Shibia - Connecting Research Education and Outreach for Resilient Food Systems

Mr. Salim Kinyimu - Agriculture Services Digitalization, a Friend or Foe: Striking the Balance between Digital and Traditional Advisory Services in Building Resilience Systems

Food and Agriculture Organization of the United Nations

Food and Agriculture Organization of the United Nations Representative

Dr. Michael Waithaka - Strengthening Food System Resilience through Smart Trade: Insights from Global and Regional Markets

Dr. Beatrice Muriithi - Scaling Up Sustainable Technologies to Strengthen Agri-Food Systems Resilience: Research Insights from Sub-Saharan Africa

CONFERENCE PROGRAM

Monday, 9th June, 2025

Time	Activity	Venue	Facilitator
	Arrival to Hotel venues	Booked Hotels	Secretariat

CONFERENCE PROGRAM DAY ONE

Tuesday 10th June, 2025

VENUE: MAIN CONFERENCE HALL
SESSION ONE: PLENARY KEYNOTE PRESENTATION AND OPENING CEREMONY
CHAIRPERSON: DR. FREDAH MAINA
RAPPORTEUR: DR. MUO KASINA AND MR. NICHOLAS KIBUNYI

Time	Activity	Facilitator
08.00am - 08.30am	Registration	Secretariat
08.30am - 08.40am	Prayers introductions	
08.40am - 08.50am	Welcome remarks	Dr Alice Murage, Ag. Director SEPD
08.50am - 9.10am	Setting the scene: Bridging biophysical and socio-economic research for resilient food systems: Towards integrated solutions for sustainable agricultural transformation	Dr Adiel Mbabu
9.10am - 9.30 am	Harnessing Research Methods and Data-driven Analytics for Evidence-based Decision-making in Building Resilient Food Systems	Prof. Gideon Obare – Director Tegemeo
9.30am -9.50 am	Strengthening policy responses for resilient food systems: Insights from NARS-CGIAR collaborative research and impact Contribution of Crop	Dr. Joseph Karugia
9.50 – 10.00 am	Plenary discussions	

10.00 – 10.20 am	Remarks from Korea-Africa Food & Agriculture Cooperation Initiative (KAFACI)	Dr. LEE Kyung-Tai, Secretary General Korea-Africa Food & Agriculture Cooperation Initiative (KAFACI) Rural Development Administration
	World Bank Representative	Ghada Elabed
	Remarks from NAVCDP Coordinator	Dr. Samuel Guto
	Remarks from FSRP Coordinator	Ms. Priscila Muiruri
10.20am -10.30 am	Remarks from the DDG Livestock	Dr. Evans Ilatsia
	Remark by DDG Crops	Dr. Felister Makini
10.30am -11.00 am	Opening Remarks by Director General, KALRO	Dr. Eliud Kireger
11.00am - 11.30 am	Group Photo	Communication
	Health Break	**Catering services**
Parallel sessions in various break out room		

DAY ONE: PARALLEL SESSION TWO (2A)
VENUE 1: MAIN CONFERENCE HALL
SUB THEME: ECONOMIC ANALYSIS, ADOPTION AND IMPACT ASSESSMENT
CHAIRPERSON: DR. MARTINS ODENDO
RAPPORTEUR: NICHOLAS KIBUNYI AND LILIAN KEMUNTO

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB1-008	1. Assessment of Smallholder Farmers Perceptions and Preferences of New Sorghum Varieties to Enhance Promotion and Adoption in Makueni County, Kenya	Rachael Kisilu
11:45am - 12:00pm	SUB1-010	2. Impact analysis of the new green gram and grain amaranth varieties upscaled in Kitui County, Kenya	Peter K. Nduati

12:00pm - 12:15pm	SUB1-011	3. Socioeconomic Aspects of Climate Change Mitigation and Adaptation in Kenya: Evidence from Smallholder Farmers	Dymphina Andima
12:15pm - 12:30pm	SUB1-014	4. Catchment Conservation through Joint Adoption of Technological and Non-technological Water Management Strategies in Kenya. (Poster)	Simon Mwaura
12:30pm - 12:45pm	SUB1-003	5. Impact of Technologies Innovations and Management Practices Adoption by Smallholder Dairy Farmers in Nyeri County. (Poster)	Shadrack Musembi Mathuku
12:45pm - 01:00pm	SUB1-034	6. Effects of socioeconomic factors on smallholder farmers' preference for selected improved maize seed varieties in Trans Nzoia County, Kenya. (Poster)	Alice Jemutai Cheruiyot

DAY ONE: PARALLEL SESSION TWO (2B)
VENUE 2: BOARD ROOM
SUB THEME: AGRICULTURAL POLICY RESEARCH
CHAIRPERSON: DR. WELLINGTON MULINGE
RAPPORTEUR: ELIAS KAMAU AND JOSEPHAT CHENG'OLE

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB12-002	1. Policy Prioritisation for Value Chain Analysis	Tim Njagi
11:45am - 12:00pm	SUB1-005	2. The Impact of Technology Adoption on Income and Food Security: Policy Implications for Finger Millet Farmers in Western Kenya	Josephat Chengole Mulindo
12:00pm - 12:15pm	SUB6-002	3. The impacts of community-based water projects on rural poverty among smallholder farmers: evidence from the Ewaso Ngiro North Catchment Area, Kenya.	Simon Mwaura
12:15pm - 12:30pm	SUB6-005	4. Integrative approaches to agricultural policy: balancing productivity and sustainability	Mark Limo
12:30pm - 12:45pm	SUB6-007	5. Integrated Disease Management Strategies and Policy Implications for *Phytophthora cinnamomi* in Avocado Production in Kenya	Wilfred Mwo Yona

12:45pm – 01:00pm	SUB6-008	6. Trend Analysis of Implicit Adoption of Climate Resilient Varieties in Kenya: A case of Maize and Bio fortified Bean Varieties	Wellington Mulinge
01.00pm - 2.00 pm	**Lunch break**		

DAY ONE: PARALLEL SESSION TWO (2C)
VENUE 3: ROOM 207
SUB-THEME: AGRICULTURAL RESEARCH METHODS AND ANALYTICS
CHAIRPERSON: DR. ALICE MURAGE
RAPPORTEUR: PETER NDUATI AND MS SERAH MUNYUA

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB7-006	1. The Role of Education in Moderating the Impact of Cassava Varieties and Fertilizer Application Levels on cassava Production in Western Kenya	Elias Gitonga Thuranira
11:45am - 12:00pm	SUB7-009	2. Bridging the Gap: Aligning Farmers' Seed Demand with Research Methods in Kenya	George Maritim Kibet
12:00pm - 12:15pm	SUB7-011	3. Economic viability and Technical efficiency of African Indigenous Vegetables in Kisii and Kakamega Counties, Kenya	Serah Wairimu Munyua
12:15pm - 12:30pm	SUB7-014	4. Performance of advanced clones and their yield potential at KALRO Tigoni	Kelele Faida John
12:30pm - 12:45pm	SUB9-018	5. Calf Sex Ratio in Dairy Cattle Under the Semi-Intensive System of The Production: A Case Of KALRO, Dairy Research Centre Ol Joro Orok	Zachary Nyaga Muturi
12:45pm - 01.00pm	SUB7-016	6. Statistical evaluation of passionfruit performance in Kisumu, Siaya, Vihiga, Kakamega and Bungoma Counties under Agri-Jobs 4 Youth project.	Simon B. Wepukhulu
01.00pm - 2.00 pm		Lunch break	

DAY ONE: PARALLEL SESSION THREE (3A)
VENUE 1: MAIN CONFERENCE HALL
SUB THEME: : ECONOMIC ANALYSIS, ADOPTION AND IMPACT ASSESSMENT
CHAIRPERSON: DR. MUMINA SHIBIA
RAPPORTEUR: PETERSON MWANGI AND STEPHEN NDAIGA

Time	Submission No.	Paper Title	Author
02:00pm - 02:15pm	SUB1-016	1. Farmer Participation in Tricot Trials and Market-Driven Sorghum Variety Selection in Makueni County.	Winnie Agola Rapada
02:15pm - 02:30pm	SUB1-018	2. Factors Influencing the Adoption of Improved Wheat Seed Varieties Among Smallholder Farmers in Kenya	Ruth Chepngeno Mutai
02:30pm - 02:45pm	SUB1-021	3. Information Gathering and the Adoption of Improved Crop Varieties in Kenya: Case of Wheat Farmers in Nakuru County	Stephen Waithaka Ndaiga
02:45pm - 03:00pm	SUB1-023	4. Determinants of adoption of sustainable agricultural technologies on pixie production in Makueni county, Kenya	Wambua Samuel Muuo
03:00pm - 03:15pm	SUB1-056	5. Effects of UTZ cocoa certification on productivity and income of cocoa farmers in the Western North Region of Ghana	Rebecca Owusu
03:15pm – 03:30pm	SUB1-060	6. Towards zero hunger and climate resilience: The role of beans in CSA strategies. (Poster)	Ann W. Gichangi et al

DAY ONE: PARALLEL SESSION THREE (3B)
VENUE 2: BOARD ROOM
SUB THEME: CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGIES
CHAIRPERSON: DR. STELLA MAKOKHA
RAPPORTEUR:MS BETTY CHEROIGIN AND CLINTON OCHIENG

Time	Submission No.	Paper Title	Author
02:00pm - 02:15pm	SUB8-003	1. Evaluation of black soldier fly larvae (*Hermetia illucens*) frass as biopesticide and biofertilizer on kales (*Brassica oleracea*)	Clinton Ochieng Otieno
02:15pm - 02:30pm	SUB8-004	2. Enhancing Food Security through Climate-Smart Adaptation and Mitigation Strategies	Nephiny Moriato Nyagaka
02:30pm - 02:45pm	SUB8-006	3. Agro pastoral communities' perceptions on indigenous browse resources of the north central rift region, Kenya.	Joseph K. Sitiene
02:45pm - 03:00pm	SUB8-007	4. Effectiveness of Mitigation strategies on Food Security in Narok County's Cross-Border Conflict Zones, Kenya	Jedidah Chepkoech Kiget
03:00pm - 03:15pm	SUB8-010	5. Sustainable maize production for food security: Climate resilience through intensification and tillage practices in Nakuru County, Kenya.	Brian Imisa Sakwa
03:15pm - 03:30pm	SUB8-009	6. Review: Understanding the Impact of Pest Resistance and the Growing Antimicrobial Resistance Crisis through One Health Approach on Crop Yield and Health Consequences in Kenya. (Poster)	Kiplanga Cheruiyot Titus
03:30pm – 03.45pm	SUB8-005	7. Zero Waste Concept to Support Green Economy in Coffee/Beans Production Value Chain System	Isaiah Kiprop keter

DAY ONE: PARALLEL SESSION THREE (3C)
VENUE 3: ROOM 207
SUB THEME: GENDER AND SOCIAL INCLUSION IN AGRI-FOOD SYSTEMS RESEARCH
CHAIRPERSON: DR. JESSICA NDUBI
RAPPORTEUR: MS. TABBY KARANJA AND JAMILA MANI

Time	Submission No.	Paper Title	Author
02:00pm - 02:15pm	SUB1-029	1. Are there gender differences in determinants of Newcastle disease vaccination on household income? A case study of Machakos County, Kenya	Tabby Karanja-Lumumba

02:15pm - 02:30pm	SUB10-006	2. Narrowing the gender gap in Kenya's wheat farming: advancing inclusive and equitable innovation	Anna W. Gichangi
02:30pm - 02:45pm	SUB10-009	3. Intersectional Identities and Maize Trait Preferences in Kenya	Emily Injete Amondo
02:45pm - 03:00pm	SUB10-003	4. Market access and multidimensional poverty among women peanut processors in Kaduna state, Nigeria: examining barriers and livelihood outcomes (Poster)	Jamila Rabe Mani
03:00pm - 03:15pm	SUB10-007	5. Gender and Banana Production and Commercialization in Tharaka Nithi County, Kenya	Jessica Ndubi

DAY ONE: PARALLEL SESSION FOUR (4A)
VENUE: MAIN CONFERENCE HALL
SUB-THEME: CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGIES
CHAIRPERSON: DR. DAVID CHANGWONY
RAPPORTEUR: NICHOLAS KIBUNYI AND ZILPHER NYAKWARA

Time	Submission No.	Paper Title	Author
03:30pm - 03:45pm	SUB8-013	1. Climate change mitigation strategy for food and nutrition in pastoral areas of Kajiado County	Esther K. Muriuki
03:45pm - 04:00pm	SUB8-019	2. Unlocking the potential of castor (*Ricinus communis* L.) for phytoremediation in Kenya	Peter Njuguna
04:00pm - 04:15pm	SUB8-022	3. From awareness to action: implementing climate change mitigation in agriculture.	Mark Limo
04:15pm - 04:30pm	SUB8-016	4. Economic analysis of mango flower induction technologies in Kenya. (Poster)	Rukia Kosi Jirma
04:30pm - 04:45pm	SUB8-037	5. Economic impact of climate change on cowpea and pigeon pea productivity in semi-arid environment. (Poster).	Reuben Cheruiyot Ruttoh
04:45pm - 05:00pm	SUB8-014	6. Potential environmental risks during fall armyworm management strategies by smallholder farmers in Bomet County, Kenya. (Poster)	Zilpher Nyakwara

HEALTH BREAK AND END OF DAY 1			
DAY ONE: PARALLEL SESSION FOUR (4B) VENUE: BOARD ROOM *SUB THEME: AGRICULTURAL FINANCING AND INVESTMENT* CHAIRPERSON: MR. CHARLES BETT RAPPORTEUR: ELIAS KAMAU AND DOUGLAS GITARI			
Time	**Submission No.**	**Paper Title**	**Author**
03:30pm - 03:45pm	SUB4-001	1. Enhancing financial inclusion: Key drivers of financial access among small-scale potato farmers in Narok County Kenya	Douglas Gitari
03:45pm - 04:00pm	SUB4-002	2. Agricultural Financing and Investment for Resilient Agri-food Systems.	Silvia Karwitha Kimathi
04:00pm - 04:15pm	SUB4-006	3. Leveraging ASTI indicators to revitalize Kenya's Agricultural Research System for Food System Resilience	Duke Ogeto Jesai
04:15pm - 04:30pm	SUB4-010	4. Remittances and Maize Farming in Kenya: A Path to Prosperity? (Poster)	Carolyne Minayo
04:30pm - 04:45pm	SUB4-004	5. Integrating Agriculture, Tourism, and Traditional Knowledge for Sustainable Economic Growth. (poster)	Stella Khaoya
04:45pm - 05:00pm	SUB4-009	6. Economic analysis of arid and range lands research institute (ARLRI), Kiboko	Charles Bett
01:00pm 2.00pm	**HEALTH BREAK AND END OF DAY 1**		
DAY ONE: PARALLEL SESSION (4C) VENUE: ROOM 207 *SUB THEME: SOCIOLOGY AND ANTHROPOLOGY AGRI-FOOD SYSTEMS RESEARCH* CHAIRPERSON: DR. ANASTACIA KAGUNYU RAPPORTEUR:PETER NDUATI AND KENNEDY WANJALA			
Time	**Submission No.**	**Paper Title**	**Author**
03:30pm - 03:45pm	SUB13-005	1. Assessment of harvest, postharvest practices and utilization of finger among farmers in Nandi County, Kenya	Dr Margaret Muchui

03:45pm - 04:00pm	SUB13-006	2. Local value chain analysis and mapping (LVCD) for improved productivity. A study of Samburu County.	PAUL K. KIPRONO
04:00pm - 04:15pm	SUB13-009	3. Anthropological Opportunities and Challenges for Enhancement of Food Safety in Camel Milk Value Chain in Isiolo and Marsabit Counties, Kenya	Kennedy Wanjala
04:15pm - 04:30pm	SUB13-008	4. Beyond Numbers: Reclaiming the Voice of Communities Through Ethnography in Agri-Food Systems Research in Kenya	Peterson Mwangi
04:30pm - 04:45pm	SUB13-005	5. Assessment of harvest, postharvest practices and utilization of finger among farmers in Nandi County, Kenya (Poster)	Dr Margaret Muchui
4.45 PM	**HEALTH BREAK AND END OF DAY 1**		

CONFERENCE PROGRAM DAY TWO

Day 2: Wednesday 11/06/2025

PLENARY PRESENTATIONS BY KEYNOTE SPEAKERS VENUE: MAIN CONFERENCE HALL CHAIRPERSON: DR. KARL NYABUNDI RAPPORTEUR: DR. MUO KASINA AND MS. VIOLET KIRIGUA		
08.00 - 08.30 am	**Registration**	**Secretariat**
08.30 - 08.50 am	Contribution of Crop Research to National Policy and Food System Resilience: Socio-Economic Impact and Lessons for Scaling	Dr. Lusike Wasilwa – Director Crops Systems - KALRO
08.50 - 09.10 am	Impact of KALRO Livestock Research on Food System Resilience: Pathways to Socio-Economic Transformation and Policy Influence	Dr. Changwony - Director Livestock Systems - KALRO
09.10 – 9.30 am	Integrating NRM Research Outputs into National Policy for Resilient Food Systems: KALRO's Impact and Socio-Economic Contributions	Dr. David Kamau – Director. Natural Resource Management - KALRO
09.30- 9.50 am	Unlocking Kenya's Potential in Agriculture: Empowering Women, Vulnerable, and Marginalized Groups for Inclusive and Resilient Food Systems in Kenya	Dr. Annet Abenakyo Mulema, Senior Program Officer at the International Development Research Center (IDRC)
09.50 – 10.10 am	Connecting Research Education and Outreach for Resilient Food Systems	Dr. Mumina Shibia Director Planning Performance Management and Quality Control - KALRO
10.10 – 11.00 am	Plenary discussions by the Keynote speakers	
11.00 - 11.30 am	Tea break	
Parallel sessions in various break out room		

DAY TWO: PARALLEL SESSION TWO (2A)
VENUE: MAIN CONFERENCE HALL
SUB THEME: ECONOMIC ANALYSIS, ADOPTION AND IMPACT ASSESSMENT
CHAIRPERSON: DR. JOHN WAMBUA
RAPPORTEUR: REUBEN RUTTOH AND WINNIE ATIENO

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB1-026	1. Socio-Economic Determinants of Digital Technology Adoption in Agriculture: A Comparative Study of Bondo and Kimilili Sub-Counties, Kenya	Peterson Mwangi
11:45am - 12:00pm	SUB1-028	2. Effect of Non-Participation in Group Membership Along The AIV Value Chain on Household Income Among Farmers in Kakamega And Kisii Counties, Kenya	Winnie Atieno Odhi-ambo
12:00pm - 12:15pm	SUB1-015	3. Building Resilient Rice Farming Systems: Socio-Economic Insights from Mwea, Kenya	Alice Murage
12:15pm - 12:30pm	SUB1-038	4. Adoption and impact assessment of utilizing forage-based technologies amongst smallholder dairy farmers in Nakuru and Nyandarua counties	Fredrick Agutu
12:30pm - 12:45pm	SUB1-042	5. Socio-Economic Impacts, Environmental and Ecosystem Services Benefits of Agroforestry Systems.	Dominic Kipngeno
12:45:pm - 01:00pm	SUB1-043	6. Upland Rice Cultivar Production, Preferred Varieties and Constraints to Farmers in Liberia.	Muga Moses
01.00-2.00 pm	**Lunch break**		

DAY TWO: PARALLEL SESSION TWO (2B)
VENUE: BOARD ROOM
SUB THEME: CLIMATE CHANGE ADAPTATION & MITIGATION STRATEGIES
CHAIRPERSON: MS NANCY NG'ANG'A
RAPPORTEUR: ELIAS KAMAU AND PATRICK LUPIYA

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB8-023	1. An Assessment of farmers Knowledge on Fall Army Worm, its management and impact in Makueni County, Kenya.	Rosemary Akhungu Emongor
11:45am - 12:00pm	SUB8-026	2. Farmer Awareness and Management of Aflatoxins in Finger Millet in Western Kenya	Francis Obuoro Wayua
12:00pm - 12:15pm	SUB8-029	3. Harnessing Apiculture for Climate Change Adaptation and Sustainable Livelihoods	Daniel Toroitich
12:15pm - 12:30pm	SUB8-030	4. Seeking best agricultural practices for production of soybean [Glycine max (L.)] under farrow irrigation in lower Kuja irrigation scheme, Migori County	James Ng'ang'a Njoroge
12:30pm - 12:45pm	SUB8-031	5. Who Listens When Climate Speaks? Access and Use of Seasonal Climate Forecasts in Smallholder Agriculture	Patrick Lupiya
12:45:pm - 01:00pm	SUB8-028	6. Assessing the Preparedness of Agribusiness SMEs to Changing Climatic Conditions: Factors Affecting Planning for Future Climate Effects in Kiambu and Kajiado Counties, Kenya	Nancy M. Ng'ang'a
01.00-2.00 pm	**Lunch break**		

DAY TWO: PARALLEL SESSION TWO (2C)
VENUE: ROOM 207
SUB THEME: NOVEL APPROACHES IN AGRI-FOOD SYSTEMS RESEARCH AND POLICY
CHAIRPERSON: DR JOHN NDUNG'U
RAPPORTEUR: PETER NDUATI AND ROBERT TABU

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB1-054	1. Optimizing nitrogen fertilizer use in tea production: case study of NPK 22:6:12 and NPK 23:5:10 nitrogenous compound fertilizer formulations	Paul Odongo Ayiemba
11:45am - 12:00pm	SUB12-003	2. Yield performance of Kenyan grain amaranth accessions collected from north rift, Kenya	Cecilia Kawira Magiri
12:00pm - 12:15pm	SUB12-001	3. Greenhouse validation of rose coco on developed bio fertilizers in relation to yield performance at KALRO HRI, Kandara	Joan Achieng Abwao
12:15pm - 12:30pm	SUB1-052	4. A Review on the Role of *Acerophagus papayae* as a Biological Control of Papaya Mealybug (*Paracoccus marginatus*) in Papaya Orchards in Kenya's Coastal Region.	Robert Tabu
12:30pm - 12:45pm	SUB12-O001	5. Greenhouse validation of rose coco on developed bio fertilizers in relation to yield performance at KALRO HRI, Kandara.	Joan Achieng Abwao
12:45pm – 01:00pm	SUB12-001	6. Assessment of the profitability in organic and conventional farming systems in Kenya for selected crops	John Ndungu
01:00pm-02.00pm	**Lunch break**		

DAY TWO: PARALLEL SESSION THREE (3A)
VENUE: MAIN CONFERENCE HALL
SUB THEME: ECONOMIC ANALYSIS, ADOPTION AND IMPACT ASSESSMENT
CHAIRPERSON: MS AGATHA MUMBUA
RAPPORTEUR: PETERSON MWANGI AND JOSEPH KIMANI

Time	Submission No.	Paper Title	Author
02:00pm - 02:15pm	SUB1-044	1. What factors influence the mixed use of mechanical, cultural, and chemical practices among smallholder maize farmers in managing Maize Lethal Necrosis Disease (MLN) in Kenya? A multivariate probit approach.	Joseph Gicho Kimani
02:15pm - 02:30pm	SUB1-049	2. Do Rice Farmers Share Similar Perspectives? Evidence from A Survey Across Ten Rice-Growing Counties In Kenya	Ruth Nzisa Musila
02:30pm - 02:45pm	SUB1-025	3. Economic evaluation of a motorized cassava chipper over conventional methods (Poster)	Rotich Eliud
02:45pm - 03:00pm	SUB1-004	4. Logistic regression of factors influencing the decision to conduct soil testing among smallholder farmers in western Kenya	Orawo Fido Odhi-ambo
03:00pm - 03:15pm	SUB1-059	5. Assessing Socio-Economic Impacts of GMO Late Blight-Resistant Potatoes in Kenya: A Multi-Stakeholder Perspective on Food Security and Markets. (Poster)	Fabian Kaburu
03:15pm - 03:30pm	SUB1-055	6. Ex-post Evaluation of Climate Smart Water Harvesting Technologies to Increase Food and Nutrition Security in Kajiado County. (Poster)	Agatha Mumbua Daniel

DAY TWO: PARALLEL SESSION THREE (3B)
VENUE: BOARDROOM
SUB THEME: DISSEMINATION OF AGRICULTURAL RESEARCH OUTPUTS
CHAIRPERSON: DR JUMA MAGOGO
RAPPORTEUR: MS BETTY CHEROIGIN AND DR JOHN MANYEKI

Time	Submission No.	Paper Title	Author
02:00pm - 02:15pm	SUB1-036	1. Existing farmer Knowledge-gaps that can shape extension services provision to manage fall armyworm (*Spodoptera frugiperda*) in south eastern and coastal Kenya	Muo Kasina

02:15pm - 02:30pm	SUB1-040	2. Assessment of sorghum seed systems and sources of agricultural knowledge in farmer research networks in Homabay and Tharaka Nithi counties, Kenya counties, Kenya	Carolyne Khalayi Wafula
02:30pm - 02:45pm	SUB9-014	3. Evaluating feed availability and utilization of sugarcane by a products for dairy cattle in Malaya sub-county, Kenya	Joseph Wanjala Munyasi
02:45pm - 03:00pm	SUB1-048	4. Effects of stakeholder platforms on youth participation in finger millet (*Eleusine coracana*) value chain in Teso south sub county , Kenya	Martha Wambui Mubia
03:00pm - 03:15pm	SUB9-003	5. Evaluation of Dissemination Pathways Effectiveness for Climate Adaptable Technologies in Agro pastoral Economies of Kenya	Dr. John Kibara Manyeki
03:15pm - 03:30pm	SUB1-022	6. Evaluating Public Engagement for Technology Uptake in Kenyan Agriculture: Evidence from Kenya Agricultural and Livestock Research Organization Open Week. (Poster)	Magogo Juma Riziki
03:30pm - 03:45pm	SUB9-019	7. An economic analysis of dairy value chain: a case study of the dairy enterprise at KALRO Ol joro orok. (Poster)	Mathai M Ndungu

DAY TWO: PARALLE SESSION THREE (3C)
VENUE: ROOM 207
SUB THEME: INSTITUTIONAL AND BEHAVIOURAL STUDIES IN AGRICULTURE
CHAIRPERSON: DR. SCOLASTICA WAMBUA
RAPPORTEUR: TABBY KARANJA AND JOSEPH MULWA

Time	Submission No.	Paper Title	Author
02:00pm - 02:15pm	SUB1-051	1. Assessment of performance contracting as a management tool on the achievement of organizational goals in the public sector: A case study on the operations of Kenya agricultural and livestock research organization	Samson Ogechi Nyaanga

02:15pm - 02:30pm	SUB11-004	2. Producers Valuation of Export Tea and Coffee as Potential Geographical Indications in Kenya: A Synthesis Analysis	Fredah Maina
02:30pm - 02:45pm	SUB11-005	3. Activities practiced by maize farmers to combat and mitigate effects of fall armyworm infestation in Masii, Machakos County, Kenya	Joseph Mutunga Mulwa
02:45pm - 03:00pm	SUB11-007	4. Assessment of milk productivity at KALRO FCRI Kitale as an improvement strategy	Wambani Hildah Nyende
03:00pm - 03:15pm	SUB11-009	5. Best-worst scaling approach for participatory improvement of finger millet	Wycliffe Otieno
03:15pm - 03:30pm	SUB11-006	6. Enhancing Research and Leadership Skills of early career scientists in Kenya Agricultural and Livestock Research Organisation (KALRO)	Scolastica Wambua

DAY TWO: PARALLEL SESSION FOUR (4A)
VENUE: MAIN CONFERENCE HALL
SUB THEME: AGRICULTURAL MARKETING AND MARKET SYSTEMS & AGRIBUSINESS MODELS IN AGRI-FOOD SYSTEMS
CHAIRPERSON: DR BETH NDUNG'U
RAPPORTEUR: REUBEN RUTTOH AND MARAIN KA-MAU

Time	Submission No.	Paper Title	Author
03:30pm - 03:45pm	SUB5-013	1. Status of the Finger Millet Value Chain in Western Kenya	Eunice Minyattah Onyango
03:45pm - 04:00pm	SUB5-015	2. Banana Marketing Systems and Constraints among Smallholder Farmers in Tharaka Nithi County, Kenya	Marian Kamau
04:00pm - 04:15pm	SUB5-016	3. Assessing the Affordability and Availability of Technology Innovations and management practices (TIMPS) among pastoral farmers in Kajiado and Isiolo Counties, Kenya	Veronica Chemutai Metto

04:15pm - 04:30pm	SUB5-017	4. Consumer resistance to insect-fortified bread in Ghana: Insights for sustainable protein policy and market development	Rebecca Owusu
04:30pm - 04:45pm	SUB2-002	5. Income diversification through agri-tourism amongst farmers in Mpumalanga, South Africa	Motla-lepule John Seema
04:45pm - 05:00pm	SUB2-006	6. Goat Finishing on Improved Grass and Legume Supplementation in Arid and Semi-Arid Lands: The Business Cases	Benson Mulei
05:00pm - 05:15pm	SUB5-014	7. An Assessment of Tomato Marketing Strategies by Smallholder Farmers in Kajiado County	Beth Ndungu
05.00 pm	**Health break and end of day 2**		

DAY TWO: PARALLEL SESSION FOUR (4B)
VENUE: BOARD ROOM
SUB THEME: AGRICULTURAL MARKETING AND MARKET SYSTEMS
CHAIRPERSON: DR JOHN WAMBUA
RAPPORTEUR: ELIAS KAMAU AND JUSTA GITONGA

Time	Submission No.	Paper Title	Author
03:30pm - 03:45pm	SUB5-003	1. Market outlet selection among smallholder cattle farmers in rural Tanzania: Building bridges for fostering participation in livestock markets	Njile Isack Shashi
03:45pm - 04:00pm	SUB5-005	2. Assessing the factors influencing the Level of commercialization of African Indigenous Vegetables among smallholder Farmers in Bungoma County	Scolastica Nanjala Nambafu
04:00pm - 04:15pm	SUB5-006	3. Assessing Production Cost and Profitability of On-Station Grown Sorghum in Nakuru County	Andrew Kiplagat Kosgei
04:15pm - 04:30pm	SUB5-008	4. Crop production diversity or market access? Welfare outcomes among sorghum-growing households in rural Kenya and Uganda	Charles Bett

04:30pm - 04:45pm	SUB5-012	5. Market and Consumer Preferred Green Gram (*Vigna radiate L.*) Characteristics for Food and Income Generation in Semi-Arid Areas of Tharaka-Nithi County, Kenya	Rodger Mutuma Mungania
04:45pm - 05:00pm	SUB5-011	6. Assessment of Banana and Plantain Marketing Status in Kenya. (Poster)	Gitonga KJ
05:00pm - 05:15pm	SUB5-004	7. Catalyzing cassava processing capabilities among the smallholder farmers to trigger improved production and marketing systems in Kenya. (Poster)	John Wambua
05.00 pm	**Health break and end of day 2**		

DAY TWO: PARALLEL SESSION FOUR (4C)
VENUE: ROOM 207
SUB THEME: CLIMATE CHANGE ADAPTATION & MITIGATION STRATEGIES
CHAIRPERSON: MR STEPHEN MAILU
RAPPORTEUR: PETER NDUATI AND SALLY NDUTA

Time	Submission No.	Paper Title	Author
03:30pm - 03:45pm	SUB8-035	1. Effects of urea-molasses mineral block supplementation on performance of Dorper sheep on buffelgrass diet in Kenya	Sally Nduta
03:45pm - 04:00pm	SUB8-038	2. Micro climate modification by shading as a strategy to climate change resilience and product diversification in tea production.	Robert K. Korir
04:00pm - 04:15pm	SUB4-003	3. Effectiveness of Mitigation strategies on Food Security in Narok County's Cross-Border Conflict Zones, Kenya	Jedidah Chepkoech Kiget
04:15pm - 04:30pm	SUB3-006	4. Influence of Gibberellin Hormone on Viability of Cleome *Gynandra L.* Seed Germination. (Poster)	Muga Moses
04:30pm - 04:45pm	SUB8-033	5. An analysis of the benefits and costs of bio digesters: a capital budgeting approach	Stephen Mailu
05.00 pm	**Health break and end of day 2**		

CONFERENCE PROGRAM DAY THREE

Thursday 12/06/2025

SESSION ONE: PLENARY PRESENTATIONS BY KEY-NOTE SPEAKERS VENUE: MAIN CONFERENCE HALL CHAIRPERSON: DR LUSIKE WASILWA RAPPORTEUR: PETERSON MWANGI AND REUBEN RUTTOH		
TIME	**ACTIVITY**	**Rapporteur**
08.00am - 08.30 am	Registration	Secretariat
08.30am - 08.50am	Devolution of Agricultural Extension Services in Kenya: The Hits and Misses for Agriculture After a Decade After Devolution – Implications for Building Resilient Food Systems	Dr. Tipo Nyabenyi, the FAO Kenya Representative
08.50am - 09.10am	Agriculture Services Digitalization, a Friend or Foe: Striking the Balance between Digital and Traditional Advisory Services in Building Resilience Systems	Mr Salim Kinyimu – Director ICT KALRO
09.10am - 09.30am	Role of R&D in enhancing resilience: The case of seed.	Dr Michael Waithaka
09.30am -10.00am	Scaling Up Sustainable Technologies to Strengthen Agri-Food Systems Resilience: Research Insights from Sub-Saharan Africa	Dr Beatrice Muriithi – Senior Agricultural Economists, icipe
10.00am - 10.20 am	Financing Agrochemical Reduction and Management for resilient and sustainable food production systems	Mr Stanley Kimereh National Project Technical Advisor_FARM Kenya Food and Agriculture Organization of the United Nations
10.20am - 11.00 am	Plenary Discussions by Key note speakers	
Parallel sessions in various break out room		

DAY THREE: PARALLEL SESSION TWO (A)
VENUE: MAIN CONFERENCE HALL
SUB THEME: AGRICULTURAL DIGITALIZATION INNOVATIONS
CHAIRPERSON: MR KEVIN KIAMBE
RAPPORTEUR: MS BETTY CHEROIGIN AND NDUNG'U MATHAI

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB3-002	1. The Digital Agricultural Revolution: Transforming Farming Through Emerging Technologies	Uzma Gulzar
11:45am - 12:00pm	SUB3-003	2. The Development of Digital Services and their Utilization in Agriculture in Kenya	Tim Njagi
12:00pm - 12:15pm	SUB3-005	3. Capital budgeting tool for agricultural investments: A case of investments to Farmer Cooperative Societies in Nyandarua County.	Mathai M Ndungu
12:15pm - 12:30pm	SUB3-007	4. The Role of Digital Technologies in Enhancing Agri-Food System Resilience among Smallholder Farmers in Kenya	Judy Chepkoech
12:30pm - 12:45pm	SUB3-001	5. Producers Drive To Procure Certified Potato Seeds Through Digital Platforms. (Poster)	Steven Owino Adongo
12:45:pm - 01:00pm	SUB3-008	6. Digital Public Infrastructure as a Catalyst for Inclusive Agricultural Innovation in Kenya's Agri-Food Systems	Kevin Kiambe Assa
01.00-02.00 pm		Lunch break	

DAY THREE: PARALLEL SESSION TWO (B)
VENUE: BOARD ROOM
SUB THEME: DISSEMINATION OF AGRICULTURAL RESEARCH OUTPUTS
CHAIRPERSON: MS PURITY KABURU
RAPPORTEUR: TABBY KARANJA AND DR STELLA MATERE

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB9-005	1. Scaling improved crop varieties to forgotten farmers through multi-stakeholder platforms: impact on food and nutrition security in western Kenya	Martins Odendo
11:45am - 12:00pm	SUB9-006	2. Translating research into action: strategies for disseminating agricultural policies	Mark Limo
12:00pm - 12:15pm	SUB9-007	3. Client satisfaction with agricultural technologies: the case of KALRO Kakamega mkulima open week 2024	Judith Mutheu Mboya
12:15pm - 12:30pm	SUB9-020	4. Science Communication of Agricultural research outputs: A Case Study of Kenya Agricultural and Livestock Research Organization	Dr. Florida Maritim
12:30pm - 12:45pm	SUB9-016	5. Leveraging Knowledge Management to Foster Resilient Agri-food Systems through Effective Dissemination of Agricultural Research Outputs	Univer Chepleting
12:45:pm - 01:00pm	SUB9-009	7. Farmer preferential information pathways for adoption of cassava Technologies, Innovations and Management Practices in Nakuru County-Kenya	Purity Kaburu
01.00pm – 02.00pm	**Lunch break**		

DAY THREE: PARALLEL SESSION TWO (C)
VENUE: ROOM 207
SUB THEME: AGRICULTURAL RESEARCH METHODS AND ANALYTICS
CHAIRPERSON: DR ROSEMARY EMONGOR
RAPPORTEUR: ELIAS KAMAU AND LENAH MUEMA

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB1-037	1. Determinants of Maize Yield Gaps Among Smallholder Farmers: Evidence from a Tobit Model Analysis	Dave Mwangi Ireri

11:45am - 12:00pm	SUB7-002	2. Survival Analysis of Boran Calves Using Kaplan-Meier and Cox Models: Insights from Beef Research Institute, Kenya	Lenah Muema
12:00pm - 12:15pm	SUB7-004	3. Propensity Score Matching approach for the Interactions between pasture biodiversity, milk production and greenhouse gas emissions in small African dairy systems.	Simon Mwaura
12:15pm - 12:30pm	SUB7-001	4. Agricultural research methods and analytics. (Poster)	Victor Kiplangat
12:30pm - 12:45pm	SUB1-024	5. Identification of Maize Varieties through Genetic Fingerprinting and Farmer recall: A case study of Bungoma and Embu counties	Rosemary Akhungu Emongor
12:45pm -01:00pm	SUB7-015	6. Farmer-researcher participatory evaluation of sorghum bean cropping systems on sorghum productivity in Tharaka Nithi County	David Musyimi
01.00-02.00 pm	**Lunch break**		

DAY THREE: PARALLEL SESSION TWO (D)
VENUE: BIG SEMINAR ROOM
SUB THEME: DISSEMINATION OF AGRICULTURAL RESEARCH OUTPUTS
CHAIRPERSON: DR MORGAN MUTOKO
RAPPORTEUR: PETER NDUATI AND DR STELLA MATERE

Time	Submission No.	Paper Title	Author
11:30am - 11:45am	SUB9-010	1. The Role of Farmers Attributes And Practices in Influencing Pesticide Resistance to Tomato Pests in Kenya	Nancy M. Ng'ang'a
11:45am - 12:00pm	SUB3-004	2. Awareness, utilization, and Challenges of Agricultural Digitalization among Rural Farmers: A Case Study of Southeastern Kenya	Stella J. Matere
12:00pm - 12:15pm	SUB9-011	3. Enhancing fruit quality of avocado (*Persea americana*) using ripeners in Kitui County, Kenya.	Dr Wilson M. Thagana

12:15pm - 12:30pm	SUB9-013	4. Evaluation of Sugarcane Tops-Based Feed Rations for Enhanced Dairy Production among Smallholder Farmers in Malava Sub-county, Kakamega County, Kenya.	Joseph Wanjala Munyasi
12:30pm - 12:45pm	SUB1-041	5. Accelerating Adoption of Seed Potato Technologies through capacity building and innovation platforms	Elias Kamau
12.45-01.00pm	SUB9-015	6. Likelihood of farmers recommending bio digesters to friends and neighbours, and the likely role of negative word of mouth	Stephen Mailu
0.1.00-01.15 pm	SUB9-008	7. Participatory Bundling of Priority TIMPs to Drive Commercialization of Coffee Value Chain in Kenya	Morgan C. Mutoko
01.15-02.30 pm	**Lunch break**		

CLOSING **VENUE: MAIN CONFERENCE HALL** **CHAIRPERSON: DR ALICE MURAGE** **RAPPORTEUR: DR STELLA MAKOKHA**		
02.30 pm – 03.30 pm	Synthesis of the1st KALRO SEPD conference	Dr Adiel Mbabu
03.30 pm – 04.00 pm	Prize Giving	KALRO DG
04.00 pm – 04.30 pm	Closing ceremony	KALRO DG
04.30 pm – 05.00 pm	Tea break and end of day 3	
5.00 pm	**End of the conference and departure**	

BOOK OF ABSTRACTS

SUB-THEME: ECONOMIC ANALYSIS, ADOPTION AND IMPACT ASSESSMENT

SUB1-060

TOWARDS ZERO HUNGER AND CLIMATE RESILIENCE: THE ROLE OF BEANS IN CSA STRATEGIES

Anne Gichangi[1], Brian Sakwa1, Patrick Ooro[1], David Karanja[2], Lusike Wasilwa[3]
[1]KALRO- Njoro, [2]KALRO- Katumani, [3]KALRO Headquarters

ABSTRACT

Beans are crucial in promoting Climate Smart Agriculture (CSA), especially for agripreneurs in ecologically sensitive areas like Njoro and Rongai sub-counties of Nakuru County. As a nutritious and affordable food, beans enhance household food security while delivering agronomic and economic benefits. Their capacity for biological nitrogen fixation improves soil fertility, lowers reliance on synthetic fertilizers, and boosts sustainability. Beans are well-suited to diverse agro ecological zones and can be effectively used in crop rotation and intercropping systems to improve resilience and productivity. Despite these advantages, adoption of bean-based CSA practices remains limited due to challenges such as poor access to improved seed varieties, weak extension services, low awareness of CSA techniques, and limited market access. These constraints hinder efforts to build resilient and economically empowered farming systems. This study aimed to assess the role of beans in enhancing food security and climate resilience; identify adoption barriers; evaluate economic and environmental benefits; and provide recommendations for scaling up bean integration into CSA. Using a mixed methods approach, data were collected through household surveys, focus group discussions, and key informant interviews involving 150 smallholder agripreneurs. Statistical and cost-benefit analyses were used to assess adoption drivers, yield outcomes, and economic viability. Key findings show that households integrating beans experienced a 38% increase in food self-sufficiency during dry spells. Improved bean varieties were strongly correlated ($r = 0.62$, $p < 0.01$) with higher yields and income stability. Intercropping with beans improved land productivity by up to 21% and reduced input costs by 10%. However, major barriers included limited access to certified seeds (72% of respondents), market constraints, and poor CSA knowledge. Women showed higher interest in CSA innovations but faced greater access challenges. In conclusion, scaling up bean integration in CSA requires targeted investment in seed systems, extension services, and markets to support climate-resilient, food-secure livelihoods.

SUB1-058

ASSESSING THE TRANSFORMATIVE POTENTIAL OF KALRO'S HIGH-YIELDING CASHEW VARIETIES: IMPACTS ON PRODUCTIVITY, FARMER INCOMES, AND EXPORT GROWTH IN KENYA'S CASHEW SECTOR

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ABSTRACT

Kenya's cashew sector has been constrained by low-yielding, senile, disease susceptible, and poorly managed cashew trees. This has limited the sector's contribution to farmer incomes and increasing Kenya's exports as envisioned in the Bottom-up Economic Transformation Agenda's (BETA) agriculture pillar. The Kenya Agricultural and Livestock Research Organization (KALRO) developed 14 high-yielding cashew varieties, with four certified and formally released for distribution in 2022. These new varieties are capable of producing up to 70 kg per tree per year compared to the previous 10 kg. This study assessed the potential impact of the seedlings of the new varieties produced at KALRO nurseries on enhancing cashew productivity, increasing farmer incomes, and boosting export volumes. Primary data were collected from seedling sales records at KALRO Centres at Mtwapa, Matuga, and Msabaha. This was complimented with secondary data obtained through review of studies conducted in the country. Adoption projections indicated a positive trend in increasing annual cashew nut production and potentially increasing farmer incomes by 30–50% through higher yields and market access, and significantly expanding export potential. The paper makes policy recommendations for developing a sustainable seed system, scaling seedling distribution and farmer training to sustain productivity, income, and export growth, contributing to Kenya's Vision 2030 and climate-resilient agriculture.

SUB1-057

ASSESSING THE POSTHARVEST IMPACT OF COCOLY FERTILIZER ON TOMATO QUALITY AND MARKETABILITY IN KENYA: A REVIEW

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ABSTRACT

Chapter 1 Tomato (Solanum lycopersicum L.) is a globally sinificant horticultural crop, valued for its rich nutritional profile and numerous health benefits. In Kenya tomato cultivation offers a vital source of income and employment, particularly for smallholder farmers. However, despite its economic and nutritional importance, tomato production remains largely unprofitable due to a myriad of challenges one of them being high postharvest losses. These losses arise from both on-farm factors, such as harvesting at inappropriate maturity stages, poor field hygiene, substandard packaging, and exposure to field heat, as well as off-farm issues including inadequate road infrastructure, unreliable transportation, limited processing capacity, and insufficient market access. Recent studies indicate that the application of specialized fertilizers like Cocoly a nutrient-dense, granule-soluble fertilizer with plant growth-enhancing properties can improve tomato fruit quality and reduce postharvest deterioration. This study evaluates the postharvest impact of cocoly fertilizer on tomato quality and marketability in Kenya. This review consolidates current literature and field-based insights to assess the influence of Cocoly fertilizer on key postharvest quality parameters in tomatoes such as firmness, shelf life, resistance to physical damage, and market attractiveness. Evidence suggests that Cocoly not only enhances physiological quality and extends storage life but also boosts market value, thereby improving the economic returns for smallholder growers. The review underscores the need for more targeted research, extension services, and policy support to promote the sustainable use of such fertilizers as a strategy to minimize postharvest losses and enhance the competitiveness of Kenya's tomato value chain. Despite these promising results, there is a need for further empirical research across diverse tomato-growing regions in Kenya to validate and contextualize these findings. Such studies will be crucial in informing targeted extension services and policies aimed at promoting sustainable fertilizer use, reducing postharvest losses, and strengthening the tomato value chain in Kenya.

SUB1-055

EX-POST EVALUATION OF CLIMATE SMART WATER HARVESTING TECHNOLOGIES TO INCREASE FOOD AND NUTRITION SECURITY IN KAJIADO COUNTY

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ABSTRACT

Climate change presents a myriad of significant challenges for our planet, reshaping ecosystems, influencing water resources and negatively impacting agricultural production. Harvesting of rainwater is one of the strategies of boosting agricultural productivity in many regions battling drought and water shortage. 'Validating Climate Smart Water Harvesting Technologies to Increase Food and Nutrition Security in Semi-Arid Kenya' was a project carried out in four counties, between the year 2020-2023. Kajiado County was one of the selected, been a region adversely affected by limited water precipitation. Four technologies were introduced, namely; Zai pits, raised double dug beds, infiltration trenches and lined water ponds. The project's objective was to increase agricultural productivity and resilience of farmers by validating and promoting climate smart water harvesting technologies, innovations and management practices. Towards the end of the project, this ex-post assessment study was carried out to ascertain adoption levels of the technologies disseminated for validation. Data was collected using individual face-to-face farmer interviews, focus group discussions, in-depth key informant interviews and observation techniques. Descriptive statistical analyses were used to assess adoption and determine the limiting social economical factors. The study established that despite challenges experienced, farmers had nevertheless adopted and out-scaled some of the promoted technologies. They shared their experiences as well as their coping strategies. Since the study targeted a small section of the households introduced to these technologies, it is limited to show the time effect of adopting the technologies on farm productivity, household food security and incomes. Future research is recommended for assessing the long term social and economic impact of sustained use of the introduced technologies.

Keywords: *Adoption, Assessment, Water harvesting technologies, Adaption, Climate Change*

SUB1-056

EFFECTS OF UTZ COCOA CERTIFICATION ON PRODUCTIVI AND INCOME OF COCOA FARMERS IN THE WESTERN REGION OF GHANA

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ABSTRACT

Cocoa is an important cash crop in Ghana that contributes immensely to the country's socioeconomic development. Production and marketing of the crop is characterized with low productivity because of poor quality of the cocoa beans. In an attempt to salvage the situation, certification programs have been rolled out including UTZ certification. This paper therefore uses the Heckit two stage and the ATE models to examine the effect of UTZ cocoa certification on the productivity and incomes of cocoa farmers. Using a sample data of cocoa farmers in the Western North region of Ghana, the econometric modelling revealed that participation and extent of participation in UTZ cocoa certification has a positive and significant effect on farm level productivity and farm level income. In addition, other factors that affect productivity and incomes of farmers include farming experience, household size, access to credit, membership of farmer-based organization and cost of production. The study highlights the importance of UTZ certification and recommends that farmers are encouraged to participate and increase their extent of participation in the certification program to derive the full benefit from it.

Keywords: *UTZ Certification, Cocoa Farmers, Heckit Two-Stage Model, Productivity, Income*

SUB1-054

OPTIMIZING NITROGEN FERTILIZER USE IN TEA PRODUCTION: CASE STUDY OF NPK 22:6:12 AND NPK 23:5:10 NITROGENOUS COMPOUND FERTILIZER FORMULATIONS

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ABSTRACT

In tea (*Camellia sinensis*) production, use of nitrogenous fertilizers is widely practiced as it has been demonstrated to improve productivity per unit area. Variations in tea yields hence returns have been obtained with use of different sources and/or forms of nitrogen. This study aims to analyze economic optimum rates of two nitrogenous compound fertilizer formulations; NPK 22:6:12 coded BY and NPK 23:5:10 coded AY, as alternative nitrogen source to the standard formulation NPK 26:5:5 used in tea production. In this analysis, three different methods; calculating marginal rate of return after constructing partial budget, marginal analysis without using production function, and marginal analysis for production function were used to determine economical optimum levels of two nitrogen formulations. Three different economic analysis methods were deployed to overcome the challenge in experimental design that was used, particularly the big margin between the treatment rates. Nitrogenous compound fertilizer formulation AY (NPK 23:10:5) proved to be the best in term economic returns followed by fertilizer formulation BY (NPK 22:6:12) and the standard formulation NPK 26:5:5. In terms of agronomic use efficiency of nitrogen; formulation AY (NPK 23:10:5) gave the highest production per unit nitrogen at 58.9 Kg Gl/Kg N followed by formulation BY (NPK 22:6:12) at 53.8 Kg Gl/Kg N and finally the standard formulation NPK 26:5:5 at 47.7 Kg Gl/Kg N. When the fertilizers formulations were evaluated independently as individual nitrogen source using the production function, the economic optimum rate for formulation AY (NPK 23:10:5) was 110.9 Kg N/Ha/yr., formulation BY (NPK 22:6:12) was at 107.3 Kg N/Ha/yr., and the standard formulation NPK 26:5:5 was at 114.7 Kg N/Ha/yr. The two nitrogenous fertilizer formulations; AY (NPK 23:10:5) and BY (NPK 22:6:12) are highly recommended as alternative source of nitrogen to standard formulation NPK 26:5:5 in tea production.

Keywords: *Tea Yield, Economic Analysis, Economic Optimum Rate.*

SUB1-053

ASSET PROTECTION INDEX-BASED LIVESTOCK INSURANCE CONTRACT SUBSCRIPTION, PRODUCTIVITY, AND PRICES

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ABSTRACT

The livelihoods of more than 90 percent of the households in arid and semi-arid areas in Northern Kenya predominantly depend on livestock, mainly cattle, sheep, goats, and camels. Because of over-dependency on livestock, households in Northern Kenya are highly vulnerable to the adverse effects of droughts that occur every 2-3 years. Frequent drought episodes threaten livestock productivity. To protect the animals against the adverse effects of forage scarcity due to severe drought, the International Livestock Research Institute (ILRI) designed and piloted Index-Based Livestock Insurance (IBLI). Given the successful piloting of IBLI, this study is motivated to assess livestock productivity for pastoral households in Marsabit County. The study used panel data to empirically examine the potential effect of output and input prices, vegetation, and subscription to index-based insurance on pastoral livestock productivity for 924 households between 2009 and 2015. Our study applied production elasticities to calculate the Total factor productivity as a measure of livestock performance. The article considers two hypotheses, the Schmookler-Lucas and Hicks hypothesis. The paper applied Random Effects to estimate production and productivity elasticities using a Cobb Douglas and translog production technology. Estimation results support the hypothesis of a negative relationship between past output prices and pastoral livestock productivity, estimated at 1.1%. The result indicates past wages positively affect productivity by 1.6% - 2%, whereas material input price has a negative effect, an estimate of -2%. Lagged vegetation for the Long Rain Long Dry Season (LRLDS) positively affects productivity, by an estimate of 15% -16%, while current vegetation has a negative effect. There is no evidence that a subscription to IBLI increases productivity.

Keywords: *Asset Protection, Index-Based Livestock Insurance, Productivity, Prices.*

SUB1-052

A REVIEW ON THE ROLE OF ACEROPHAGUS PAPAYAE AS A BIOLOGICAL CONTROL OF PAPAYA MEALYBUG (PARACOCCUS MARGINATUS) IN PAPAYA ORCHARDS IN KILIFI AND KWALE COUNTIES

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ABSTRACT

Papaya (*Carica papaya* L.) is an economically and nutritionally important fruit crop for smallholder farmers in Kenya's coastal counties Kilifi, Kwale, and Taita Taveta contributing to household income, food security, and local market systems. However, its productivity has been severely threatened by the papaya mealybug (*Paracoccus marginatus*), an invasive, sap-sucking pest with a rapid reproductive cycle and a broad host range. Infestations causes significant yield losses through chlorosis, premature fruit drop, and loss of entire crop, that has driven farmers to rely heavily on chemical pesticides. This strategy, however, is often unsustainable due to environmental risks, increased cost of products, pesticide resistance, and negative effects on beneficial organisms. In response to these challenges, biological control has gained attention as a sustainable alternative. *Acerophagus papayae*, a host-specific endoparasitoid wasp, has demonstrated remarkable success in managing *P. marginatus* populations in tropical regions of Asia and West Africa. This review explores the biology, global application, and feasibility of deployed *A. papayae* in Kenya's coastal papaya production systems. It draws on scientific literature, expert consultations, and agro-ecological assessments to evaluate the parasitoid's suitability for local conditions. Findings suggest that Kenya's warm, humid coastal climate and the existing institutional capacity of research organizations like KALRO and CABI has presented favorable technical and long term experience for successful implementation. However, constraints such as limited farmer awareness, regulatory hurdles, and funding gaps must be addressed. The review recommends a phased strategy involving farmer based mass rearing, targeted releases, farmer training, policy support, and multi-stakeholder coordination. Ultimately, integrating *A. papayae* into Kenya's pest management framework offered a promising pathway toward sustainable papaya production, ecological balance, and long-term resilience in coastal farming communities.

Keywords: *Acerophagus Papayae, Integrated Pest Management, Invasive Pest, Mass Rearing, Papaya, Papaya Mealybug, Parasitoid Wasp, Smallholder Farmers*

SUB1-051

ASSESSMENT OF PERFORMANCE CONTRACTING AS A MANAGEMENT TOOL ON THE ACHIEVEMENT OF ORGANIZATIONAL GOALS IN THE PUBLIC SECTOR: A CASE STUDY ON THE OPERATIONS OF KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANIZATION

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ABSTRACT

Performance in the public sector has consistently fallen below the expectations of the public owing to unclear and conflicting objectives, lack of autonomy and accountability, and inadequate management information systems. The government of Kenya, in its policy paper on Economic Recovery Strategy for wealth and Employment Creation of 2003-2007 cited that fact as the basis for introducing Performance contracting as a performance management tool in the public sector. This management tool has been in place for the last two decades but its effectiveness has not been well documented. Thus this study identified the Kenya Agricultural and Livestock Research Organization (KALRO) as the area of study in establishing the tool's effectiveness. The target population was 866 employees placed under Performance Contracts. A sample size of 272 staff was taken consisting of 16 top managers, 154 research officers, 29 technical officers, 25 technologists, 12 human resource officers, 12 finance staff and 24 staff from other support departments. A random sampling technique was applied on the identified strata with data being collected using questionnaires. Data analysis was by means of descriptive statistics and a five point Likert Scale weighted average. The findings of the study indicated that the Performance Contracting Strategy had a moderate positive effect on the operations of KALRO. The study is intended to benefit Research organizations including KALRO, the Kenya Government, universities and donor agencies like World Bank. A replication of the research is suggested in organizations whose operations are similar to those of KALRO so as to obtain a wider coverage of participants.

SUB1-050

WILLINGNESS TO PAY FOR PESTES DES PETITS RUMINANTS (PPR) VACCINE IN NAROK COUNTY

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ABSTRACT

Peste des Petits Ruminants (PPR) is a highly contagious viral disease that significantly hampers small ruminant production in sub-Saharan Africa, with annual global economic losses estimated at USD 2.1 billion. In Kenya, and particularly in pastoral regions such as Narok County, the disease poses a critical threat to livelihoods reliant on sheep and goats. Despite the availability of effective vaccines, uptake remains suboptimal in some regions, necessitating a better understanding of the socio-demographic characteristics influencing willingness to pay (WTP) for vaccination. This study presents descriptive findings from a survey conducted among 315 smallholder livestock farmers in Narok County. The analysis explores key socio-economic variables including age, gender, level of education, farming experience, and household size in relation to expressed WTP for the PPR vaccine. Results reveal that the majority of respondents were male with a mean age of 40 years and an average of 43 years of livestock farming experience. Education levels varied, with 30% having completed primary school, 36% secondary education, and 16% tertiary education. Preliminary descriptive trends suggest that those with higher education levels exhibit greater awareness and expressed willingness to pay for the PPR vaccine. Female farmers, although fewer in number, demonstrated a high concern for animal health but faced more financial constraints. These findings underscore the importance of targeting awareness campaigns and policy interventions based on farmer profiles, to enhance PPR vaccine uptake and achieve sustainable disease control.

Keywords: *Disease Control, Farmer Characteristics, Livestock Farmers*

SUB1-049

DO RICE FARMERS SHARE SIMILAR PERSPECTIVES? EVIDENCE FROM A SURVEY ACROSS SELECTED RICE-GROWING COUNTIES IN KENYA

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ABSTRACT

This baseline survey was designed to explore the demand for improved certified rice seed in Kenya, focusing on farmers' decision-making frameworks for selecting rice varieties. Using a cross-sectional and descriptive design, the survey covered ten rice-producing counties and involved 710 respondents through participatory methods. For a more in-depth understanding, four counties were purposefully selected based on their differing histories and intensity of rice production: two counties with a long history and high intensity of rice farming, and two others with a more moderate history and relatively low intensity. Key attributes, or "criteria," that farmers use to select rice varieties were identified from data points across the four counties. These attributes were analysed using a Grid Analysis approach, allowing for county-based and overall rankings of the varieties selected. The results revealed that farmers consistently prioritize attributes such as market demand and high yield, irrespective of spatial separation, indicating the presence of an "invisible hand" guiding their decisions. This influence is largely attributed to the shared public good of research and extension services provided by organizations like the Kenya like KALRO and IRRI. Ultimately, the study confirms that Kenyan rice farmers are rational decision-makers, driven by objectives of profit maximization and food security. The findings highlight the importance of involving farmers in the planning and implementation of research and development interventions for rice improvement, ensuring their rational behaviour is integrated into future agricultural strategies.

Keywords: *Attributes, Grid Analysis Approach, Rational Farmer, Rice Varieties, Variety Choice.*

SUB1-048

EFFECTS OF STAKEHOLDER PLATFORMS ON YOUTH PARTICIPATION IN FINGER MILLET (ELEUSINE CORACANA) VALUE CHAIN IN TESO SOUTH SUB-COUNTY, KENYA

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ABSTRACT

In sub-Saharan Africa, youth participation in agricultural value chains remains a critical pathway for addressing unemployment and enhancing food security .Despite its potential, youth participation in the finger millet (Eleusine coracana) value chain has been limited, particularly in regions like Teso South Sub-County, Kenya. This study investigates the role of stakeholder platforms in promoting youth involvement across various nodes of the finger millet value chain; including production, processing, marketing, and value addition.

A mixed-methods approach was employed, combining surveys, key informant interviews, and focus group discussions with youth groups, farmer organizations, extension agents, and other value chain actors. The findings reveal that stakeholder platforms significantly enhance access to information, training, financial services, and market linkages, which in turn increase youth participation and entrepreneurship within the value chain. However, challenges such as limited access to land, inadequate policy support, and provision of harvesting machines (e.g., threshers and winnowers) for millet farming still hinder their participation.

The study concludes that strengthening stakeholder platforms, with a specific focus on youth-responsive strategies and inclusive policies, can catalyze youth-driven innovation and value addition in the millet sector. These findings offer critical insights for policymakers, development partners, and agricultural stakeholders seeking to harness the untapped potential of youth in rural agri-food systems.

Keywords: *Stakeholder Platforms, Youth Participation, Finger millet, Value Chain, Teso South, Kenya*

SUB1-044

WHAT FACTORS INFLUENCE THE MIXED USE OF MECHANICAL, CULTURAL, AND CHEMICAL PRACTICES AMONG SMALLHOLDER MAIZE FARMERS IN THE MANAGEMENT OF MAIZE LETHAL NECROSIS DISEASE (MLN) IN KENYA? A MULTIVARIATE PROBIT APPROACH

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ABSTRACT

Transboundary pests and diseases pose a major threat to cereal crop production, with maize being a key food security crop. Maize Lethal Necrosis (MLN) remains a significant challenge for Kenyan farmers. While various control practices have been recommended, their adoption levels remain unclear. Most research has focused on disease pathology and resistance, with limited attention to farmers' knowledge and perceptions in management decisions. This study addressed this gap by analyzing the drivers of MLN control adoption using data from 398 households across five agro ecological zones (AEZs) in Kenya, collected in December 2023. Descriptive and inferential statistics, including a multivariate probit model, were used to assess adoption. Results showed that 89.7% of farmers adopted at least one control method, with cultural practices (79%) being the most common and tolerant varieties (7%) the least adopted. Farmers frequently combined mechanical and chemical methods, while chemical and cultural practices were often substitutes. Adoption was influenced by socioeconomic, institutional, and perceptual factors. Age, tropical livestock units (TLU), access to credit, and perceived effectiveness significantly influenced mechanical practices, while larger TLUs, perceived effectiveness, and AEZ location influenced adoption of chemical control. Cultural practices were preferred by farmers with more farming experience, those practicing intercropping, and those with social networks and extension access. Findings underscore the importance of extension services and farmer networks in MLN management. Strengthening farmer groups and information-sharing platforms can enhance knowledge dissemination and encourage the adoption of effective control strategies. Policies should focus on targeted interventions across AEZs to improve access to MLN management resources.

Keywords: *Adoption, Complementarity, Cultural Control, Integrated MLN Management*

SUB1-043

UPLAND RICE CULTIVAR PRODUCTION, PREFERRED VARIETIES AND CONSTRAINTS TO FARMERS' IN LIBERIA

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ABSTRACT

Rice (*Oryza spp*) is the primary staple food crop for over 5.3 million people in Liberia and thus it significantly contributes to food security. Rice is well acknowledged for its significant health benefits, owing to its comprehensive nutritional profile. Despite the numerous benefits of rice, its production in Liberia has remained heavily constrained by low yield, diseases and rainfall variability. To improve rice adoption and productivity in Liberia, it is very important to understand farmers' production constraints and identify their own preferred rice varieties. This study was conducted to assess key production constraints and farmer-preferred rice varieties across the three major upland rice-growing Counties in Liberia. Participatory and group discussions were conducted among 328 upland rice farmers using a comparative approach, probing, and semi-structured interviews. The results of the survey revealed that most of the farmers cultivated more than one variety of rice. The survey also showed there were significant differences in farmers' preferences for rice varieties among the three counties and the choice of varieties varied significantly across districts within the counties surveyed. Of the nine districts, Jorquelleh district had the highest proportion of farmers who chose to grow Jaowo rice variety followed by Fassama rice variety, Mienpea Mahn district, and Congo district, Zoe Gbao district respectively. Across the nine districts, Jaowo rice cultivar is the most preferred variety grown by farmers followed by Fassama variety and black rice respectively. The study found that farmers grow these rice varieties due to their high-yielding capacity, early maturity, and drought tolerance. The highly preferred varieties desired by farmers had attributes such as high grain yield, tall plant height, early flowering and good cooking quality. Constraints such as drought, pests and diseases, availability of seed, high input cost, and post-harvesting were the major challenges in the study areas. Solution is through plant breeding of a resistant variety with better taste and cooking ability be produced in Liberia through the Ministry of Agriculture to rice farmers hence maximize profit and minimize cost of production.

Keywords: *Upland Rice, Constraints, Varieties and Farmers' Preferences*

SUB1-042

SOCIO-ECONOMIC IMPACTS, ENVIRONMENTAL AND ECOSYSTEM SERVICES BENEFITS OF AGROFORESTRY SYSTEMS

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ABSTRACT

Agroforestry systems, where trees and shrubs are integrated into agricultural landscapes, offer ecological benefits that set them apart from conventional agriculture. They are increasingly recognized for their potential to mitigate climate change, enhance biodiversity, improve soil quality, and regulate water cycles. Integrating trees with crops and/or livestock, agroforestry systems offer a regenerative land-use strategy that enhances environmental sustainability while delivering multiple ecosystem services. Despite the adverse effects of forest degradation and biodiversity loss, and people's reliance on forests for their livelihoods, there is little empirical information available on the socio-economic impact on livelihood and ecosystem services among people living around the forest. This study investigates the socio-economic and environmental benefits of agroforestry and forest resource use among 2,255 households living near forested areas in Kenya. Using household survey data and propensity score matching (PSM) techniques, the research assesses how forest benefits-such as wild fruits, timber, honey, and medicinal plants-impact farm productivity and household welfare. The findings reveal a positive but statistically insignificant average treatment effect (ATE) of forest benefits on household income and productivity. This suggests that while agroforestry contributes to livelihood diversification and resilience, the measurable economic impact varies across households and contexts. The findings highlight agroforestry's potential as a climate-resilient, livelihood-enhancing solution in rural landscapes.

Keywords*: Propensity Score Matching, Agroforestry, Benefits*

SUB1-041

ACCELERATING ADOPTION OF SEED POTATO TECHNOLOGIES THROUGH CAPACITY BUILDING AND INNOVATION PLATFORMS

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ABSTRACT

Climate change continues to pose numerous challenges on the sustainability of the agrarian livelihoods in Sub-Saharan Africa. As a result, National Agricultural Research Systems (NARS) have developed Technologies, Innovations and Management Practices (TIMPs) to curb the ever changing climate. However, the adoption of TIMPs still remains low among the smallholder farmers, especially in Kenya. Among the factors derailing the absorption, is the agricultural technology dissemination models, market access and participation, and availability of quality and affordable inputs. In the past, the linear model for dissemination, which involves research to extension to farmer has proven low to none adoption levels of TIMPs. However, the use of Innovation platform (IP) model, where all value chain actors are assembled to diagnose problems and identify solutions and opportunities within the value chain has revealed an increase in the rate of adoption of TIMPs among the smallholder farmers. Therefore, the study developed and utilized potato IP model to accelerate the adoption levels of seed potato in Nakuru and Nyandarua counties in Kenya. Consequently, technology capacity building trainings through farmer field and business schools (FFBS) and farmer led demonstration were utilized to upscale the TIMPs thus improve the adoption rates. The findings indicate that compared to control farmer groups, the farmers in AIP resulted in 60%, 30%, and 50% higher in variety identification, use of certified seed and absorption of seed multiplication technologies respectively. Generally, the study recommends the anchoring of farmer groups on Innovation platforms to accelerate the adoption and utilization of TIMPs developed by the NARS.

Keywords: *Potato, Seed, Innovation Platform*

SUB1-040

ASSESSMENT OF SORGHUM SEED SYSTEMS AND SOURCES OF AGRICULTURAL KNOWLEDGE IN FARMER RESEARCH NETWORKS IN HOMABAY AND THARAKA NITHI COUNTIES, KENYA COUNTIES, KENYA

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ABSTRACT

The farmer seed channels determine the success of crop productivity and stability; hence, understanding where farmers acquire seed is crucial for assessing the accessibility and availability of seeds within communities. The challenge has been the delivery of improved varieties to smallholder farmers through reliable seed channels regularly. Social networks contribute to seed dissemination and the functioning of seed systems, while their importance varies by crop varieties and seed sources. Despite the successful interventions by Farmer Research Networks (FRNs), the sorghum seed system in Kenya is constrained by unsuitable communication structures between linkage partners, poor methods of seed distribution especially improved varieties, reducing the ability to reach smallholder farmers. The study aimed to assess the role of FRNs in sorghum seed systems and sources of agricultural knowledge among smallholders in Homabay and Tharaka Nithi counties, Kenya. Three hundred and fifty-four sorghum-growing households were randomly sampled and interviewed using a structured questionnaire. Data was analysed using Python programming language, a versatile and efficient platform for data manipulation and visualization. The study indicated that the most popular main source of agricultural knowledge in both study regions is farmer-to-farmer research networks. This suggests a strong reliance on peer-to-peer knowledge exchange within the farming community and a decentralized approach to knowledge sharing, emphasizing the collaborative nature of these networks. The study revealed that social networks through the FRNs, farmer-to-farmer seed networks, and community-based seed groups were found to be important to the performance of the sorghum seed system. It was noted that a good percentage of community-based seed groups, research institutes, government extension, and FRN-NGO give seed to farmers before the beginning of the season. Commercial outlets like local markets and Agrovet/Input dealers play significant roles in seed acquisition. However, differences exist in the reliance on informal networks, engagement with external organizations, and extension preferences.

Keywords: *Social Networks, Seed Dissemination, Knowledge Sharing, Seed Channels, Seed Sources*

SUB1-038

ADOPTION AND IMPACT ASSESSMENT OF UTILIZING FORAGE-BASED TECHNOLOGIES AMONGST SMALLHOLDER DAIRY FARMERS IN NAKURU AND NYANDARUA COUNTIES

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ABSTRACT

Application of dairy technologies offer a promising strategy in boosting dairy productivity and improving household income among smallholder dairy farmers in Kenya. These forage-based technologies including animal genetics and utilization of novel climate smart forage feeding systems on-farm offer avenues for technological advancement in improving economic returns from dairy farming. However, uptake of these forage-based technologies aimed at improving dairy productivity still remains low thereby limiting optimal production potential within the dairy farmers. The study assessed adoption rates and impacts of applying forage-based dairy technologies on milk production and income amongst beneficiaries of Dairy Kenya Ireland project in Nakuru and Nyandarua Counties in Kenya. Primary data both in qualitative and quantitative form were collected during through longitudinal evaluation survey involving observations, interviews and focus group discussions from smallholder dairy farmers applying the technologies. Data was analysed using Ms Excel and SPSS to generate multivariate analysis and casual relationship between adoption of promoted forage-based technologies and changes in milk production and income. Results indicated a gradual decrease in variances of milk production during peak (wet) and off (dry) seasons. Lead dairy farmers recorded the highest and positive impact during the dry season at 102% increase in milk production. This was mostly attributed to improved dairy resilience through adoption of improved forages and technologies. In conclusion, applying forage-based technologies and practices are inevitable in boosting feed resource base (quantity and quality) for improved herd productivity and income. The study recommends continuous sensitization and adoption of the forage-based technologies for increased dairy productivity and economic returns amongst dairy farmers.

Keywords: *Adoption, Dairy, Forage-Based Technologies, Milk, Smallholder*

SUB1-037

DETERMINANTS OF MAIZE YIELD GAPS AMONG SMALLHOLDER FARMERS: EVIDENCE FROM A TOBIT MODEL ANALYSIS

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ABSTRACT

This study investigates the effectiveness of push-pull technology (PPT) in reducing the maize yield gap in Eastern Africa, using a Tobit regression model to account for censored yield data. Data were collected from 1200 smallholder farmers in Kenya, Uganda, Tanzania, Rwanda, and Ethiopia, including both push-pull adopters and non-adopters. Descriptive statistics and Tobit regression analysis were used to evaluate the impact of PPT adoption on maize yields, pest control, and soil fertility. The results show that push-pull adopters experienced a significant reduction in yield gaps, with pest management and soil fertility improvements being the primary factors contributing to the increase in maize productivity. Additionally, credit access and off-farm income were found to significantly influence the adoption of the technology. The study suggests that while push-pull technology provides substantial benefits in terms of improving productivity and sustainability, challenges such as labour intensity, initial costs, and access to inputs must be addressed for broader adoption. The findings emphasize the importance of enhancing extension services, credit access, and community-based training to scale up push-pull adoption and close the maize yield gap across the region.

Keywords: *Maize Yield Gap, Smallholder Farmers, Tobit Regression, Agricultural Productivity, Food Security*

SUB1-036

EXISTING FARMER KNOWLEDGE-GAPS THAT CAN SHAPE EXTENSION SERVICES PROVISION TO MANAGE FALL ARMYWORM (SPODOPTERA FRUGIPERDA) IN SOUTHEASTERN AND COASTAL KENYA

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ABSTRACT

With entry of fall armyworm, a devastating pest of maize, in Kenya in 2017, it became necessary to understand farmer coping mechanisms to inform research and extension activities. In 2020, eight Focus Group Discussions (FGD) were interviewed in three south eastern and coastal counties – Kitui, Taita Taveta and Kilifi. The focus was to understand the maize farming system practiced in relation to fall armyworm (*Spodoptera frugiperda*). Face to face interviews and interactions with the FGD were undertaken and farmers allowed to create consensus for each question. This was expected to provide 'average' responses per group. The findings showed that farmers were aware of the pest and its damage. However, they only noticed late instars when the damage is pronounced and irreversible, resulting to an average of 54% yield loss even with the use of insecticides. It is recommended that more efforts should be directed towards enhanced extension service provision to the farmers, and, developing appropriate technologies, innovations and management practices through effective research to come up with an integrated pest management plan for use to manage this pest.

Keywords: *Fall Armyworm, Integrated Pest Management, Maize Yield Loss*

SUB1-035

REVIEW OF AGRICULTURAL INFORMATION DISSEMINATION AND ADOPTION OF NEW YAM TECHNOLOGIES IN NIGERIA

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ABSTRACT

Yam is a significant staple crop in West Africa and other yam-producing regions, significantly contributing to the food security and livelihood of Nigerians. Despite its importance, yam productivity faces numerous challenges such as obsolete agricultural practices and limited access to new technologies. These challenges have led to a decline in productivity and increased prices. Effective dissemination of agricultural information and adoption of new yam technologies is essential to overcoming these obstacles. This review paper provides an overview of the current state of agricultural information dissemination on yam production technology in Nigeria, examines the adoption of new yam technologies, identifies the factors influencing these processes, and explores the impact of adopting these technologies on yam farmers' performance. This paper presents a comprehensive overview of the mechanisms, hindrances, and impacts of information dissemination and technology adoption in yam production in Nigeria drawn from recent literature and empirical studies.

SUB1-029

ARE THERE GENDER DIFFERENCES IN DETERMINANTS OF THE IMPACT OF NEWCASTLE DISEASE VACCINATION ON HOUSEHOLD INCOME? A CASE STUDY OF MACHAKOS COUNTY, KENYA

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ABSTRACT

Newcastle disease (ND) vaccination is a key intervention in poultry development programmes. In Machakos county, initiatives promoting ND vaccination were implemented in poultry development projects since 2012. The main aim of the initiatives was commercialization of indigenous poultry production as an income generating venture for women. These initiatives resulted in men gaining interest in indigenous poultry, taking over ownership and control of the enterprise in some households. It is widely recognized that technology adoption has differential impacts on outcomes for female and male producers, but there is limited empirical evidence on gender differences in determinants of the impact of ND vaccination on household income. In an attempt to fill this knowledge gap, a poultry enterprise survey was conducted where 469 female-owned and 399 male-owned poultry enterprises were randomly sampled. Using an Endogenous Switching Regression (ESR) model, the study evaluated gendered determinants of the impact of ND vaccination on household income. Results revealed that the causal effect of ND vaccination was a 33% increase in household income in male-owned poultry enterprises and a negative effect in female-owned enterprises. An evaluation of determinants of the impact of ND vaccination on household income revealed gender disparities. Lack of access to credit for use in the poultry enterprise, lack of training on poultry production, farm-gate as the point of sale for poultry and poultry products and limited awareness on ND vaccines reduced the impact of ND vaccination on household income where the poultry enterprise was female-owned. In households where the poultry enterprise was owned by a male member, the level of education, landsize and alternative sources of income enhanced the impact of ND vaccination. These findings underscore the importance of identifying and addressing gender-specific determinants through gender-responsive poultry development programmes. A gender-responsive approach is likely to enhance equitable impact of adoption of agricultural technologies.

Keywords: *Gender Differences, Determinants, Impact, Newcastle Disease Vaccination, Indigenous Poultry Enterprises*

SUB1-028

EFFECT OF NON-PARTICIPATION IN GROUP MEMBERSHIP ALONG AIV VALUE CHAIN ON HOUSEHOLD INCOME AMONG FARMERS IN KAKAMEGA AND KISII COUNTIES, KENYA

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ABSTRACT

Participation in group membership is essential for smallholder farmer communities, like enhancing rural development, poverty reduction, productivity gains, and food security (Zakari *et al.*, 2021). At the same time, participation in group membership is associated with problems like free-riding and poor leadership in terms of every leader fighting for self-interest and discouraging non-members from joining (Phakathi *et al.*, 2021). However, most studies focus on the impacts or effects of group membership participation on household income, with limited literature on non-group participation among farmers. The study evaluated the effect of non-participation in group membership along the AIV value chain on household income among farmers in Kakamega and Kisii counties, focusing on assessing factors influencing non-participation in group membership among AIV farmers in Kakamega and Kisii counties. A multistage sampling procedure was used. Structured questionnaires on ODK were used to collect data from a sample of 400 AIV farmers. A binary logistic regression model was used for data analysis. Findings showed that only 11.6% of AIV farmers participated in group membership.

Keywords: *AIV, Group Membership, Non-Participation, Factors*

SUB1-026

SOCIO-ECONOMIC DETERMINANTS OF DIGITAL TECHNOLOGY ADOPTION IN AGRICULTURE: A COMPARATIVE STUDY OF BONDO AND KIMILILI SUB-COUNTIES, KENYA

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ABSTRACT

The adoption of digital technologies in agriculture has the potential to enhance productivity and resilience, yet its uptake remains uneven across regions. This study evaluates the socio-economic factors influencing the adoption of digital technology among smallholder farmers in Kenya using cross-sectional survey data in the sub-counties of Bondo (Siaya County) and Kimilili (Bungoma County). Bondo exhibited a higher non-adoption rate (13.0%) compared to Kimilili (3.2%), highlighting a significant disparity (Pearson chi-square test 15.549, p-value <0.05). A logistic regression model was used to analyze the probability of digital tool adoption based on a range of explanatory variables, including age, education level, gender, primary farming activity,

access to internet and digital training. Results revealed that education, internet access, and digital training significantly increased the likelihood of adoption, while older age was associated with lower adoption rates. Focus group discussions and key informant interviews provided contextual understanding where education, income, access to digital training, and infrastructure significantly influenced adoption rates. Barriers to digital adoption in Bondo included lower digital literacy, limited access to training programs, and weaker market linkages compared to Kimilili. To promote digital uptake, these findings underscore the need for targeted policy interventions such as farmer-centered digital literacy programs, improved internet infrastructure, and financial support. The study contributes to the discourse on inclusive digital transformation in agriculture, offering insights to researchers, development agencies working to bridge the digital divide in rural farming communities.

SUB1-025

ECONOMIC EVALUATION OF A MOTORIZED CASSAVA CHIPPER OVER CONVENTIONAL METHODS.

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ABSTRACT

The study evaluated the economic efficiency of a motorized cassava chipper compared to traditional manual methods. Economic efficiency was assessed in terms of profitability, energy use, and machine durability. A machine is considered efficient if it can perform tasks quickly and at minimal cost. Manual cassava processing is labor-intensive and produces large chips that take longer to dry, affecting overall productivity. The research evaluated the performance of the existing KALRO chipper, a modified chipper and traditional manual methods to determine their cost effectiveness in cassava processing and support decision-making for farmers. Field and station trials were conducted to assess the economic performance of each method. Gross margin analysis and statistical T-tests were used to compare costs and benefits across three repetitions for each chipping approach. The modified chipper outperformed both the KALRO and manual methods, showing higher cost-effectiveness and improved safety. Unlike manual chipping, which poses risks such as finger injuries, the modified chipper offers safer operation while saving time and reducing post-harvest losses. The findings highlight the potential of the modified chipper to improve cassava processing efficiency, food security, and farmer income. There is a need to create awareness and train farmers on its use to enhance adoption.

Keywords: *Economic Evaluation, Cassava, Modified Chipper, KALRO Chipper, Conventional Methods, Gross Margins, Cost-benefit Analysis.*

SUB1-024

IDENTIFICATION OF MAIZE VARIETIES THROUGH GENETIC FINGERPRINTING AND FARMER RECALL: A CASE STUDY OF BUNGOMA AND EMBU COUNTIES

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ABSTRACT

Maize is the main staple food crop in Kenya, thus important in achieving food security. Despite the fact that many improved maize varieties have been developed and shown to increase maize yield significantly, there has been a perennial maize deficit. Assessment of maize adoption rates have relied on farmers' identification and knowledge about the varieties yet molecular markers can make accurate identification, thus giving an opportunity to determine if farmers make accurate identification or not. Variety misidentification may affect farmers' agronomic decisions and misinform other stakeholders in the maize value chain, thus affecting yield and investment in the value chain respectively. Identifying factors influencing misidentification of varieties would be useful for development of maize programs. The objectives of the study were to compare adoption rates between DNA fingerprinting and farmer identification as well as determine factors influencing farmers' misidentification of improved maize varieties. Socioeconomic data was collected from 365 smallholder farmers by use of a structured questionnaire as well as maize samples taken from the interviewed farmers for DNA fingerprinting. A DNA reference library was developed from samples collected from seed companies and agrovets. Data was analysed using SPSS software and a logistic regression model applied. Results from DNA fingerprinting show that in Embu County, 89.6% of the farmers grew improved maize varieties compared to 63% adoption rate calculated from farmer identification. In Bungoma County 96% of the farmers identified growing improved maize varieties compared to 74% of the farmers as identified from the DNA results, indicating a disparity between the two adoption rate methods. Significant factors influencing identification of maize varieties were location, gender of farmer, education and membership of a social group. Stakeholders in the maize seed sector should take note of these factors when developing the seed distributing system.

Keywords: *Maize Varieties, Adoption Rates, Misidentification, Logit Model*

SUB1-023

DETERMINANTS OF ADOPTION OF SUSTAINABLE AGRICULTURAL TECHNOLOGIES ON PIXIE PRODUCTION IN MAKUENI COUNTY, KENYA

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ABSTRACT

Sustainable agricultural technologies are the best agricultural practices adopted by the farmers to help ensure high agricultural production, while protecting the environment from adverse effects. They have an impact on the productivity levels of agricultural commodities. The purpose of the study was to analyze the determinants of adoption of sustainable agricultural technologies among the pixie farmers. Purposive and simple random sampling techniques were used in selection of a sample of 311 pixie-growing farmers. Non-experimental cross-sectional research design was adopted. Multinomial logit model was used to find how the predictor variables influenced the chances of adoption of the specific sustainable agricultural technologies. Three sustainable agricultural technologies were examined: irrigation, integrated pest management techniques and soil and water management techniques. The study revealed that adoption of the sustainable agricultural technologies predicted greater percentages to the model. Irrigation adoption predicted 11.82% of the model, Integrated Pest Management predicted 35.88% of the model while soil and water management predicted 41.83% of the model. Non-adoption of the sustainable agricultural technologies in pixie farming predicted the least percentage of the model (10.47%). Several socio-economic and demographic characteristics of the pixie farmers were found to have increased the chances of adoption of sustainable agricultural technologies. The study recommends for the adoption of the sustainable agricultural technologies in an efficient way to realize increased production levels.

Keywords: *Adoption, Sustainable Agricultural Technologies, Multinomial Logit Model, Integrated Pest Management*

SUB1-022

EVALUATING PUBLIC ENGAGEMENT FOR TECHNOLOGY UPTAKE IN KENYAN AGRICULTURE: EVIDENCE FROM KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANIZATION OPEN WEEK

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ABSTRACT

The 2025 KALRO Open Week survey evaluated public engagement's role in technology uptake within Kenyan agriculture. Findings from 53 participants revealed that educated, group-active farmers adopted innovations more readily, aided by peer learning, social media, and on-farm demonstrations. High mobile phone access supports the expansion of digital advisory services. Strengthening ties with cooperatives, agro-dealers, and mobile platforms can enhance stakeholder engagement and scale climate-smart agriculture. This model offers a replicable pathway to foster agri-food system resilience.

Keywords: *Technology Adoption, Stakeholder Engagement, Climate-Smart Agriculture, Digital Advisory Services, Agri-food System Resilience*

SUB1-021

INFORMATION GATHERING AND THE ADOPTION OF IMPROVED CROP VARIETIES IN KENYA: CASE OF WHEAT FARMERS IN NAKURU COUNTY

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ABSTRACT

Limited access to information on the advantages of poverty alleviation and innovative agricultural technologies is still one of the challenges confronting the adoption of the technology among small-scale farmers in Kenya. Such low capitalization limits the adoption of new technologies, leading to low productivity and poverty, particularly among small-scale farmers. We compare our review to existing literature on social networks and technology diffusion, and emphasize the possibility that social networks

can do much more to increase agricultural technology adoption than is currently known. Specifically, it reports on empirical research findings on the influence of social networks on the adoption of better wheat varieties among smallholder farmers in Kenya. Based on the findings, the adoption decision of farmers is significantly affected by peer adoption behavior, the experience of farm peers, and input from trained agricultural extension agents. Network attributes lower segmentation of farmer groups, high credibility of the information, and smooth flow of information also improve access to information for farmers and hasten the adoption of improved wheat varieties. To promote improved wheat varieties in Kenya, we suggest that policy attention should be prioritized on investment towards strengthening farmer social networks and enhancing the capacity of extension services. This includes training local leaders and farmer groups to serve as information conduits to peers, fostering sound peer learning and assuring the relevance and accessibility of agricultural information. Focus on strengthening these networks will accelerate technology diffusion, enhance information flow, and eventually lead to increased productivity and income of smallholder wheat farmers.

Keywords*: Social Networks, Technology, Adoption, Smallholder Farmers, Wheat Varieties, Information Diffusion*

SUB1-018

FACTORS INFLUENCING THE ADOPTION OF IMPROVED WHEAT SEED VARIETIES AMONG SMALLHOLDER FARMERS IN KENYA

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ABSTRACT

This study examines the factors influencing the adoption of improved wheat seed varieties among smallholder farmers in three counties in Kenya. Cross-sectional data were collected from a randomly selected sample of 180 farming households during the 2024/25 cropping season. Both descriptive and inferential statistical methods were employed in data analysis. Descriptive statistics were used to distinguish adopters from non-adopters, while a logit regression model was estimated to identify determinants of adoption. The descriptive results indicate significant mean differences between adopters and non-adopters based on various household and farm characteristics. The logit model results show that the adoption of improved wheat seed varieties was positively associated with age, household size, level of education, farming experience, labour availability, access to extension services, farm size, off-farm income, and membership in farmer

organizations. The study concludes that enhancing farmer education, expanding the reach and effectiveness of extension services, and strengthening farmer organizations are critical policy measures for increasing the adoption of improved wheat varieties. Additionally, addressing issues related to seed availability, affordability, and accessibility, improving access to agricultural credit, and mitigating risk perceptions are essential for enhancing adoption rates. Strengthening linkages between researchers, seed developers, and farmers is crucial for increasing wheat productivity to meet national demand and enhance food security in Kenya.

Keywords: *Adoption, Determinants, Kenya, Smallholder Farmers, Wheat*

SUB1-017

EFFECTS OF ACCESS TO BASIC FACILITIES IN SMALL SCALE WHEAT PRODUCING REGIONS IN KENYA

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ABSTRACT

Wheat (*Triticum Aestivum*) is the second most important cereal in Kenya after maize. The crop has however been threatened by low yields and reduced acreage in the high potential areas of the country. Northern Rift valley, Southern rift valley, Central Rift Valley and Mt. Kenya regions are the major wheat growing regions in the country. Over 70% of the farms are small ranging between 0.2 and 12 hectares. In large-scale wheat farming the average size of farms is around 700 hectares. Overall, 25 % of the farms range between 20 and 50 hectares. A total of 773 households distributed in all wheat growing regions were interviewed. Data collected included general household information and access to basic facilities, electricity, all weather roads, human and animal health services, credit services, Agricultural extension services, inputs and outputs. Data and information were collected by a questionnaire ,and analyzed by Statistical Package for Social Scientists (SPSS, Version 20) From the findings access to basic facilities varied across all the regions ($P<0.001$) that is electricity ($X^2$1.648E2a,df6,$P<0.001$),all weather road ($X^2$1.028E2a,df6,$P<0.001$),Health services ($X^2$1.533E2a,df6,$P<0.001$),Animal health services ($X^2$2.106E2a,df6,$P<0.001$),access to credit($X^2$1.650E2a,df 6,$P<0.001$),access to public and private extension services($X^2$1.6775E2a,df 6,$P<0.001$),agricultural inputs and output outlets($X^2$1.797E2a,df 12,$P<0.001$). The variability in access of basic facilities across regions indicated that basic facilities were not equally distributed, hence impacting in one way or the other on wheat productivity.

Keywords: *Access, Productivity*

SUB1-016

FARMER PARTICIPATION IN TRICOT TRIALS AND MARKET-DRIVEN SORGHUM VARIETY SELECTION IN MAKUENI COUNTY

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ABSTRACT

The Triadic Comparison of Technology Options (Tricot) is a participatory research approach that actively engages farmers in evaluating agricultural technologies. This study utilized the Tricot method to assess farmer preferences for different sorghum varieties in Makueni County, Kenya, a semi-arid region where sorghum plays a critical role in smallholder livelihoods. A total of 270 farmers participated in the trials, each planting three randomly assigned varieties in a blind assessment to minimize bias. Farmers ranked the varieties based on key performance criteria, including yield potential, drought resistance, bird tolerance, and pest resistance. The findings revealed a strong preference for Pato (44.4%) and Ndume (24.4%), followed by Jasiri and Smart (15.5%), while Gadam was the least preferred variety due to high susceptibility to bird damage. Gender-based analysis indicated that women preferred Pato (28.8%) and Ndume (22.2%), while men favored Pato (15.5%) and Jasiri (13.3%). Farmers prioritized early maturity, high grain yield, and resilience to environmental stressors. These results demonstrate the effectiveness of farmer-led participatory trials in identifying locally adapted sorghum varieties that align with farmer needs. The study highlights the importance of integrating farmer insights with agronomic assessments to improve adoption rates. Key recommendations include promoting the top-performing varieties, providing training on best agronomic practices, expanding trials across diverse agroecological zones, and strengthening farmer-researcher collaboration to enhance future varietal improvements.

Keywords: *Tricot Trials, Sorghum Variety Selection, Participatory Research, Farmer Preferences, Makueni County.*

SUB1-015

BUILDING RESILIENT RICE FARMING SYSTEMS: SOCIO-ECONOMIC INSIGHTS FROM MWEA, KENYA

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ABSTRACT

Rice farming in Mwea, Kenya, plays a vital role in local agriculture, contributing to household food security and rural livelihoods. The region produces approximately 80% of Kenya's domestically grown rice, yet the resilience of this sub-sector is increasingly challenged by climate variability, production constraints, and market dynamics. This study examines the socio-economic aspects of rice farming, including varietal adoption, market access, and the factors shaping production sustainability. Data was collected through farmer surveys and interviews, incorporating both quantitative and qualitative analysis. Findings indicate that while rice remains a staple crop, its production is constrained by erratic weather patterns, pest infestations, and inadequate irrigation infrastructure, with over 60% of farmers citing water shortages as a major challenge. Basmati and Komboka are the dominant rice varieties, with adoption influenced by market preferences, input costs, and extension support. However, economic challenges—such as fluctuating farm-gate prices (ranging from KES 50 to 120 per kg) and delayed payments by cooperatives (often exceeding three months)—hinder farmers' ability to invest in improved practices. Despite these challenges, rice farming remains a critical source of income and food security for many households, with more than 70% of farmers relying on rice as their primary source of livelihood. This study highlights the need for targeted policy interventions, including investments in climate-smart irrigation, strengthening farmer cooperatives, and enhancing access to improved rice varieties. By addressing these socio-economic and policy gaps, stakeholders can build a more resilient rice production system that sustains livelihoods and strengthens Kenya's food security.

Keywords: *Rice, Socio-economics, Adoption*

SUB1-014

CATCHMENT CONSERVATION THROUGH JOINT ADOPTION OF TECHNOLOGICAL AND NON-TECHNOLOGICAL WATER MANAGEMENT STRATEGIES IN KENYA

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ABSTRACT

This paper evaluates the determinants of the adoption of Technological and Non-Technological Water Management Strategies (TWMS & NTWMS) using a sample of 652 households from the Upper Ewaso Ng'iro North catchment in Kenya. The study employs the Seemingly Unrelated Biprobit model to assess adoption decisions. The results show that for the adoption of TWMS; WRUA membership; land size; extension; time to water source; ownership of a radio; crop loss due to floods and owning livestock are the significant determinants. For NTWMS; WRUA membership; education; experience farming; title; tenure security; extension; time to water source; credit; male adults; water sufficiency; crop loss due to floods; livestock loss due to drought; soil erosion; reliability of water source and distance to farm input market are the significant drivers of adoption. The results, suggest that TWMS and NTWMS are substitutes, as such interventions aimed at promoting adoption needs to factor in this aspect for instance, WRUA membership, extension, and time to water source seem to bear antagonistic effects on adoption.

Keywords: *Water, Water Management, Adoption, Climate Change, Ewaso Ny'iro North Catchment*

SUB1-013

THE IMPACT OF SOCIOECONOMIC ADAPTATION ON COMMUNITY RESILIENCE AND DEVELOPMENT

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ABSTRACT

Socioeconomic adaptation refers to the strategies individuals and communities employ to adjust to changing economic, social, and environmental conditions. This study examines how adaptive measures influence resilience, poverty alleviation, and sustainable development. Economic shocks, climate change, and globalization necessitate adaptive responses such as livelihood diversification, education, and policy interventions. Findings indicate that effective adaptation enhances economic stability, reduces vulnerability, and fosters inclusive growth. Communities with access to resources, social safety nets, and skill development programs demonstrate greater resilience. Conversely, marginalized groups face barriers like limited financial access and institutional support, exacerbating inequalities. Policy recommendations include strengthening social protection systems, promoting equitable resource distribution, and integrating local knowledge into adaptation planning. By addressing structural disparities, socioeconomic adaptation can drive long-term development and climate resilience. Keywords: Socioeconomic adaptation, resilience, poverty, sustainable development, inequality. Socioeconomic adaptation refers to the strategies individuals and communities employ to adjust to changing economic, social, and environmental conditions. This study examines how adaptive measures influence resilience, poverty alleviation, and sustainable development. Economic shocks, climate change, and globalization necessitate adaptive responses such as livelihood diversification, education, and policy interventions. Findings indicate that effective adaptation enhances economic stability, reduces vulnerability, and fosters inclusive growth. Communities with access to resources, social safety nets, and skill development programs demonstrate greater resilience. Conversely, marginalized groups face barriers like limited financial access and institutional support, exacerbating inequalities. Policy recommendations include strengthening social protection systems, promoting equitable resource distribution, and integrating local knowledge into adaptation planning. By addressing structural disparities, socioeconomic adaptation can drive long-term development and climate resilience.

Keywords: *Socioeconomic Adaptation, Resilience, Poverty, Sustainable Development, Inequality. Socioeconomic Adaptation Refers to the Strategies Individuals And Communities Employ to Adjust to Changing Economic, Social, Environmental Conditions.*

SUB1-011

SOCIOECONOMIC ASPECTS OF CLIMATE CHANGE MITIGATION AND ADAPTATION IN KENYA: EVIDENCE FROM SMALLHOLDER FARMERS

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ABSTRACT

Climate change poses significant threats to smallholder farmers in Kenya, necessitating effective mitigation and adaptation strategies. This study reviews the socioeconomic impacts of Climate-Smart Agriculture (CSA) interventions led by KALRO across six counties: Nyandarua, Makueni, Machakos, Kericho, Bomet, and Lower Nyando. It evaluates key aspects such as changes in income, food security, employment opportunities, and the adoption of CSA practices concerning farm size, crop type, access to credit, and gender involvement. Utilizing secondary data, comparative analyses, and case studies, results indicate that CSA adoption correlates with income increases of over 60% and improved yields, alongside enhanced employment prospects. The findings align with national policy frameworks, including Vision 2030 and the Paris Agreement. However, challenges persist, particularly in infrastructure, financing, and equitable resource access, highlighting the need for inclusive, gender-responsive strategies and improved policy integration.

Keywords: *Climate-Smart Agriculture, Smallholder Farmers, Socioeconomic Impact, Gender Inclusion, Climate Change Adaptation*

SUB1-010

IMPACT ANALYSIS OF THE NEW GREEN GRAM AND GRAIN AMARANTH VARIETIES UPSCALED IN KITUI COUNTY, KENYA.

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ABSTRACT

Adopting improved agricultural innovation and technologies is a significant strategy to increase productivity of smallholder farmers in Kenya, as it promotes economic growth

and improves the well-being of millions of disadvantaged households. The decision of farmers to adopt improved technologies as well as the rate of adoption is influenced by a variety of economic, social, cultural and sectoral factors. European Union and Government of Kenya supported AgriFI Kenya Climate Smart Agricultural productivity project which was hosted at Kenya Agricultural and Livestock Research Organization to disseminate climate smart technologies. Under the project, KALRO subcontracted two organizations Anglican Development services Eastern and Catholic Diocese of Kitui, medical department to upscale new green gram *(Ndengu tosha, Karembo and Biashara*) and grain amaranth (*KAT-GOLD and Terere Smart*) varieties in Kitui County. The objective of the study was to assess the adoption and impact of new grain amaranth and green gram varieties upscaled in Kitui County, Kenya. Comparative analysis methodology was adopted for the study. This involved in-depth analysis of project baseline survey data conducted in 2020 and endline survey data collected in 2024 in Kitui County. It involved systematically examining similarities and differences between the two studies to draw meaningful conclusions on impact of adopting new grain amaranth and green gram varieties. The AgriFI CS APP baseline data (2020) showed that the most grown green gram varieties were Nylon and local varieties. However, the endline survey in 2024 showed an improvement in adoption of new KALRO technologies, with Karembo, Ndengu tosha, and Biashara being the most grown varieties. The most planted grain amaranth varieties were Terere smart and Kisii white as per the baseline data, with Kat Gold and Terere smart being the most planted as noted during the endline survey 2024 revealing high adoption rate.

Keywords: *Impact, Adoption, Green Gram, Grain Amaranth, Comparative Analysis.*

SUB1-009

COMPARATIVE PRODUCTIVITY AND PROFITABILITY OF CONVENTIONAL, ORGANIC AND GENETICALLY MODIFIED COTTON FARMING: EVIDENCE FROM WESTERN BURKINA FASO

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ABSTRACT

The economic performances of conventional, organic and genetically modified (GM) crops farming systems are highly controverted. Most of the controversies are methodological, including the failure to address selection bias and to control for non-technological factors affecting adoption and performances. Moreover, assessments considering systematically these three farming systems together are very scarce. This paper assesses the relative productivity and profitability of conventional, organic and GM cotton farming in western

Burkina Faso, the largest cotton production zone of the country. A multivalued treatment effect approach, namely the augmented inverse-probability weighting (AIPW) estimator, was used to address the above methodological issues. The data used are from farmers' survey for the 2014/2015 production season, the latest database on socio-economic aspects of the three cotton farming systems before the country's reversal from GM cotton production since 2016. Estimates of average treatment effects revealed that yield was the lowest for organic cotton but similar for conventional and GM cotton farming. Labour productivity was similar for the three cotton systems. Multifactor productivity was the highest for GM cotton but similar for conventional and organic cotton. Despite these differences in physical factor productivity, gross margin per land unit and gross margin per labour unit were similar for the three cotton systems. Indeed, lower cost of insecticide used for GM cotton was offset by higher cost of GM seed. Similarly, lower yield for organic cotton was offset by lower fertiliser and insecticide cost, as well as higher cotton sale price. Nevertheless, gross return on investment and gross margin ratio in organic cotton farming were higher than those in conventional and GM cotton farming. Keywords: augmented inverse-probability weighting (AIPW), Burkina Faso, cotton, genetically modified (GM) crops, organic farming, productivity, profitability. JEL: O13, O33, Q16

SUB1-008

ASSESSMENT OF SMALLHOLDER FARMERS' PERCEPTIONS AND PREFERENCES OF NEW SORGHUM VARIETIES TO ENHANCE PROMOTION AND ADOPTION IN MAKUENI COUNTY, KENYA

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ABSTRACT

Sorghum is increasingly transforming into part of the foundation of successful food and beverage industries after being proven the best alternative to barley for beer brewing. Sorghum farmers in Makueni County in addition to inadequate rainfall, suffer bird damage which could lead to 100% loss. The main varieties preferred in Makueni are seredo, Gadam, KARI Mtama 1 and Serena. The grain yield is reported low compared to research potential with about 32.1% of the farmers harvesting between 151-250 kgha^{1}. One of the major farmers' reasons for the low yields was bird damage. To address this constraint among others, Kenya Agricultural and Livestock Research Organization (KALRO) has developed and released new sorghum varieties characterized with high yield, drought tolerance and low bird damage. These are Jasiri, Ndume and Smart. The objectives of this study were **to establish farmers' perceptions and** identify the most

preferred new sorghum varieties **in Makueni County** to enhance promotion and adoption. Farmers' observations, perceptions and preferences mainly on yield, drought tolerance and bird resistance were collected through a survey contacted during a participatory demonstration plots. Data were analysed using descriptive statistics through SPSS. Results indicated that low bird damage attribute dominated the preferences as observed by 48.6% of farmers combined with the potential to fetch high market prices (5.6 %), earliness (3.7%) and large grain size (2.8%). Jasiri variety dominated in low bird damage (35.8%), high fodder yield (2.8%), early maturity (2.8%) and potential to fetch high market prices (5.5%). Major farmer preferences were low bird damage, large grain sizes, good grain colour and potential of fetching high market prices. To enhance promotion and adoption of the farmers' preferred Jasiri variety, a resilient seeds system and market awareness of the grain will be necessary.

Keywords: *Sorghum, Smallholder Farmers, Bird Damage, Yield, Varieties.*

SUB1-007

ADOPTION AND IMPACT: A PATHWAY TO SUSTAINABLE CHANGE

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ABSTRACT

Adoption of new technologies, practices, or policies is a critical driver of societal and economic transformation. The process involves individuals, organizations, or communities embracing innovations to enhance efficiency, productivity, and sustainability. The adoption curve typically follows phases from awareness to interest, evaluation, trial, and eventual integration into daily routines. Factors influencing adoption include perceived benefits, ease of use, cost, and social influence. The impact of adoption extends across multiple domains, including agriculture, healthcare, education, and business. In agriculture, for example, the adoption of climate-smart practices and improved seed varieties enhances productivity, resilience, and food security. In healthcare, digital solutions such as telemedicine and electronic records improve service delivery and patient outcomes. Businesses leveraging technology adoption experience improved operations, competitiveness, and customer satisfaction. Measuring impact requires evaluating key performance indicators, such as efficiency gains, cost reductions, behavioral shifts, and overall improvements in quality of life. Successful adoption often leads to positive economic, social, and environmental outcomes, while challenges

such as resistance to change, lack of awareness, and financial constraints may hinder progress. To enhance adoption rates and maximize impact, strategies such as capacity building, financial incentives, stakeholder engagement, and policy support are essential. Bridging knowledge gaps and fostering collaboration among researchers, policymakers, and end-users ensures a smooth transition from innovation to impactful transformation. Ultimately, understanding adoption dynamics and measuring impact is crucial for designing effective interventions that drive sustainable change. To enhance adoption rates and maximize impact, strategies such as capacity building, financial incentives, stakeholder engagement, and policy support are essential. Bridging knowledge gaps and fostering collaboration among researchers, policymakers, and end-users ensures a smooth transition from innovation to impactful transformation. Ultimately, understanding adoption dynamics and measuring impact is crucial for designing effective interventions that drive sustainable change. To enhance adoption rates and maximize impact, strategies such as capacity building, financial incentives, stakeholder.

SUB1-005

THE IMPACT OF TECHNOLOGY ADOPTION ON INCOME AND FOOD SECURITY: POLICY IMPLICATIONS FOR FINGER MILLET FARMERS IN WESTERN KENYA

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ABSTRACT

Finger millet is one of the major traditional high value food security crop grown in Kenya and beyond. In Kenya, efforts to raise finger millet productivity to meet increasing human demand in the face of climate change have only yielded marginal results. This has been attributed to low technology adoption. Utilizing household primary survey data for 384 respondents, a cross-sectional study was done to understand the factors affecting the adoption of improved technologies in finger millet and assess the current impact of the technologies on household food security in Busia County of western Kenya. A logit model and the Household Food Insecurity Access Scale (HFIAS) model were used to assess factors affecting technology adoption and the impact of technology adoption on household food security, respectively. Improved technology adoption in finger millet production among smallholder farmers was found to be generally low. Logit model estimates revealed that the distance to the nearest all-weather road, household head membership to a community group and education level of household head were significant

in affecting the probability of adoption of improved finger millet technologies. From the comparative HFIAS score, it was found that more food secure households were found among adopters of improved finger millet technologies than otherwise. HFIAS model estimates found technology adoption in finger millet positively affecting food security in households that had mild food insecurity. It follows that, significant factors affecting the adoption of improved finger millet technologies provide robust policy tools for use to enhance productivity of the crop for sustainable household food security.

Keywords: *Adoption, Finger Millet, Food Insecurity, HFIAS, Impact, Technologies*

SUB1-004

LOGISTIC REGRESSION OF FACTORS INFLUENCING THE DECISION TO CONDUCT SOIL TESTING AMONGST SMALLHOLDER FARMERS IN WESTERN KENYA

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ABSTRACT

Depletion of topsoil fertility over time has led to low agricultural production, particularly for maize (*Zea mays*), the country's staple crop. This paper determined the factors influencing the decision to conduct soil testing among smallholder farmers in western Kenya. The data used were drawn from Tegemeo Institute during the survey period of June-July 2022, with a sample size of 1592 farm households. The data was analyzed using descriptive and inferential (Logistic model) statistics. The findings revealed that less than 8% (N=126) of sampled farm households had conducted soil testing. The marginal effects results showed that perceived fertility of the soil ($P<0.05$), number of groups ($P<0.01$), parcel size ($P<0.05$), age of the household head ($P<0.01$), number of active household members ($P<0.1$), awareness about soil testing lab ($P<0.05$), and access to extension services ($P<0.01$) were statistically significant with positive effect on the decision to conduct soil tests. This study pointed out the need for concerted efforts between policymakers and other stakeholders to promote *in-situ* soil analysis. The study recommends interventions aimed at increasing the number of soil testing centers, enhance farmer awareness through targeted communication strategies, and strengthening public extension services to improve soil testing adoption.

Keywords: *Smallholder Farmers; Maize, Western Kenya, Soil Testing, Logistic Model*

SUB1-003

IMPACT OF TIMPS ADOPTION BY SMALLHOLDER DAIRY FARMERS IN NYERI COUNTY

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ABSTRACT

Nowadays technologies is being introduced in almost all aspects of life, political, economic, social education etc. Agriculture and specifically dairy farming is no exception. Consequently incorporating technology and innovation in the less advanced small scale dairy farming is rather relevant. Modern technologies and innovations can allow livestock products producers optimize their production and reduce environment impact as well as lower production cost.

Activities like Milking, feeding, environmental control and reproductive performance are mostly likely to be affected by correct management decisions. Incorporating technologies, innovation and management practices in these decisions can make production easier and better.

The aim of this study is to deepen knowledge in livestock technology innovation and management practices. We identified appropriate and potential livestock innovations for smallholder farmers and studied there impact on milk yield production and other farm activities. Using a binary logit model this paper therefore examines the impact of the attributed TIMPS to milk yield. The method used for TIMPS dissemination was training through extension service.

Keywords*: TIMPS, Adoption, Innovation; Technology, Management Practice*

SUB1-001

KNOWLEDGE, ATTITUDES, PRACTICES, AND WILLINGNESS TO USE INSECT-BASED TECHNOLOGIES FOR ORGANIC WASTE MANAGEMENT

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ABSTRACT

Organic waste management remains an onerous challenge, particularly in the rapidly growing urban areas. This study surveyed 485 organic waste producers and collectors in Nairobi Region, Kenya, to assess factors influencing their knowledge, attitudes, and practices (KAPs) and willingness to use insect-based technologies to recycle organic waste into value-added products. Cross-sectional research design and multi-stage sampling were used to come up with the study sample. Logistic regression, multinomial logit, and Tobit model were used for analysis. Most respondents (99%) knew about insect-based waste management, with 80% expressing a positive attitude towards the practice, while only 57% were practicing it. Pig and poultry farmers were the most (89%) willing to add value to organic waste using insects, while 75% of the survey respondents were willing to sell the waste if not able to add value. The amount of waste the respondents were willing to recycle was highly influenced by market availability and cost-effectiveness. Despite most respondents possessing good knowledge and willingness to add value using insects, only a few of them recycled organic waste using this approach. Subsequently, increased training and awareness campaigns on organic waste management using insects is crucial for the enhanced adoption of this innovation. Organic waste should be viewed as a resource to boost its recycling and favorable policies be put in place for the same.

SUB-THEME: AGRICULTURAL POLICY RESEARCH

SUB6-009

MONETARY POLICY AND ITS EFFECTS AGRICULTURAL SECTOR PERFORMANCE IN KENYA

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ABSTRACT

The agricultural sector is the mainstay of Kenyan economy whose growth providing employment creation, poverty reduction and increasing food security. To continually achieve these goals in the short-run, the implementation of the appropriate monetary policy instruments is essential. Hence, this study examined the short-run causality between monetary policy and agricultural sector performance. The study examine the impacts of monetary policy on the Agricultural sector gross domestic product (Ag GDP) in Kenya. The methodology included use of time series data between 1981 and 2020 for the study obtained from the Central Bank of Kenya (CBK) and supplemented by economic survey data. The monetary policy instruments in the model were broad money supply (M2), Central Bank Rates (CBR), Cash Reserve Ratio (CRR) and Exchange Rate (ER), and agricultural sector implicit price deflator (ASI). The agriculture gross domestic product (Ag GDP) was the proxy for agricultural sector performance. After first differencing, the Augmented Dickey-Fuller test confirmed the stationarity of the variables. Optimal lag selection-order recommended four lags. The vector autoregressive model, pairwise Granger causality test and Wald coefficient test were used to show the robustness and validation of the causality test. The results of the study indicated that monetary policy Granger-caused agricultural sector performance in the short-run. That is the broad money supply had a positive influence on agricultural GDP while exchange rate displayed a negative impact on the performance agricultural sector. The study recommended that, the government's increase of budgetary allocation to support agriculture and monetary policy commission commitment to maintain exchange rate volatility are necessary to realize full potential of agricultural sector.

Keywords: *Monetary Policy, Agricultural Performance, Exchange Rates, Money Supply.*

SUB6-008

TREND ANALYSIS OF IMPLICIT ADOPTION OF CLIMATE RESILIENT VARIETIES IN KENYA: A CASE OF MAIZE AND BIO FORTIFIED BEAN VARIETIES

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ABSTRACT

The adoption of climate-resilient crop varieties in Kenya is a significant but complex issue, with varying levels of success across different regions and farming practices. Studies indicate a significant "adoption gap" between the potential and actual adoption rates, highlighting the need for targeted interventions to increase awareness and access. These varieties are designed to withstand harsh environmental conditions and improve yields. The methodology included trend, correlation and market share analysis. The null hypothesis low adoption with increasing trends. Trend analysis included visualization of the data to identify patterns and shifts through creation of charts including graphs, bar charts, or other visual representations of the data to see trends. Market share tool analysis was used crucial tool for understanding a variety's competitive position within a market. It involves measuring and comparing a variety's sales performance to the total sales or revenue within a specific market or industry. The trend analysis was also used to forecast future trends in production and marketing of seed for the selected climate resilient crop varieties. The production and sale of climate-resilient maize and bean varieties show a growing trend probably due to increased awareness of climate change impacts and the need for more resilient agricultural practices. This trend is driven by the necessity to adapt to climate-change and the potential for increased productivity, production and income for farmers. Although production and sale of climate-resilient maize and bean varieties seeds show growing trend, adoption among smallholder farmers remains low, highlighting the need for a better understanding of farmers' preferences and willingness to pay for specific traits (Kimathi et al. 2021).

Keywords: *Adoption, Varieties, Climate-Resilient*

SUB6-007

INTEGRATED DISEASE MANAGEMENT STRATEGIES AND POLICY IMPLICATIONS FOR Phytophthora cinnamomi IN AVOCADO PRODUCTION IN KENYA

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ABSTRACT

Avocado plants (Persea americana) are commercially grown in Kenya. It is a major source of income to smallholder farmers and an important foreign exchange earner to the country contributing 7% to the country's Gross Domestic Product (GDP) hence emergence of the avocado fruit as Kenya's 'Green Gold'. Avocado production is affected by the most devastating disease avocado root rot disease from the pathogen Phytophthora cinnamomi. The P. cinnamomi fungus causes avocado root rot making the avocado tree to dry up and eventually die. The study has likened the devastating avocado disease to 'cancer of avocado' as it affects growth and physiology of plants and leading to death of plants. Despite six decades of research, there is no established definitive control measures for this disease. However, it remains a huge loss for farmers whose crop is wiped out by the disease as the disease is soil borne and once a field is affected it easily spread out to the entire catchment area and it becomes very difficult to eradicate. Through systematic literature review and meta-analysis of existing studies, the paper seeks to compile and evaluate various control strategies into a comprehensive approach known as the "integrated disease management of avocado root rot," which is designed to mitigate the effects of the disease and enable the sustainable production of avocados despite the presence of the pathogen. The paper discusses integrated disease management approach which is combining biological, chemical, and cultural practices, along with supportive policy frameworks. This response outlines the key strategies and policy implications for managing P. cinnamomi in Kenyan avocado production, drawing on insights from relevant research supported by a combination of regulatory measures and R&D initiatives. Regulatory frameworks ensure that control efforts are coordinated and targeted, while R&D provides innovative tools and techniques to manage the pathogen sustainably.

Keywords: *Phytophthora cinnamomi, Avocado Root Rot, Integrated Disease Management*

SUB6-006

FOOD SAFETY POLICY ISSUES: FRAUD IN BEEF TRADE

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ABSTRACT

Domestic demand for beef in Kenya has increased over the years owing to the growing population, urbanization, and a growing middle-class with changing dietary preferences. With this demand, fraudsters have invaded the domestic beef market with the illicit donkey meat being passed off as beef. This study analysed the prevailing circumstances along the beef value chain that may contribute to its exploitation by fraudsters, leading to the misrepresentation of beef. A Google Scholar search was run on beef value chain in Kenya to identify vulnerabilities and opportunities for beef fraud. Food laws and legal frameworks were scrutinized, to identify their impact, potential gaps and their effectiveness in addressing beef fraud. The Kenyan beef value chain is highly fragmented, with the meat inspectorate seemingly overwhelmed by the expansive base of slaughter facilities. Factors contributing to beef fraud vulnerabilities identified included; the legalization of donkey slaughter in 2016, poor livestock tracing systems, the ease of misrepresenting illicit meat as beef, unlicensed slaughter facilities and butcheries, inadequate inspectorate capacity (human and technical), disintegrated value chain linkages availing fraudsters exploitative access to livestock and markets, inadequate information systems between actors and regulators, demand for beef in urban areas, international demand for donkey hide, corruption and unethical business culture. Additionally, the legal framework lacks well documented guidelines for beef fraud prevention. Beef fraud prevalence poses public health risks, erodes consumer confidence and trust of regulatory authorities, and contributes to opaque decline of donkey population. The fragmented beef value chain, inadequate meat inspectorate, lack of transparency in the value chain, and non-specificity of the food safety policy are major challenges to beef fraud prevention. The study recommends a specific legal framework to mitigate beef fraud risk and proposes the collaborative effort of multiple levels of actors, regulators and enablers in the beef supply chain.

SUB6-004

CASSAVA PRODUCTIVITY AND MARKETING IN RONGO DISTRICT OF MIGORI COUNTY

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ABSTRACT

Cassava (Manihot Esculenta crunz) has been produced in western and Nyanza regions for decades; the crop has supported many households (HH) both for food and as a source of income. Rongo district in Migori County has been noted to have a great potential in cassava production .This study was carried out in five locations Central Kamagambo, South Sakwa, Central Sakwa, East Sakwa and North Sakwa. Small holder farmers (SHF) have been growing cassava varieties introduced by the Ministry of Agriculture (MOA), KARI and NGO's. Data was collected by way of questionnaire administered in several Households. Focus group discussions (FGD) were held. Despite the high potential in the cassava sector market none of the existing avenues have been exploited. Poor market linkages have led to low utilization of value-addition technologies .Age and gender had great bearing on cassava production. The main aim of the study was to establish the cassava market behaviour and benchmarks in cassava production in Rongo.

Keywords: *Low Utilization, Value Addition, Market Behavior*

SUB6-005

INTEGRATIVE APPROACHES TO AGRICULTURAL POLICY: BALANCING PRODUCTIVITY AND SUSTAINABILITY

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ABSTRACT

Agriculture plays a critical role in ensuring global food security and supporting rural livelihoods, but it also faces the dual challenge of increasing productivity while addressing its significant environmental impacts. This paper explores integrative policy approaches that aim to harmonize agricultural development with sustainability goals. Through a comprehensive review of scientific literature and case studies, this study examines the complex trade-offs, synergies, and policy levers required to foster more sustainable and resilient agricultural systems. The findings highlight the importance of holistic, multi-stakeholder frameworks that align economic, social, and environmental objectives. The paper concludes with a set of tailored recommendations to guide policymakers in developing and implementing integrated agricultural policies that balance productivity, resource efficiency, and climate change mitigation.

SUB6-002

THE IMPACTS OF COMMUNITY-BASED WATER DEVELOPMENT PROJECTS ON RURAL POVERTY AMONG SMALLHOLDER FARMERS: EVIDENCE FROM THE EWASO NG'IRO NORTH CATCHMENT AREA, KENYA

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Paper extracted from Mwaura et al., 2021[1] for the KALRO-SEPD Conference 2025

1 Mwaura, S. N., Maina Kariuki, I., Kiprop, S., Muluvi, A. S., Obare, G., & Kiteme, B. (2021). The impacts of community-based water development projects on rural poverty among small-holder farmers: Evidence from the Ewaso Ng'iro North Catchment Area, Kenya. *Cogent Economics & Finance*, *9*(1). https://doi.org/10.1080/23322039.2021.1882763

ABSTRACT

The main challenge with respect to water in the rural setting, lies in access, control and management. Collective action has been taken up following the International Water Management (IWM) principles and institutionalized in the Kenyan legal framework through water resource users' associations (WRUAs). We carried out this study to assess whether this collective action has any impact on household poverty using objective poverty measures (consumption and income), a subjective poverty measure and a water poverty measure. We used 2019 household survey data of 652 randomly selected rural households from the Upper Ewaso Ng'iro North Catchment Area. We employed the full information maximum likelihood endogenous probit regression model to obtain the impact of WRUA membership on household poverty status. We find that, collective water management can have welfare improving impacts for rural households, especially where there low public investments in water provision, management and access. We recommend that WRUAs be empowered through financial, legal and capacity building interventions to enhance their community impacts.

Keywords: *Objective Poverty, Subjective Poverty, Water Poverty, Collective Action, Rural Poverty, Upper Ewaso Ng'iro North Catchment*

SUB6-001

QUALIFYING SOIL PRODUCTIVITY FOR ACCURATE ESTIMATION OF OUTPUT AND SYSTEMATICALLY ESTABLISHING THE OPTIMUM SOIL CONDITIONS FOR MAXIMUM PRODUCTIVITY THROUGH BUILDING RESILIENT ECOSYSTEMS AND INTEGRATION OF TECHNOLOGY

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ABSTRACT

Soil productivity, a measure of the soil's ability to support plant growth and yield, remains a cornerstone in ensuring food security and sustainable agricultural practices globally. Accurately qualifying soil productivity involves integrating physical, chemical, and biological parameters to estimate output potential while addressing limitations imposed by environmental and anthropogenic factors. This abstract explores a systematic approach to assess soil productivity and establish practices for maximizing it through the development of resilient ecosystems. Effective estimation of soil productivity begins with a multidimensional evaluation of soil health indicators, including nutrient availability, soil organic matter content, pH balance, microbial activity, and physical properties like texture and water-holding capacity. Advanced methods, such as laboratory chemical extractions, remote sensing technologies, and plant tissue analysis, offer precise insights into nutrient dynamics and soil fertility. Additionally, data-driven models and Geographic Information Systems (GIS) facilitate spatial analysis of soil productivity, allowing for targeted interventions at regional and field scales. However, maximizing soil productivity is not solely dependent on measurements and precision agriculture techniques—it also requires an ecosystem-based approach that emphasizes resilience and sustainability. Practices such as crop rotation, intercropping, agroforestry, conservation tillage, and organic amendments enhance soil structure, improve nutrient cycling, and support beneficial microbial communities. Simultaneously, measures to combat soil erosion, salinization, and contamination are integral to preserving productivity over the long term. Building resilient ecosystems hinges on fostering biodiversity both above and below ground, ensuring that soil systems can adapt to environmental stressors, such as climate change, pests, and disease outbreaks. This abstract underscores the interconnectivity between soil productivity and ecosystem resilience, advocating for an integrated framework that balances agricultural output with environmental stewardship. The future of global food systems depends on adopting practices that protect and enhance soil health while optimizing crop yields.

SUB-THEME: AGRICULTURAL RESEARCH METHODS AND ANALYTICS

SUB7-016

STATISTICAL EVALUATION OF PASSIONFRUIT IN KISUMU, SIAYA, VIHIGA, KAKAMEGA AND BUNGOMA COUNTIES UNDER AGRI-JOBS 4 YOUTH PROJECT

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ABSTRACT

Among the youth-friendly value chains selected, passion fruits have a high potential of earning incomes for attracting youth and providing long-term livelihood. A study for the suitability of different passion fruits varieties (yellow, purple and Ester) and intercrops (Kales and beans) in different agro-ecological zones in Kisumu, Siaya, Vihiga, Kakamega and Bungoma counties. The Split Plot design was used. The highest height recorded then was 180cm for yellow passionfruit intercropped with beans followed by pure stand of yellow Passionfruit (175cm) in Kisumu County while the lowest was purple passionfruit intercropped with Kales in Vihiga County (60cm).

Keywords: *Passion Fruit Varieties, Agro Ecological Zones, Split-Plot Design, Cover Crops*

SUB7-015

FARMER-RESEARCHER PARTICIPATORY EVALUATION OF SORGHUM BEAN CROPPING SYSTEMS ON SORGHUM PRODUCTIVITY IN THARAKA NITHI COUNTY

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ABSTRACT

Sorghum is an ideal crop for arid and semi-arid lands (ASALs). This study was carried out to determine the effect of cropping systems on sorghum and land productivity in ASALs of Tharaka Nithi County. The experiment was on a Randomized Complete Block Design replicated three times in the rains of March, April and May, 2023 in Mukothima and Tulima Tweru. Sorghum varieties (*Kamani, E5* and *Gadam)* were planted as sole crops and in intercrops of Nyota beans under MBILI, additive and alternate cropping systems. Sorghum farmers were invited to assess the crops performance at maturity. In both sites sorghum grain yield under MBILI, additive, and sole crop were at par ($p > 0.05$), but exhibited significantly higher grain yield to alternate cropping system ($p \leq 0.05$). Land productivity increased by 72% and 71% due to additive and 67% and 83% due to MBILI cropping designs in Mukothima and Tulima Tweru respectively ($p \leq 0.05$). Alternate cropping system exhibited an increase in land productivity in Mukothima (+33%) and a decrease in land productivity in Tulima tweru (-2%) ($P > 0.05$). MBILI cropping system produced the highest revenue at 972$/ha, and in Tulima tweru additive design produced the highest revenue at 1045$/ha. In both sites, revenue by additive and MBILI were at par, but significantly ($p \leq 0.05$) higher to alternate design and sole crop. More women (78%) participated in the cropping system participatory selection compared to men (22%). Depending on the performance of beans, most farmers preferred MBILI (38.8%), followed by additive (34.7%) and then alternate cropping system at 24.5%. Depending on sorghum performance additive cropping system was most preferred followed by MBILI cropping system and alternate cropping system was least preferred. Additive and MBILI cropping systems can optimize farm output and revenue.

Keywords: *Sorghum, Cropping Systems, Ridging, Farmers Preferences*

SUB7-014

PERFORMANCE OF ADVANCED CLONES AND THEIR YIELD POTENTIAL AT KALRO TIGONI

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ABSTRACT

Potato (*Solanum tuberosum* L.) is among the most economic important root and tuber crops in Kenya. It serves as a food source and a source of revenue for farmers. Despite prominence of the crop in the food diet, the yield produced at farm levels has been poor. A primary factor contributing to the poor potato production and productivity in the nation is the scarcity of high-yielding, disease-resistant varieties.

In light of this, KALRO-Tigoni conducted a nationwide variety trial for potatoes with the goal to decipher the yield potential of the advanced clone for the long rain cropping season of 2023.

In this experiment, five advanced clones were tested along with the standard and local checks in randomized complete block design with three replications on plot size of 20.25 m^2 planted at a spacing of 75 cm × 30 cm between rows and plants, respectively. The results indicated that the clone MSR-127-2 had the highest total tuber yield of 9.22t/Ha. The clone MSR-127-2 had the highest marketable tuber yield at with 8.02t/Ha and then IG 70 with marketable yield of 7.89 t/Ha. The clone IG35 had the highest seed yield at 6.25 t/Ha followed by the clone IG 70 at 6.16 t/Ha. The clone IG35 had the highest specific gravity of 1.101 among all the clones. However, the other advanced clones also had relatively very high specific gravity raging between 1.0799 – 1.0956 with the clone 6C11 having the lowest. It can be deduced from this experiment that the advanced clones MSR-127-2 and IG 70 yielded more than the checks. This show that the advance clones present a potential variety to be utilized by farmers to bridge the gap of yield increase that is required for food nutrition and security. Furthermore, these clones had high specific gravity and can be used for processing.

Keywords: *Variety, Advanced Clones, Marketable Yield, Specific Gravity*

SUB7-013

CLIMATE SMART RICE VARIETIES DEVELOPMENT THROUGH FARMERS PARTICIPATORY PLANT BREEDING

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ABSTRACT

Farmers' participation during variety development and selection can promote adoption of the released cultivars. Farmers therefore, have been involved during KAFACI rice variety evaluations in order to capture and incorporate their desirable attribute requirements for faster variety adoption upon commercialization. Rice consumption is estimated at 1,000,000 while production is at approximately 300,000 mt per annum, thus creating a net deficit of about 700,000 mt that is met through importation, hence draining the meagre resources from the other sectors of the economy. There is urgent need to develop high yielding climate smart rice varieties with desirable end user traits for each of the ecologies and any multi-ecological variety could be highly desirable. In order to come up with climate resilient varieties, different lines derived from double haploid crosses between elite African landraces and Korean Tongil type were evaluated in Mtwapa, Mwea, Kwale and Alupe where farmers had opportunities to participate and give their inputs and observations. The design used was RCBD with spacing of 20x20 cm both inter and intra row spacing by direct seeding, while check variety being the farmers preferred variety. Normal rice production practices were observed. Data was collected on days to 50% flowering, Maturity days, Plant height, disease and pest score, yield and general phenotypic acceptability. While the farmers varieties yielded as low as 0.4 t ha-1, the KAFACI double haploid derived lines yielded as high as 5 t ha-1. Most of the KAFACI lines had the preferred consumer traits such as medium to long, thin and white grains after milling. The phenotypic appearance of both plant architecture and grains were generally good for KAFACI materials and even ratoonability was good for some lines. Ratoonability has become very important for livestock-crop interphase and it's a trait gaining momentum for farmers because of extra yield of upto 70%.

SUB7-012

RESEARCH METHODS AND APPLIED STATISTICS (RMAS) TRAINING PROGRAM AT KALRO FCRI KITALE

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ABSTRACT

KALRO FCRI Kitale has a mandate to conduct research in food crops and has establish platforms for the purposes of sharing research information through training of students and other KALRO stakeholders. The study aimed to support and promote the training in research methods and applied statistics in agriculture. A survey was conducted at KALRO FCRI Kitale in 2025 and data was collected for the period of four years on students admitted for industrial attachment in Research Methods and Applied Statistics department. A training manual developed in 2013 was used for training. The training manual is tailored to the different student's educational background. The students complete individual and group assignments after every topic through emails and oral presentations. The data was subjected to simple analysis using Microsoft Excel worksheet. A total of 175 students have been trained since 2022, of which 51% were males and 49% were females. Majority (87%) of the students were certificate and diploma holders while only 13% of students were degree holders. The degree varied from BSc in statistics or statistics with ICT/mathematics/IT/economics/computing. The highest admission of students for industrial attachment was observed in 2023 constituting 47%, followed by 2024 (25%), 2022 (22%) and 2025 (6%). May, June, July 2024 intake had the highest admission compared to the January, February, March intake and September, October, November intake across the years. Majority of the students (60%) did not have an up to date Curriculum Vitae. After the attachment period, most of the students analytical, writing and presentation skills were improved. The career road map provided the students with a holistic training in terms of academic, professional, social and spiritual growth and the potential tradeoffs among the choices made.

Keywords: *Capacity Building, Mentorship, Research Methods and Applied Statistics, Career Road Map, Trainings.*

SUB7-011

ECONOMIC VIABILITY AND TECHNICAL EFFICIENCY OF AFRICAN INDIGENOUS VEGETABLES IN KISII AND KAKAMEGA, KENYA.

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ABSTRACT

African Indigenous Vegetables are increasingly recognized for their nutritional, economic and ecological benefits, especially their significant potential to contribute to food security and the economic well-being of smallholder farmers. Despite their potential, AIVs remain under-researched in terms of economic viability and production efficiency. This study examines viability and technical efficiency of AIV production through gross-margin analysis, cost-benefit analysis (CBA) and Stochastic Frontier Analysis (SFA). Primary data were collected from 307 smallholder AIV farmers through a multi-stage sampling technique in Kisii and Kakamega through structured questionnaires. Gross margin and CBA assessed the financial performance of AIV production, while a Cobb-Douglas SFA was employed to measure technical efficiency and identify inefficiencies in resource use at the farm level. The results revealed that AIV production is generally profitable, with positive gross margins and favourable benefit-cost ratios. Further, results revealed that average technical efficiency in the production of AIVs was 88% for both counties which showed many farmers operating below the optimal production frontier, suggesting significant room for improving efficiency through better resource management. Key factors found to significantly influence technical inefficiency were farmers' experience, household size, credit access, gender, market access and use of certified seeds. In conclusion, the production of AIVs exhibits decreasing returns to scale. These findings highlight the potential for improving farm-level performance through targeted support services, knowledge dissemination, and policy interventions.

SUB7-010

EFFECTIVENESS OF ORGANIC AND INORGANIC SOIL AMENDMENTS ON FORAGE AND YIELD QUALITY OF MAIZE IN TWO AGRO-ECOLOGICAL ZONES OF KENYA

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ABSTRACT

Phosphate (P) fertilizer use is crucial for enhanced crop productivity. Integrated P management through combined use of organic and inorganic amendments improves soil fertility while maize food and fodder production can benefit from such practices. A study was, therefore, conducted to evaluate effects of various P fertilizer sources; organic (press mud & cow manure) and inorganic (Triple Super Phosphate-TSP) amendments at different ratios (full rate, half and thirds) to supply 30kg P ha-1 for maize production. The field experiment was carried out in Kibos and Bumula, western Kenya using the Maize variety H520. Soil characteristics forage yield quality and grain yield were measured. Combined use of press mud, cow manure and TSP each providing a third (10kgP ha-1) of P required PM10+CM10+TSP10), press mud (two-thirds) and cow manure (a third) (PM22.5+CM7.5) and TSP and Cattle manure applied each at half rate. Combining the three amendments each at third (10kgP ha-1) P rate (PM10+CM10+TSP10) and applying TSP and Cow manure each at half P rate. Largest (4.6 t ha-1) dry matter yield and (4.6 t ha-1) TSP15+PM15 dry grain yield were observed from combination of TSP and press mud each at half P rate (TSP15+PM15) and in combination of all amendment applied at a third P rate (PM10+CM10+TSP10). for grain yield the highest treatment was TSP15+PM15 with (4.6 t ha-1) at Bumula site and 4.3 (t ha-1) at Kibos site. There were no significant difference between TSP30, TSP15+PM15 and MP10+CM10+TSP10 but the highest for forage yield was was PM10+CM10+TSP10 with mean value of 4.6 (ton per ha-1) .Nutritional quality of the forage from the various p amendments was variable Acid detergent fiber (ADF) fluctuated from 22.23 to 43.85% and best ADF was TSP15+PM15 at Kibos, ADL fluctuate between 5.23 to13.74, the best in ADL was PM10+CM10+TSP10 at Kibos, nutrient detergent fiber.

SUB7-009

BRIDGING THE GAP: ALIGNING FARMERS' SEED DEMAND WITH RESEARCH METHODS IN KENYA

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ABSTRACT

Because there has also been progress over the decades in the creation of better seed varieties, however, their uptake among smallholder farmers is heterogeneous. This indicates that existing research methodologies to investigate farmers' seed demand may be ill-equipped to capture the multifaceted decision-making processes and behavioral dynamics behind seed selection and acquisition. Drawing from the socio-cultural dynamics of the methods theoretical framework, we, posit those methodological approaches to the study of seed demand shape seed availability. The access to, and perceived desirability of seeds is extremely context-specific and depends also on a farmer's socio-economic status (SES), the functional role of a particular crop or variety within the farming system market integration, and agro-ecological conditions. These contextual variables display considerable heterogeneity between farming communities. But existing research methodologies often do not sufficiently capture these dynamic and multidimensional factors. This is mainly because they produce fragmented and cross-sectional insights introducing various biases and constraints in wholesomely capturing the farmers' seed preferences and needs. To overcome these methodological constraints, we call for a more integrative and holistic approach to seed systems research. Such an approach must account for variability in real-world farming contexts while yielding robust empirical metrics to inform evidence-based decision-making by seed sector stakeholders and policy-makers. By increasing the methodological rigor in seed demand research, we will ultimately be able to enhance seed accessibility, adoption, and thus the agricultural productivity of smallholder farmers.

Keywords: *Inclusive Development, Seed Systems, Social Sciences.*

SUB7-006

THE ROLE OF EDUCATION IN MODERATING THE IMPACT OF CASSAVA VARIETIES AND FERTILIZER APPLICATION LEVELS ON CASSAVA PRODUCTION IN WESTERN KENYA.

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ABSTRACT

This study investigates how education moderates the effects of cassava variety (local vs. improved) and fertilizer application levels (low, moderate, high) on cassava production among 300 households in Western Kenya. Using hierarchical regression models, the research assesses whether education enhances the productivity of improved varieties and optimal fertilizer use. The objectives include: (1) examining education's moderating role in the cassava variety–production relationship, and (2) evaluating its influence on the fertilizer–production relationship. Findings aim to inform strategies for improving cassava production.

The analysis was conducted using SPSS v.27, where three models were developed to evaluate the relationships among the variables. Model 1 focused on the main effects of cassava variety and fertilizer application levels on production. The results indicated that both improved varieties and high fertilizer levels significantly increased cassava production, with coefficients of $B=497.10$ ($p < 0.001$) for improved varieties and $B=530.43$ ($p < 0.001$) for high fertilizer levels. However, moderate fertilizer levels did not yield significant results ($p=0.247$).

Model 2 introduced education as an additional predictor variable. While the direct effect of education on production was not statistically significant ($B=-34.47$, $p = 0.774$), it was essential for understanding the interaction effects in subsequent analyses.

Model 3 incorporated interaction terms to evaluate the moderation effects of education on the relationships between cassava variety, fertilizer levels, and production. The results revealed a significant interaction between variety and education ($B=-1142.62$, $p < 0.001$), indicating that education negatively moderated the effect of improved varieties on production. This suggests that educated farmers may require training to fully leverage improved technologies.

The findings highlight the importance of integrating educational interventions into agricultural programs to optimize productivity among farmers in Western Kenya.

Keywords: *Moderation Analysis, Education, Cassava Production, Fertilizer Application, Hierarchical Regression.*

SUB7-005

PRODUCTIVE EFFICIENCY OF AGRICULTURAL HOUSEHOLDS IN THE FACE OF FOOD INSECURITY IN KANEM PROVINCE

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ABSTRACT

This article aims to determine the productive efficiency of agricultural households and identify the factors that determine their yield. A total of 300 agricultural producers are randomly selected and interviewed using a structured questionnaire to obtain data related to agricultural production in the oases of Kanem, the use of inputs during the year 2024. The Data Envelopment Analysis (DEA) technique is used to determine the technical efficiency levels of these operations. In addition, a Tobit regression model is applied to identify the factors influencing the technical efficiency of farms in agricultural production.

The average technical efficiency is estimated to be 72.6%, indicating that there was a substantial level of technical inefficiency of the sampled producers. The results show that the productivity of agricultural producers remains low in the research area. The results show that 2.24% of producers have a total technical efficiency (TEG) score of less than 40%, while 29% of producers have a total technical efficiency score of 100%. The minimum ETG level is 12.5%. As far as the factors of production are concerned, the results show that productivity is significantly influenced by the area under cultivation, the use of fertilizer with coefficients of 0.185 and 0.068 respectively and negatively by the use of pesticides and the quantity of seeds with coefficients of -0.233 and 0.107 respectively. As far as the explanatory factors of technical inefficiency are concerned, they are significantly negatively influenced by management, age and sex with coefficients of -1.510, -0.043 and -0.847 respectively. It is therefore recommended that a policy be undertaken to improve the formal education of producers, to strengthen the capacities of their organizations and to provide access to land and inputs.

Keywords: *Efficiency, Agricultural Households, Food Security, Kanem.*

SUB7-004

PROPENSITY SCORE MATCHING APPROACH FOR THE INTERACTIONS BETWEEN PASTURE BIODIVERSITY, MILK PRODUCTION AND GREENHOUSE GAS EMISSIONS IN SMALL AFRICAN DAIRY SYSTEMS

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ABSTRACT

The highlands of Kenya comprise some of the most biodiverse regions of the world. Smallholder farms account for 80% of all farms in Kenya (and pasture accounts from 53% to 100% of feed dry matter intake by cattle, depending on season. Despite the significant research focus on livestock-rangeland dynamics in Kenya, the interplay between biodiversity, livestock and pastures on smallholder farms in the highlands remains largely unexplored. To obtain a sample size of 30 pioneer farms and their controls, we used a Rural Household Multi-Indicator Survey data for Bomet County on n=511 farms. Initially, we excluded farms based on pastureland ownership and proportion of grazing in the feed basket (n=468) farms. To identify and characterise positive deviant farmers, a structured telephone survey designed to capture the indicators of pasture biodiversity was administered, from which, a pareto optimality criterion for positive deviance was applied resulting in 41 positive deviant farmers (pioneers). Principal Components Analysis (PCA) (nearest-neighbour-matching) was employed to select controls. We finally, conducted scoping interviews, using a semi-structured questionnaire and collected soil samples for analysis of SOC, TN, pH and Texture to control for soil parameters, after which 30 pioneer farms and their controls were validated. Here we report the research methodology and analytics whereby, we detail the matching quality, diagnostics and the study preliminary analysis. Preliminary results indicate that the quality of the matching was quite good since pioneers and controls were well matched and differed significantly on the highest cow's: current milk production($p=0.011$), peak milk production ($p=0.013$), number of paddocks (0.047), and knowledge-sharing on pasture management (0.001) as expected. This quality matching will necessitate testing of the long-term study hypothesis on the effect of pasture biodiversity on milk productivity and greenhouse gas emissions in small-scale farms in the ongoing project work.

SUB7-003

PROPENSITY SCORE MATCHING APPROACH FOR THE INTERACTIONS BETWEEN PASTURE BIODIVERSITY, MILK PRODUCTION AND GREENHOUSE GAS EMISSIONS IN SMALL AFRICAN DAIRY SYSTEMS

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ABSTRACT

The highlands of Kenya comprise some of the most biodiverse regions of the world. In Kenya, tropical highland regions account for only 11% of the total land area) but are home to most of the country's population). These regions, however, are under significant threat to land degradation as a result of human-induced climate change, land-use change, and the unsustainable use of the natural resources. Dominating the landscape in densely populated areas of the East African highlands are smallholder livestock farms practicing extensive and semi-intensive farming, often relying on semi-natural grasslands and managed pastures for feeding their livestock. These farms are critical to the ecological dynamics of these ecosystems. Smallholder farms account for 80% of all farms in Kenya (and pasture accounts from 53% to 100% of feed dry matter intake by cattle, depending on season. Despite the significant research focus on livestock-rangeland dynamics in Kenya, the interplay between biodiversity, livestock and pastures on smallholder farms in the highlands remains largely unexplored. This research gap necessitates a thorough investigation of the ecological and economic implications of pasture management in these biodiverse and vulnerable areas. Understanding these issues would help guide policy for increasing milk production. To study the interaction between pasture diversity, milk production and greenhouse gas emissions an adapted version of a Rural Household Multi-Indicator Survey RHoMIS data for Bomet County was used on 511 farms. In the initial screening of 511 farms, we excluded farms based on two criteria: ownership of pastureland and the proportion of grazing in the feed basket. The effective sampling frame that remained after exclusion was 468 households. To identify and characterise positive deviant dairy farming systems in Kenya's highlands, on pasture biodiversity, adaptation to climate change, and evaluate the effects of the implementation of climate smart agricultural practices on farm productivity and GHG emissions.

SUB7-002

SURVIVAL ANALYSIS FOR IMPROVED BORAN CALVES USING KAPLAN-MEIER AND COX PROPORTIONAL HAZARDS MODELS: A CASE STUDY AT BEEF RESEARCH INSTITUTE, LANET KENYA

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ABSTRACT

Calf survival is a critical factor influencing the productivity and sustainability of beef production systems, particularly in arid and semi-arid lands (ASALs) where environmental and management challenges contribute to high calf mortality rates. Despite its importance, few studies have used time-to-event statistical methods to assess mortality risks in improved Boran calves. This study aimed to evaluate survival probabilities and identify key risk factors influencing calf mortality in improved Boran cattle at the Beef Research Institute, Lanet, Kenya. A retrospective dataset of 1,329 improved Boran calves (2005–2020) was analyzed using Kaplan-Meier survival estimation and Cox Proportional Hazards regression. Factors examined included parity, sex, birth weight, weaning weight, and season of birth. The one-year survival probability was 84%. Parity significantly influenced mortality ($p < 0.005$), with higher-risk calves born to high-parity dams (≥6 births). Sex, birth weight, and season of birth showed no significant effects. Optimizing parity control and improving calf nutrition can enhance survival.

Keywords: *Survival Analysis, Kaplan-Meier Curve, Cox Proportional Hazards Model, Calf Mortality, Boran Cattle*

SUB7-001

AGRICULTURAL RESEARCH METHODS AND ANALYTICS

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ABSTRACT

Agricultural research methods and analytics play a crucial role in advancing sustainable food production, improving farm practices, increasing crop yields, and addressing global challenges like: climate change, population growth, food security, pests and soil degradation. It aims to improve crop and livestock production, enable decision making, soil management, and pest control and climate adaptation. Traditional research methods like field surveys enables researchers to assess practices like soil health, pest management and yield performance under controlled conditions. Modern analytics integration has revolutionized those methods, leveraging big data, machine learning and remote sensing technologies enhancing precision and scalability. Statistical tools like regression analysis and multivariate modelling are used to interpret experimental data, identify patterns and predict agricultural trends. Geographical information systems and satellite imagery are used to monitor land use, water distribution and climate impacts, enabling site-specific management strategies. Participatory research methods and on-farm trials enhance scientific advancement tailored to local context fostering adoption among smallholder farmers. Genomics and bio-informatics advancements ensure genetic data analysis to develop resilient crop varieties and improve breeding programs. Adoption of internet of things (IOTs) devices like soil sensors and drones generate real time data streams which when integrated with Artificial intelligence(AI) ensure a dynamic monitoring and adaptive responses to environmental changes. Despite these advancements, challenges also exist like data quality and accessibility, data scarcity, digital divide in rural regions, and interdisciplinary collaboration to apply findings practically. Agricultural research methods must evolve to integrate socioeconomic factors, farmer knowledge and physical implications alongside biophysical data. This approach will drive innovations and sustainable agriculture thus meeting demands of rapidly changing world. Future research should focus on integrating sustainable intensification principles and refining climate smart agricultural models. Combining traditional agronomic principles with modern analytics, agricultural research continues to foster innovations that enhance food security and environmental conservation.

SUB-THEME: SOCIOLOGY AND ANTHROPOLOGY IN AGRI-FOOD SYSTEMS RESEARCH

SUB13-008

BEYOND NUMBERS: RECLAIMING THE VOICE OF COMMUNITIES THROUGH ETHNOGRAPHY IN AGRI-FOOD SYSTEMS RESEARCH IN KENYA

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ABSTRACT

This paper explores the role of ethnography in reclaiming the voices of communities within Kenyan agri-food systems research dominant by quantitative paradigm over the lived experiences and perspectives of farmers. Drawing from interdisciplinary literature including anthropology, institutional theory, technography, and decolonial feminist epistemologies, it examines the socio-cultural and political dynamics that shape farmer behaviour, policy implementation, and value chain participation. Particular focus is given to the voices and experiences of project beneficiaries including women, youth, Vulnerable and Marginalized Groups (VMGS) and grassroots cooperatives. A critical lens is applied to examine how impression management and role performance shape research encounters and data production, often leading to the exclusion or distortion of community knowledge in agricultural policy and practice. By integrating ethnographic methods such as participatory action research (PAR), oral histories, and photovoice, the study shows how communities can become co-creators of knowledge and policy-relevant insights. The analysis underscores the potential of ethnography not only as a method but as a political act that challenges dominant knowledge systems, advancing epistemic justice and inclusive development. It demonstrates that qualitative approaches are not merely complementary to quantitative methods but foundational for revealing the symbolic meanings, moral economies, and institutional practices that affect agricultural innovation, resilience, and uptake. The paper concludes by calling for the mainstreaming of ethnographic and participatory methodologies in research and development programs, the restructuring of evaluation criteria by donors to value local knowledge, and the development of a national framework that integrates community voices into agricultural research systems. These recommendations support Kenya's Bottom-Up Economic Transformation Agenda (BETA) and contribute to global efforts to build inclusive, resilient, and sustainable food systems.

Keywords: *Ethnography, Participatory Research, Agri-food Systems, Epistemic Justice, Inclusive Research*

SUB13-006

LOCAL VALUE CHAIN ANALYSIS AND MAPPING (LVCD) FOR IMPROVED PRODUCTIVITY. A STUDY OF SAMBURU COUNTY

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ABSTRACT

A study was done on an assessment of Local Value Chain analysis and mapping in Samburu County with the goal of establishing existing and potential Agricultural value chains (crops and livestock) and Apiculture in Samburu County. Samburu County is classified as one among 10 poorest arid and semi-arid Counties in Kenya characterized by severe living conditions, with unreliable rainfall.

The study employed a multi-stage sampling design. The target population was identified based on available data on population estimates computed through the help of local leaders and target sample (number of respondents from each village) were computed pro-rata to the total desired sample size. Data was collected on kobo collect platform and analyzed through computer aided programmes including excel and SPPS.

The assessment identified climate resilient livelihoods and sustainable alternative livelihood options to destructive livelihood sources and how women and at-risk girls participate in them. The findings of the study revealed that Samburu County has livestock related value chains with very little mixed crops production systems. The diverse agro-ecological zones imply potential for diverse agricultural value chains. The existing value chains are characterised by limited commercial orientation and deep rooted subsistence agriculture not sufficient to support sufficient food. Similarly, most farm households in the county have limited commercial orientation occasioned by low farm productivity, reliance on rain fed agricultural production systems, under-developed market structures with limited farmer linkages and poor physical infrastructure especially road connection among other factors.

The study recommendations included that there is need of strengthening technical assistance to farmers through collaborative partnership with the County government of Samburu, ASDSP 11, NAGRIP project, private sector players and other stakeholders along the different value chains to offer practical based innovative technical assistance to producers by optimizing on synergy through harmonization of interventions among other coordinated interventions by partners and actors.

SUB13-005

ASSESSMENT OF HARVEST, POSTHARVEST HANDLING PRACTICES AND UTILIZATION OF FINGER MILLET AMONG FARMERS IN NANDI COUNTY, KENYA

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ABSTRACT

Finger millet (*Eleusine coracana* L.) grows in varied agro-climatic conditions and performs better than wheat and rice for its ability to grow in drylands. However, it is one of the orphaned crops which is not fully exploited for enhancing food and nutrition security and economic well-being of resource poor farmers in Kenya. The crop's distribution, production, harvest, postharvest handling, utilization, value-addition and nutritional significance in Kenya is poorly understood. A baseline study was conducted in February, 2022 to assess the current harvest, postharvest handling and value addition practices in Nandi County to establish the existing gaps in order to inform interventions. The study targeted farmers along the crop value chain. Data were collected on ODK platform and analysed using SPSS-27. Majority of the farmers (75%) used the change of head colour of the crop as the maturity index and most (68%) used a knife for harvesting. Most (88%) incurred losses at harvest with majority (89%) incurring losses of less than 5%. Similar losses were also incurred during postharvest handling mainly through spillage. Majority (98%) cleaned the grains after drying majorly through winnowing (92%). Most (88%) stored the crop after cleaning majorly (48%) in gunny bags/sacks in the house. All (100%) made flour for *ugali* and porridge. A few of them (23%) used finger millet as animal feeds. Eighty eight percent blended the finger millet flour with other flours, majorly with maize flou**r** (50%). All (100%) consumed the crop for perceived nutritional benefits (48%) while 29% and 23% consumed for perceived health benefits and medicinal value, respectively. The study noted that the farmers have appreciable knowledge of harvest, postharvest handling and utilization practices but lacked knowledge on improved practices.

Keywords: *Finger Millet, Harvest, Postharvest Technology, Utilization.*

SUB13-004

SOCIAL, CULTURAL, AND ECONOMIC BARRIERS TO TOMATO PRODUCTION IN KAJIADO AND SIAYA COUNTIES, OF KENYA

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ABSTRACT

Tomato farming is an essential agricultural activity in Kenya, as tomatoes are among the most consumed vegetables in the country. With a growing population and increasing urbanisation, the demand for tomatoes continues to rise. Small-scale farmers play a crucial role in meeting this demand, yet various social, cultural, and economic barriers limit their participation. Despite efforts by the national and county governments, as well as non-governmental organizations, tomato farming uptake remains low. This study aimed to identify the key challenges affecting tomato production in Kajiado and Siaya Counties and propose solutions to enhance farmer participation and productivity. A survey was conducted with 256 respondents (128 from each county) through household interviews, focus group discussions, and key informant interviews. Quantitative data was analyzed using SPSS version 20, with descriptive statistics such as frequencies and percentages used for presentation. Qualitative data from focus group discussions and key informants were sorted and aligned with the study objectives to complement and validate the quantitative findings. The study identified major social barriers, including limited knowledge of tomato farming (Kajiado 62%, Siaya 26.4%), insecurity (Kajiado 46.9%, Siaya 42.7%), consumer preference (Kajiado 4.7%, Siaya 20%), negative attitudes (Kajiado 73.6%, Siaya 23.9%), and belief systems/taboos (Kajiado 19.2%, Siaya 22.2%). Economic barriers included high input costs (Kajiado 44.5%, Siaya 33.6%), limited access to capital and credit (Kajiado 39.1%, Siaya 39.8%), and unstructured markets with limited market information (Kajiado 45.3%, Siaya 25%). To overcome these challenges, the study recommends strengthening farmer groups, increasing training opportunities, and conducting awareness campaigns to address negative cultural perceptions. Additionally, there is a need to train farmers in different marketing models and provide them with better market information. The tomato producers should be made aware of the existing credit facilities and subsidies to encourage investment in tomato farming and reduce production costs.

Keywords: *Tomato*

SUB13-001

UNVEILING THE HIDDEN FORCES: THE ROLE OF CULTURE, SOCIAL NORMS, AND TRADITIONAL KNOWLEDGE IN KENYA'S AGRI-FOOD SYSTEMS

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ABSTRACT

Food is more than just a necessity it embodies identity, heritage, and social cohesion. In Kenya, agri-food systems are not solely shaped by economic policies or technological advancements but are deeply embedded in cultural traditions, social structures, and indigenous knowledge. However, these critical elements are often overlooked in modern agricultural interventions, raising concerns about sustainability and resilience. *Objective:* This study examines the intersection of culture, social norms, and traditional knowledge in shaping Kenya's agri-food systems. By exploring the influence of gender roles, communal resource-sharing, and indigenous agricultural techniques, the research seeks to highlight the importance of integrating socio-cultural perspectives into food security strategies. *Methodology:* Using an ethnographic lens, the study employs case studies and interviews with farmers, traders, and policymakers to capture the lived experiences that define food production, distribution, and consumption. The research also investigates how traditional ecological knowledge informs climate adaptation and sustainable farming practices. *Findings and Discussion:* Preliminary insights suggest that indigenous knowledge plays a crucial role in enhancing food security and climate resilience but remains marginalized in formal agricultural planning. Women, despite being central to food production and processing, often face systemic barriers that limit their decision-making power. Additionally, informal networks and traditional markets emerge as vital yet underestimated players in food distribution. The study underscores the tensions between traditional and modern agribusiness models, highlighting the need to bridge the gap for a more inclusive and resilient food system. *Conclusion:* Sustainable food systems require more than technical solutions they demand an acknowledgment of cultural and social realities. Policies that embrace traditional knowledge, empower marginalized voices, and foster community-led agricultural strategies will drive Kenya's food security agenda forward.

THEME: GENDER AND SOCIAL INCLUSION IN AGRI-FOOD SYSTEMS RESEARCH

SUB10-011

AN ANALYSIS OF GENDER ROLES IN BEEKEEPING IN ABIA STATE, NIGERIA

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ABSTRACT

This study explores the gender dynamics within the beekeeping sector in Abia State, Nigeria, as a means to address significant challenges in the country, such as unemployment, youth restiveness, poverty, and food insecurity. Recognizing beekeeping as a lucrative yet traditionally male-dominated field, the research examines how gender influences various aspects of honey production and commercialization, aiming to promote inclusive participation for sustainable development. The study was conducted through a field survey in the Ohafia and Umuahia agricultural zones of Abia State, employing purposive sampling technique to collect data from 40 respondents. Descriptive statistical analysis was used to assess the socioeconomic characteristics of beekeepers and the specific roles of men, women, and youth throughout the beekeeping value chain. Key findings indicate that while men predominantly occupy the sector—particularly in technical and early-stage activities such as site selection, hive installation, baiting, and inspection—women play vital roles in honey extraction, processing, and marketing. Notably, women possess greater experience in beekeeping practices, while youth demonstrate higher productivity, evident in the number of hives they manage and the volume of honey produced. The study also uncovers gendered patterns in decision-making across both production and commercialization stages, suggesting that there is untapped potential for collaboration if all genders are equally empowered. In conclusion, the report asserts that modernizing beekeeping practices and encouraging equitable gender participation can significantly contribute to poverty reduction, food security, and enhanced well-being in rural communities. It recommends targeted capacity building, improved access to resources, and inclusive policies to strengthen gender integration and unlock the full potential of the beekeeping enterprise in Abia State

SUB10-010

WOMEN EMPOWERMENT AND HOUSEHOLD FOOD SECURITY AMONG SMALLHOLDER FARMERS IN SCHOOL FEEDING PROGRAMMES IN NAKURU, ISOLO AND KAJIADO COUNTIES, KENYA.

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ABSTARCT

Women empowerment plays a crucial role in agricultural development and food security, particularly in rural areas where women are often the primary caregivers and contributors to farm labour. Despite the crucial role women play in agriculture and food production, they often face significant challenges that hinder their full potential. School Feeding Programs (SFPs) present a unique context where women's empowerment could have substantial impacts on both household and community-level food security. A multistage sampling method was used to obtain a sample of 400 smallholder farmers, 20 from Isiolo, 40 from Kajiado and 280 from Nakuru Counties. A cross-sectional survey was conducted using a semi-structured questionnaire to collect data and then analysed using Stata and SPSS software. We use PRO-WEAI, Ordinary Least Squares and Poisson Regression to establish the relationship between women empowerment and household food security. The Blinder Oaxaca model is used to determine the gender differences in household food security. The results obtained will be used for policy recommendations aimed at strengthening women's role in agriculture, improving food security, and enhancing the effectiveness and sustainability of SFPs.

SUB10-009

INTERSECTIONAL IDENTITIES AND MAIZE TRAIT PREFERENCES IN KENYA

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ABSTRACT

Understanding farmers' preferences is crucial for promoting the adoption of new crop varieties and improving support for marginalized groups, particularly women. Addressing this issue can foster equity and have a positive impact on food security and poverty reduction. Involving farmers in the selection and testing of new technologies is essential to develop crop varieties that meet their needs. Breeding programs have increasingly acknowledged the importance of gender differences in trait preferences; however, many have overlooked the socio-economic diversity among farmers. By recognizing this diversity and analyzing gender alongside other intersecting factors such as class, age, and marital status, breeders can prioritize traits that cater to the varied needs of all farmers. Our study gathered data on intrahousehold preferences and varietal trait preferences from women-headed households among 250 farmers conducting maize on-farm trials in Kenya. Using logistic regression models, we examined how gender and wealth influence trait prioritization. The preferred traits included grain yield, grain size, early maturity, grain color, and resistance to diseases, particularly fall armyworms. Among farmers in the lower and middle wealth terciles, both men and women showed similar preferences for yield traits. The logistic regression analysis indicates that women had lower odds of prioritizing yield traits compared to men, but these odds increase as women gain wealth. Conversely, women exhibited higher odds of preferring certain grain colors than men, although this preference diminishes as their wealth increases. These findings suggest that men and women from similar marginalized backgrounds, particularly those who are poor, tend to prefer similar traits. By adopting an intersectional approach, we can more effectively address the diverse needs of all farmers and facilitate the successful adoption of new maize varieties.#

Keywords: *Intersectionality, Gender, Wealth, Trait Preferences, Market Intelligence*

SUB10-008

ENHANCING STUDENT ENGAGEMENT IN MODERN AGRICULTURE: A STUDY ON KNOWLEDGE AND ATTITUDES OF GMOS AMONG KENYAN HIGH SCHOOL STUDENTS, WITH A FOCUS ON THE POTATO VALUE CHAIN.

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ABSTRACT

Kenya's agricultural sector is vital to its economy but continues to face challenges such as low productivity, slow adoption of modern technologies, and an aging farming population. With over 75% of the population under 35 years old, there is an urgent

need to engage the youth in agriculture through innovative and practical approaches. The ongoing shift to a Competency-Based Curriculum (CBC) emphasizes experiential learning and teacher capacity development, creating opportunities to integrate science communication and informal education into classrooms. However, misconceptions and limited understanding of genetically modified organisms (GMOs) persist among students and the general public, often fueled by misinformation and lack of exposure to scientific perspectives. This study sought to assess the impact of the Global Biotech Potato Partnership (GBPP) on high school students' knowledge, attitudes, and engagement with modern agricultural science. A quasi-experimental design was used, involving 120 students from six high schools in Nyandarua and Nakuru counties. Pre- and post-questionnaires were administered to evaluate baseline and post-program shifts in knowledge, perception of GMOs, and interaction with scientific professionals. The intervention included interactive science shows, visits to agricultural research centers, and direct participation in biotechnology-related activities such as potato farming. Findings revealed that prior to the program, only 45% of students had heard about GMOs, mostly through television and YouTube (70%), with fewer citing print media (5%) and scientists or science institutions (3%). After the program, 97% of students demonstrated improved understanding, and positive attitudes toward GMOs increased from 23% to 88%. Notably, student interaction with scientists rose from 20% to 89%, and 98% expressed a willingness to consult professionals on scientific matters in the future. These results highlight the effectiveness of experiential learning and informal education in transforming students' perspectives on biotechnology. The GBPP initiative demonstrates that strategic science communication and youth engagement can play a crucial role in reshaping public understanding of GMOs and driving the future of agricultural innovation in Kenya.

Keywords*: GMOs, Agricultural Education, Biotechnology, Youth Engagement, Science Communication.*

SUB10-007

GENDER AND BANANA PRODUCTION AND COMMERCIALIZATION IN THARAKA NITHI COUNTY, KENYA

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ABSTRACT

Before the mid-1990s banana was a women's crop in Tharaka Nithi county. However, the decline of coffee due to price fluctuations coupled with commercialization of

bananas resulted in a major shift. Men shifted from coffee production to banana farming. The objective of this study was to examine how banana commercialization changed the crop's gender roles and power relations in the household. Data were collected using multiple methods. These included a formal survey that covered 289 households, key informant interviews (KIIs), Focused Group Discussions (FGDs) and literature review. Data were entered in Statistical Package for Social Science (SPSS) Version 20 software and analyzed through descriptive statistics (frequency, percentages, chi-squared and means). The Harvard analytical framework was used to structure the analysis. The main findings indicated that after bananas were commercialized the crop shifted from being a women's crop to a men's enterprise. The study recommends that research scientists need to design gender-responsive technologies that are tailor made to men's needs and concerns for increased productivity. The study also recommends that the county and national governments need to design conducive policies that attract youth in agriculture as they are the banana farmers of tomorrow. The paper contributes literature on the appropriation of women's crops by men once they become commercialized.

Keywords: *Banana Commercialization, Shift, Gender Roles, Gender Relations.*

SUB10-006

NARROWING THE GENDER GAP IN KENYA'S WHEAT FARMING: ADVANCING INCLUSIVE AND EQUITABLE INNOVATION

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ABSTRACT

Wheat production faces ongoing challenges due to shifting agro-ecological and socio-economic conditions, alongside the slow adoption of modern farming technologies. One key social factor influencing this trend is gender, which plays a significant role in technology adoption and varietal preferences. Understanding these gender-specific preferences is essential for targeted agricultural interventions. Therefore, this study explores the wheat traits that shape male and female farmers' choices of wheat varieties in Narok County, Kenya. To gather relevant insights, primary data was collected through semi-structured interviews, focus group discussions, and key informant interviews, involving 84 male and female farmers selected through a two-stage sampling method. The study employed descriptive statistics and a multinomial logit model to analyze the factors influencing male and female farmers' wheat variety preferences. Findings

from the descriptive analysis reveal notable differences in the wheat trait preferences of male and female farmers. The results highlight that risk-averse traits were the most frequently preferred across all wheat types. Additionally, the multinomial logit model results indicate that factors such as yield potential, grain weight, drought tolerance, early maturing, and disease resistance significantly influenced both male and female farmers' wheat variety choices. This study aims to bridge existing knowledge gaps and address critical challenges faced by male and female wheat farmers by shedding light on the specific traits that drive their variety selection. While their preferences were diverse, the dominant factors guiding their choices were risk minimization and yield potential. These findings offer valuable insights for crop breeding programs to develop gender-sensitive wheat varieties. Furthermore, they serve as a vital resource for policymakers, agricultural input suppliers, and extension services, ensuring more inclusive and effective agricultural strategies that enhance the productivity of both male and female wheat farmers.

Keywords: *Wheat Gender, Varietal Preference, Multinomial Logit*

SUB10-003

MARKET ACCESS AND MULTIDIMENSIONAL POVERTY AMONG WOMEN PEANUT PROCESSORS IN KADUNA STATE, NIGERIA: EXAMINING BARRIERS AND LIVELIHOOD OUTCOMES

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ABSTRACT

In Nigeria, women play dual roles as both farmers and entrepreneurs in agriculture. However, men predominantly control key management decisions, leading to persistent gender disparities that limit women's full participation and benefits. Data obtained from 100 randomly selected peanut processors was analyzed using descriptive statistics and the Multidimensional Poverty Analytical Tool (MPAT). This study assessed market access and multidimensional poverty among women peanut processors in Kaduna State, Nigeria. The results showed that the average age of the respondents was 37 years, and the majority (89.4%) lived in households with 1 to 7 members. Approximately 47% had completed secondary school. In terms of wealth distribution, different wealth groups make up the women community; wealthy (9%), middle class (44%) and poor (76%). Regarding market access, most women had no access to markets and self-select out of the credit market. Seasonal variations also affect financial stability, as women face

higher poverty levels in August, while they experience greater wealth in December. Additionally, the study found that most respondents were constrained by limited natural, human, and financial capital. Improving market access, financial literacy, seasonal income stability, and rural infrastructure can enhance the economic empowerment of women and reduce multidimensional poverty.

SUB10-002

IMPACT OF MULTIPURPOSE COOPERATIVES ON RURAL WOMEN HOUSEHOLDS' FOOD SECURITY AND MAIZE PRODUCTIVITY: EVIDENCE FROM EAST HARARGHE, ETHIOPIA

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ABSTRACT

The study analyzed the impact of multipurpose cooperatives on food security and maize crop productivity among rural women households in East Hararghe. Both qualitative and quantitative cross-sectional data was collected from 385 rural women household participants and non-participants in multipurpose cooperatives using a multi-stage sampling procedure. A logistic regression model generated from propensity score was employed to identify the factors influencing women's participation. It was observed that access to credit, extension contact, chemical fertilizer, distance to the nearest market and use of improved seed had statistically significant positive effects on participation. While, age of the household and distance to the cooperative office had statistically significant negative effects on their participation. To measure the impact of participation in on their households' food security and maize productivity, Propensity Score Matching (PSM) technique was employed and Endogenous Switching Regression Model (ESRM) also utilized to check the robustness by comparing the result with PSM. Accordingly, the PSM estimation result of average treatment effect showed that, the average calorie intake for participant and non-participant women households were found to be 3418.11 Kcal/AE/Day and 2659.70 Kcal/AE/Day respectively. Furthermore, the average maize productivity of participant and non-participant women households was 7.61 quintals and 5.93 quintals respectively. This result indicates that participation in multipurpose cooperatives significantly increased the calorie intake and maize productivity of women households compared to non-participants by 28.5% and 28.3% respectively. Strengthening access to credit, provision of improved seed, enhancing extension service can be considered as a panacea to improve women participation in multipurpose cooperatives which in turn improves food security and crop productivity in the study area.

Keywords: *Food Security, Multipurpose Cooperatives, Propensity Score Matching, Endogenous Switching Regression Model, East Hararghe Zone, Ethiopia*

SUB10-001

SOCIO-ECONOMIC DETERMINANTS OF GENDER IN SMALLHOLDER FARMING: A BINARY PROBIT ANALYSIS IN KWAZULU-NATAL, SOUTH AFRICA

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ABSTRACT

Gender plays a pivotal role in smallholder farming systems, influencing resource access, decision-making, and household food security. This study employs a binary probit model to analyze the socio-economic determinants of gender roles among 300 smallholder farmers in KwaZulu-Natal, South Africa. Key explanatory variables include Household Dietary Diversity Score (HDDS), Household Food Insecurity Access Scale (HFIAS), income levels, education, land ownership, and market participation. The findings reveal significant gender disparities in access to productive resources and decision-making power, with female farmers facing higher constraints in financial autonomy and market access. Additionally, HDDS and HFIAS scores indicate that food security outcomes differ by gender, reinforcing the need for targeted policy interventions. This study contributes to the ongoing discourse on gender equity in agriculture by providing empirical evidence to support policies aimed at reducing structural inequalities and promoting inclusive food systems.

Keywords: *Gender, Binary Probit Analysis, Smallholder Farming, HDDS, HFIAS, Socio-Economic Factors, South Africa*

SUB-THEME: AGRICULTURAL FINANCING AND INVESTMENT

SUB4-010

LEVERAGING ASTI INDICATORS TO REVITALIZE KENYA'S AGRICULTURAL RESEARCH SYSTEM FOR FOOD SYSTEM RESILIENCE

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ABSTRACT

Kenya's pursuit of a resilient and inclusive food system is deeply intertwined with the performance of its national agricultural research system. At the forefront is the Kenya Agricultural and Livestock Research Organization (KALRO), the country's leading institution for agricultural research and innovation. However, recent data from the Agricultural Science and Technology Indicators (ASTI) reveal systemic challenges that hinder KALRO's capacity and long-term sustainability. Between 2015 and 2024, KALRO maintained a full commitment of its research workforce allocating 100% of researchers' time to agricultural R&D. Despite this dedication, the institution struggled with constrained and inconsistent financial resources. Annual expenditures ranged from KES 5.48 billion in 2015 to a peak of KES 7.40 billion in 2023, before declining slightly to KES 6.86 billion in 2024. A significant portion of the budget was absorbed by salaries and benefits, increasing from KES 2.93 billion in 2015 to KES 4.54 billion in 2024. This left limited funding for core research activities. Operating costs, for instance, dropped to KES 1.56 billion in 2017 before modestly rising to KES 2.23 billion in 2024. Capital investments remained minimal and inconsistent, with a notable low of KES 82 million in 2024. These financial trends reflect KALRO's growing struggle to support research programs and infrastructure while managing administrative overhead. The challenge is compounded by workforce issues, including an aging cadre of researchers—over two-thirds of PhD-qualified staff were above 50 years old as of 2016—and persistent gender disparities in leadership roles. To strengthen Kenya's food system resilience and unlock innovation, urgent reforms are imperative. Priorities include establishing sustainable funding mechanisms, such as an operational agricultural research fund; ring-fencing allocations for research programs; and addressing human capital gaps through succession planning and gender equity initiatives.

SUB4-009

ECONOMIC ANALYSIS OF ARID AND RANGE LANDS RESEARCH INSTITUTE

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ABSTRACT

The main goal of this study was to assess the economic viability of ARLRI, Kiboko and make recommendations on improvement. The size of the Institute land is 15,512 ha, suitable for arid and rangeland research because it is located in ecological zone five, ideal for extensive production of cattle, goats, sheep; and even camels. Data were collected using an excel template that was developed and shared among all the programs at the Institute, including Ecology, Livestock, Socio-economics, Accounts, Supplies and Human Resource Departments. Profitability was calculated on the basis of the animals sold and the unsold for the last 5 years (2018-2023) where gross margins were calculated and the net benefits. Benefit-cost ratios (BCR) were calculated for cattle, goats, grass seed production and hay production. The results revealed that cattle and grass seed production were profitable. The Cattle enterprise was profitable in all the years save for 2019 and 2021 which was attributed to prevailing droughts, while range grass seed and hay production were profitable in all the years. Galla goat production was not profitable with negative gross margins in all the years except in 2023. Overall, the Institute was found to be economically viable with annual net revenue growing exponentially during the last six years (2018-2023) from KES 2 million in 2018 to KES . 8 million in 2023. This study concludes that improvement of management of the Galla goat enterprise with an aim of reducing mortality is necessary and enhancement of the numbers to take advantage of economies of scale, and hence turn the enterprise to the path of profitability. We also recommend increased scale of livestock, range grass seed and hay so as to take advantage of economies of scale and increase net revenue.

SUB4-008

EXPLORING RICE MILLERS' PREFERENCES IN KENYA

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ABSTRACT

The rice milling industry in Kenya has undergone significant advancements, playing a crucial role in the rice value chain. The quality traits of rice varieties, including grain size, shape, color, and moisture content, hold immense influence over the final product's quality, price, and marketability. Consumer preferences and the economic value of rice are influenced by these traits. Understanding millers' preferences related to these traits and associated parameters are crucial for guiding future product design decisions. The study conducted a cross-sectional survey of 105 rice processors in various regions of Kenya to gather information on rice mill operations, capacity, factors considered during milling, and sourcing practices. The results highlighted the prevalence of the one-step process in rice milling across regions, with the two-step process observed in all areas except Nairobi. The multi-stage milling process was also found to be widespread. The most commonly sourced and milled rice varieties in each region were IR05N221 (Komboka), Basmati 370 and Sindano, reflecting a preference for aromatic varieties. Traits considered during the evaluation of sourced rice varied across provinces, with moisture content and grain dimension as the most common basis. The findings suggest that aligning breeding programs with millers' preferences and including specific traits in product design could enhance the competitiveness of Kenyan rice millers. Moreover, upgrading milling equipment and methods is essential to improve the quality of milled rice in Kenya. Understanding market trends and consumer preferences is also necessary to align rice production with market needs.

SUB4-007

UNLOCKING THE POTENTIAL OF AGRICULTURAL FINANCING AND INVESTMENT FOR RESILIENT AGRI-FOOD SYSTEMS: A FARMER'S PERSPECTIVE

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ABSTRACT

The development of resilient and sustainable agri-food systems in Kenya hinges on inclusive financing and strategic investment in agriculture. Despite being a key pillar of the country's economy, smallholder farmers — who constitute over 70% of agricultural producers — face persistent barriers in accessing credit and investment opportunities. This paper highlights the neglected dimension of agricultural financing and investment in Kenya, emphasizing how perceived risks, stringent collateral demands, and inadequate policy support have systematically excluded farmers from essential financial tools needed to enhance productivity and sustainability. Drawing from personal experiences and community-level case studies in Kilifi and Western Kenya, the study unpacks the lived realities of farmers navigating informal financial systems due to the lack of tailored agricultural credit facilities. It explores how digital finance, cooperative models, warehouse receipt systems, and government-backed agricultural insurance could provide scalable solutions when mainstreamed into national agricultural policy. By analysing Kenya's current agri-financing landscape through a socio-economic and policy lens, the paper proposes actionable strategies such as: creation of inclusive credit scoring models, state-guaranteed agricultural funds, incentivized public-private partnerships, and the integration of financial literacy in farmer training programs. This research underscores that bridging the financing gap is not just a question of capital availability, but of enabling policy and institutional frameworks that recognize and de-risk smallholder agriculture. It calls on policymakers, financial institutions, and development actors to co-create financing ecosystems aligned with the Bottom-Up Economic Transformation Agenda (BETA) and the SDGs. Ultimately, empowering farmers through access to capital will catalyse the transformation of Kenya's agri-food systems — making them more productive, resilient, and sustainable.This paper adds a farmer's voice to the critical discourse on socio-economic transformation, contributing evidence-based recommendations for inclusive and impactful policy development.

SUB4-006

AGRICULTURAL FINANCING AND INVESTMENT FOR RESILIENT AGRI-FOOD SYSTEMS

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ABSTRACT

Agricultural sector significantly contribute to the Kenya's national GDP, employment and food security. It is considered to be the cornerstone of the country's economy because its contribution to the national GDP is between 20%-25% (KNBS, National Agriculture Production Report, 2024). However, despite its impact to the national development, it is under-funded making it difficult for the country to unlock agricultural sector full potential in the development of the Kenya's economy (World Bank, 2021). Agriculture sector faces many challenges including limited access to financing (AFC, 2024 Report), low/inadequate investment to the sector, and the effects of climate change (Kenya Climate Smart Agriculture Project Report, 2020). These challenges needs to be addressed for the country to achieve economic transformations that will spur economic development. Smallholder farmers needs to be empowered so that they can be agents of transformations that the country is anticipating to achieve through the Bottom-Up Transformation Agenda. This paper examines the critical role of agricultural financing and investment in fostering resilient agri-food systems that will not only be sustainable, but also be the tools that the country can use to achieve the economic development agenda. It highlights barriers to financing, investment to the agricultural sector, importance of Public Private Partnerships (PPP), innovative financial models in agriculture, and risk management strategies in agricultural sector lending. This paper also provides recommendations that if adopted can be catalytic tool for achieving sustainable, more efficient, and increased food production.

Keywords: *ASTI Indicators, Research funds, Resilience*

SUB4-005

THE NEXUS BETWEEN CLIMATE FINANCE AND TECHNOLOGICAL CLIMATE-SMART AGRICULTURE PRACTICE (CSAP): A REVIEW

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ABSTRACT

Climate change threatens farmers' livelihoods in developing countries despite implementing Climate-Smart Agricultural Practices (CSAP). Due to these farmers' socio-economic constraints, climate finance emerged as a funding mechanism to overcome financial barriers and enable adaptation to climate change, as technological CSAPs are costly to implement. Problem statement: However, despite the constant mobilisation and investment of these funds, previous research argues that farmers remain vulnerable to climate change, and the impact of financial resources remains unclear. Therefore, this study's objective is to provide insight into the role of climate finance in financing the adoption of technological climate-smart agriculture. Methodology: To accomplish this goal, the systematic review followed the PRISMA method for record identification. Objectives: This comprehensive literature's first objective is to identify the types and sources of financing available for adopting climate-smart agricultural practices in Sub-Saharan Africa. Secondly, to explore the technological climate-smart agricultural practices supported through available financing in Sub-Saharan Africa. The last objective aims to assess the co-benefits of financing the adoption of technological climate-smart agricultural practices for farmers in Sub-Saharan Africa. The review provided insights into technological climate-smart agriculture Practices (CSAP) and an overview of various climate finance mechanisms for funding technological climate-smart agriculture practices. This systematic review shortlisted and identified developing countries within Sub-Saharan Africa (SSA) and searched using journals and programme documents. Results: The literature synthesis highlighted best practices and lessons learned where climate finance had been effectively used to support technological innovations in agriculture to understand how climate finance influenced the adoption of technological CSAP. Additionally, the outcomes of this review, complemented by the case studies, revealed varying regional differences in the adoption of technological CSAP across the continent despite the availability of financial resources. It discovered positive outcomes, highlighting that farmers' productivity, food security and income improved as a co-benefit of adopting CSAP funded.

SUB4-004

REMITTANCES AND MAIZE FARMING IN KENYA: A PATH TO PROSPERITY?

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ABSTRACT

This paper examines the impact of remittances on the production and welfare of maize farmers in Kenya. As a key staple food crop, maize plays a crucial role in household consumption and national food security, with production largely dominated by smallholder farms. At the same time, remittances have grown significantly, serving as an important financial resource for many households and now constitute Kenya's largest source of foreign cash flow. This study applies the farm household production model to evaluate how both external and local remittances influence maize production and farmer welfare, while also exploring the underlying mechanisms. To address potential endogeneity, the study employs two-stage regression analysis and the propensity score matching (PSM) technique, using data from the 2015/2016 Kenya Integrated Household Budget Survey (KIHBS). The results indicate that both local and external remittances positively and significantly impact maize production and farmer welfare by facilitating the purchase of seed. However, local remittances have a stronger effect on maize production and welfare compared to external remittances. The results also reveal heterogeneity in impact based on location and farm size. Overall, the study highlights the importance of remittances in reducing poverty supporting the smallholder farmers in the rural areas and strengthening Kenya's agricultural sector.

Keywords: *Remittances, Maize, Production, Welfare, Kenya*

SUB4-003

EFFECTIVENESS OF MITIGATION MEASURES ON FOOD SECURITY IN NAROK COUNTY'S CROSS-BORDER CONFLICT ZONES, KENYA

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ABSTRACT

Food insecurity remains a persistent challenge in conflict-affected regions worldwide, where violence disrupts agricultural production, market access, and food distribution systems. This problem is particularly acute in pastoral border areas like Narok County, Kenya, where recurrent cross-border conflicts have severely compromised household food security. This study examines the effectiveness of mitigation measures implemented to address these challenges, focusing on how well interventions have improved food availability, access, and stability in this conflict-prone region. Employing a mixed-methods approach, the research combines quantitative surveys (n=160 households) with qualitative interviews (n=20 key informants) to evaluate intervention outcomes. Findings reveal significant implementation gaps: only 51.4% of respondents were aware of mitigation programs, while 61% reported minimal community participation in intervention design. Although some reduction in conflict incidents was achieved, food security outcomes remained concerning, with 53.3% of households experiencing deteriorating conditions and 54.2% noting declining food safety standards. The study makes three important contributions to the literature on conflict and food security. First, it demonstrates that current top-down approaches yield limited success without meaningful community engagement. Second, it identifies critical implementation challenges including inconsistent funding and inadequate capacity building. Third, it provides empirical evidence on how conflict dynamics uniquely undermine different dimensions of food security in pastoral border regions. These findings suggest the need for more participatory, context-specific strategies that simultaneously address conflict resolution and food system resilience in similar agro-pastoral systems across East Africa. Keywords: food security, conflict mitigation, pastoral communities, intervention effectiveness, Kenya, cross-border conflicts.

Keywords: *Food Security, Conflict Mitigation, Pastoral Communities, Intervention Effectiveness, Kenya, Cross-Border Conflicts*

SUB4-002

DETERMINANTS OF FINANCIAL ACCESS VIA FORMAL AND INFORMAL SOURCES: EVIDENCE FROM SMALL-SCALE POTATO FARMERS IN NAROK COUNTY, KENYA.

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ABSTRACT

Financial inclusion has been widely accepted as a potential means to advance economic empowerment, and it plays a crucial role in promoting faster, broad-based economic growth, and poverty reduction, and thus strongly supports global and national development goals. This study assessed the factors influencing access to financial services among small-scale potato farmers in Narok County, Kenya. Multistage sampling method was used to identify and collect primary data from 275 small-scale potato farmer households in Narok North Sub County. Bivariate probit model was used to determine the factors influencing small-scale potato farmers' access to financial services from both formal and informal financial sources. The results revealed that financial account and mobile phone ownership, access to credit source information, group membership, and off-farm occupation positively influenced access to formal financial services. Informal financial access was positively influenced by access to agricultural information, household on-farm income and group membership while education level and age of the farmer had a negative influence. This study also found that access to financial services remains a challenge to the small-scale potato farmers as they have to travel for long distances to access financial services from formal financial institutions. Therefore, financial institutions should consider developing agricultural friendly loan products tailor-made for small-scale potato farmers, and opening branches closer to the farmers to ensure ease of financial services access. Moreover, policymakers and regulators need to create an enabling environment that links informal savings groups to formal financial institutions. Additionally, digital financial literacy programs should be expanded to the area in order to equip the farmers with the necessary skills on the effective access and management of financial resources, and use of digital technologies.

SUB4-001

INTEGRATING AGRICULTURE, TOURISM, AND TRADITIONAL KNOWLEDGE FOR SUSTAINABLE ECONOMIC GROWTH

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ABSTRACT

Intellectual Property Rights (IPRs) present an unprecedented opportunity to revolutionize agricultural financing in Kenya by creating an alternative and sustainable income stream for farmers. Traditionally, the agricultural sector has been vulnerable to fluctuating seasons, market instability, and climate variability, leaving farmers financially constrained. However, IPRs provide a new, unchartered, and uncontaminated industry through which farmers can be rewarded for their intellectual contributions, including innovations in farming techniques, seed varieties, and processing methods. By leveraging patents, trademarks, and geographical indications (GIs), Kenya can establish a system where agricultural producers benefit from their ingenuity, ensuring economic stability irrespective of seasonal yields. The integration of IPRs with Kenya's tourism sector further amplifies its potential. Kenya's rich cultural heritage, traditional knowledge (TK), and traditional cultural expressions (TCEs) remain underutilized assets in the global market. Through strategic IP frameworks, local farmers and artisans can brand and commercialize their unique products—such as Kericho tea, Nyeri coffee, and Baringo honey—under GIs, ensuring authenticity and premium market positioning. This alignment not only enhances economic gains for rural communities but also strengthens Kenya's competitive advantage in the global agritourism industry. Kenya's policy landscape, including Vision 2030 and the Tourism Act of 2011, provides a foundation for integrating IPRs into agriculture and tourism. By capitalizing on these legal frameworks and fostering awareness through institutions like KIPI and WIPO, Kenya can unlock new financing models, empowering farmers as IP stakeholders. Protecting and commercializing TK and TCEs ensures that the benefits of innovation flow directly to their origin communities, fostering equitable economic growth. Thus, IPRs offer a transformative mechanism to propel Kenya's agricultural sector into a knowledge-driven, high-value economy that rewards intellectual contributions while preserving cultural and ecological heritage.

SUB-THEME: AGRICULTURAL DIGITALIZATION INNOVATIONS

SUB3-008

DIGITAL PUBLIC INFRASTRUCTURE AS A CATALYST FOR INCLUSIVE AGRICULTURAL INNOVATION IN KENYA'S AGRI-FOOD SYSTEMS

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ABSTRACT

Data, innovation, and technologies that require bundled interventions in agri-food systems are increasingly recognized as critical pathways to improving productivity, profitability, and resilience. In Kenya, persistent digital inequalities continue to hinder progress, particularly among marginalized groups such as smallholder farmers. Careful consideration must be given to their design, deployment, and scaling methods to ensure these innovations are truly transformative. A Digital Public Infrastructure (DPI), comprising interoperable digital identity systems, payment platforms, data exchanges, and registries, provides a foundational framework for enabling innovation, equity, and efficiency across the agri-food system. This paper examines the role of DPI as a catalyst for inclusive agricultural innovation in Kenya, focusing on how it can empower smallholder farmers, extension officers, service providers, researchers, and policymakers to access and deliver critical services, markets, and information. Drawing on case studies, policy reviews, and emerging practices, the paper explores how DPI facilitates data-driven decision making, improves service delivery, and fosters collaboration between public and private actors. We also identify key challenges related to governance, digital inclusion, infrastructure, and institutional capacity. The paper concludes with strategic recommendations for strengthening Kenya's agricultural DPI ecosystem to advance a more sustainable, inclusive, and resilient agri-food system aligned with national development goals and global commitments.

SUB3-006

INFLUENCE OF GIBBERELLIN HORMONE ON VIABILITY OF *CLEOME GYNANDRA L.* SEED GERMINATION

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ABSTRACT

Germination process is influenced by external and internal factors including the type of seed. Vegetable seeds require special treatment in stimulating the germination process such as scarification and stratification (for example applying exogenous hormones to seeds during the germination process). This research study aimed to describe the effect of gibberellin hormone on the viability and duration of germination on cleome gynandra L. seeds. This study used RBD (Randomized Block Design) with two treatment factors, namely root extract concentration from cleome gynandra (local) (0 ppm, 200 ppm, 300 ppm, 400 ppm, and 500 ppm) and Cleome gynandra seed types (farmers, certified and control) with three replications. The observed parameters for seed viability were germination percentage and vigour index, while duration of germination parameters was germination index. Data were analyzed using ANOVA and followed by Duncan Multiple Range Test. The results showed that there was a significant effect of gibberellin on seed viability and duration of germination. The optimal concentration of root extracted on water hyacinth to Cleome gynandra was 400 ppm, with the highest germination percentage, vigour index, and germination index were 80.55%, 10.33%, and 9.12% respectively. The local seeds revealed the best viability and shortest duration of germination due to applying the gibberellin hormone. The findings revealed that there was a positive synergism in gibberellin on the effect of germination process on seed.

Keywords: *Seed Germination, Gibberellin, Cleome Gynandra L.*

SUB3-007

THE ROLE OF DIGITAL TECHNOLOGIES IN ENHANCING AGRI-FOOD SYSTEM RESILIENCE AMONG SMALLHOLDER FARMERS IN KENYA

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ABSTRACT

This abstract explores how digital technologies can strengthen Agri-food systems to make Kenyan smallholder farmers who face climate change impacts and market instability more resilient while combating resource shortages. Digital agricultural innovations create opportunities to boost farm productivity and market access while supporting environmental sustainability which leads to economic progress and ecosystem protection (Zambrano et al., 2023). The research starts with an examination of Kenya's Agri-food systems while focusing on smallholder farmers' challenges such as restricted access to information, financial services and technology that increase their vulnerability to shocks and stresses. The expanding global population requires us to tackle world food insecurity with agricultural technology improvements that ensure safe nutrition and environmentally sustainable food production (Burg et al., 2020). The agricultural sector experiences rapid transformation through digital technologies like precision farming, Internet of Things, remote sensing, data-driven applications and artificial intelligence which create new opportunities to solve existing problems and enhance smallholder farmers' livelihoods (Assimakopoulos et al., 2025; Finger, 2023). This research conducts a thorough analysis of how digital technologies function within the Kenyan agricultural framework by evaluating their effectiveness across multiple agri-food system components including crop production and livestock management along with supply chain optimization and market linkages.

SUB3-005

CAPITAL BUDGETING TOOL FOR AGRICULTURAL INVESTMENTS: A CASE OF INVESTMENTS TO FARMER COOPERATIVE SOCIETIES (FCS) IN NYANDARUA COUNTY.

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ABSTRACT

Capital budgeting provides a basis for agricultural investment decisions and advisories. The capital budgeting tool, which is a customized MS-excel program, provides a platform for this kind of analysis. The analysis was conducted during the period January and February 2025, involving analysis of capital injections for targeted investments projects identified by various farmers' cooperative societies (FCS) domiciled in Nyandarua County. The farmer cooperative societies had applied for infrastructural and capital support through the National Agricultural Value Chain Development Project (NAVCDP) for targeted investments aimed at improving their productivity and performance. The aim of the analysis was to advise the cooperatives on whether to accept or reject the investments based on economic viability through key indicators including; Net present value (NPV), Internal rate of return (IRR), Benefit cost ratio (BCR), Profitability Index (PI) and Payback period, where all the investments turned out to be Economic viable (Profitable) for the cooperatives to pursue.The farmer cooperative societies analyzed included Miharati FCS, Boiman FCS, South kinangop FCS, Nyala dairies and Umoja dairy cooperative. The tool visualized the result indicators and provided a basis for accepting or rejecting the proposed investments. For all capital injections, the interest rate was based on the cost of capital rate which in the Kenyan context was estimated at 15%. With investments ranging from Kes. 4.6 to 9.7 Million, the analysis indicated that Net present value (NPV) was positive for all targeted investments. The Internal rate of return (IRR) provided a basis for acceptance or rejection of the investments based on evaluation of the Internal rate of return (IRR) and Interest rate (IR). If the IRR was greater than the IR, then the investment was accepted, and vice versa. The Benefit cost ratio (BCR) value of >=1 indicated a project was profitable, while a value of <1 means the proposed investment was not profitable. The same applied for Profitability Index (PI) which Compared the present value of cash inflows to the initial investment. The last indicator was the Payback period (PBP) for the investments, which is the investment recovery time. For all the investment, the PBP, ranged between 2.78 and 4 years which were acceptable as the invested amounts would be recouped within NAVCDP project life of 5 years. Capital Budgeting is an important process for any investment as it defines the process by which a business determines which fixed asset purchases or project investments are acceptable and which are not. Using this approach and tool, each proposed investment is given a quantitative analysis, allowing rational judgment to be made by investors. For this to be achieved, appropriate tools need to be developed and availed for use by interested parties and stakeholders. Through evaluation of potential investments in a systematic manner, capital budgeting helps organizations and other entities make informed decisions that drive growth and enhance shareholder value.

Keywords: *Capital Budgeting, MS-Excel, Net Present Value, Profitability Index, Cost Benefit Ratio, Payback Period*

SUB3-004

AWARENESS, UTILIZATION, AND CHALLENGES OF AGRICULTURAL DIGITALIZATION AMONG RURAL FARMERS: A CASE STUDY OF SOUTH-EASTERN KENYA.

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ABSTRACT

Climate change is already affecting agriculture, food security, water resources, natural ecosystems and economic stability all over the world and especially in Sub-Saharan Africa. On the positive side, the rapid emergence of digital innovations is enhancing agricultural efficiency in the face of climate change. However, there is little information on how rural-smallholder farmers use digital tools to overcome key challenges in farming. This study sought to establish digital technologies utilized by smallholder farmers in Machakos and Makueni Counties and difficulties they encountered while employing digital technology in their agricultural practices. The study used a cross-sectional research design. A semi-structured questionnaire was used to collect both quantitative and qualitative data from 384 households. The questionnaire delved on farmers' awareness of digital agricultural tools, utilization of digital agricultural technologies, benefits and challenges encountered in use. Stata version 16.1 was used in descriptive data analysis. The results showed that 52% of the male and 36% of the female in the sample were aware of digital tools for agriculture particularly the Digifarm app. Radio was a source of the information to 67% male and 35% female. Over 85% of the farmers used the digital financial services and 50% used climate information. High cost of digital tools, low digital literacy and lack of trust in digital platforms were the main challenges in accessing and using digital agricultural technologies. The study concludes that digital technologies used by farmers can potentially improve farming methods, enhance agri-food systems resilience to climate change and improve farmers' lives. The study recommends community-based initiatives to raise smallholder farmers' awareness of digital technologies, advocates for enhancing rural infrastructure, making smartphones and other digital devices more affordable, expanding internet access, improving digital literacy, and encouraging stakeholders to promote inclusive digitalization in agriculture to ensure women and other marginalized groups are not excluded.

Keywords: *Agriculture, Awareness of Digital Technologies, Rural Farmers, Utilization of Digital Tools, Challenges, South Eastern Kenya*

SUB3-003

THE DEVELOPMENT OF DIGITAL SERVICES AND THEIR UTILIZATION IN AGRICULTURE IN KENYA

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ABSTRACT

Digital agriculture in Kenya has been developing rapidly and is helping farmers to increase their productivity and profitability. The paper summarises that the utilisation of digital tools is low despite high registrations. Low utilisation is due to a lack of trust in market platforms or tools providing market linkages, high costs of credit or high transaction costs to access credit and poor bundling of complementary services. Other challenges include high costs of technology, lack of access to information and services, and a lack of training and capacity building for farmers. The Kenyan government and other stakeholders are working to address these challenges and to continue to promote the use of digital technologies in the agriculture sector. Key intervention includes incentives for scaling up promising technologies, lowering acquisition costs for digital tools developers and investments in the supply of public goods, e.g., farmer registries.

SUB3-002

THE DIGITAL AGRICULTURAL REVOLUTION: TRANSFORMING FARMING THROUGH EMERGING TECHNOLOGIES

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ABSTRACT

The digital agricultural revolution represents a paradigm shift in agriculture, where emerging technologies like big data, Internet of things (IoT), augmented reality robotics, sensors, 3D printing, system integration, ubiquitous connectivity, artificial intelligence, machine learning, digital twins, and blockchain among others are integrated to enhance productivity, efficiency, and sustainability. The socio-technical process of implementing digital advancements, known as “digitalization,” is becoming more and more common.

Digitalization is expected to radically transform everyday life and productive processes in agriculture and associated food, fibre and bioenergy supply chains and systems and initial signs of transformation are already visible. A number of ideas have surfaced in the agricultural industry to describe various types of digitalization in value chains, agricultural production systems, and, more generally, food systems. Using sensors, machines, drones, and satellites to monitor animals, soil, water, plants, and people, digitalization implies that management tasks both on and off-farm (in the larger value chain and food system) focus on various types of data (on location, weather, behaviour, phytosanitary status, consumption, energy use, prices, and economic information, etc.). The data obtained is used to interpret the past and predict the future, to make more timely or accurate interventions, through constant monitoring or specific big data science enquiries. Therefore, it is anticipated that digitalization in agriculture would offer technical optimization of food systems, value chains, and agricultural production.

Keywords: *Digital Agriculture, IoT, AI, Machine Learning, Precision Farming, Blockchain, Big Data, Smart Farming, Sustainable Agriculture*

SUB3-001

PRODUCERS DRIVE TO PROCURE CERTIFIED POTATO SEEDS THROUGH DIGITAL PLATFORMS

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ABSTRACT

Potato is the second staple food crop in Kenya after maize, cultivated by approximately 800,000 smallholder farmers, and employing nearly 2.5 million people within the value chain. Enhancements in potato production have the potential to improve food security and incomes of the smallholder farmers. However, its production in Kenya is below the global average due to low availability and access to certified seed varieties, and endemic seed-borne pests and diseases. The emerging digital technologies solve these challenges by enhancing access to certified improved potato seed varieties to boost yield outcomes. This research aimed to evaluate the farmers' preference for the digital technology attributes, factors influencing their use in sourcing certified potato seeds, and determinants of seed quantities procured through digital platforms in Kenya. A sample of 364 farmers from Nakuru County were randomly selected for this study. The data was analyzed using Best-Worst Scaling (BWS), Probit regression, and Tobit models. The findings revealed that gender, household income, cultivated land size, credit access, extension services, group membership, and quantity of seeds procured influenced the use

of digital platforms. The seed quantities procured were determined by household size, household income, seed price, and credit access. Further, farmers ranked the reliability of the services provided by the platform, and ease of access to input information and services as the most essential attributes. In contrast, good knowledge of the ICT application was ranked as the least important attribute of the digital platform. The study recommends disseminating reliable and user-friendly platforms to improve farmer adoption. Also, national and county governments should support capacity-building and awareness-raising initiatives targeting women and low-income smallholder farmers in urban and rural areas. Smallholder potato farmers should form cooperatives to benefit from economies of scale by purchasing seeds in bulk through digital platforms.

Keywords: *Certified Potato Seeds, Digital Platforms, Best-Worst Scaling, Logistic Regression*

SUB-THEME: NOVEL APPROACHES IN AGRI-FOOD SYSTEMS RESEARCH AND POLICY

SUB12-001

GREENHOUSE VALIDATION OF ROSE COCO ON DEVELOPED BIOFERTILIZERS IN RELATION TO YIELD PERFORMANCE AT KALRO HRI, KANDARA

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ABSTRACT

Biofertilizers play a crucial role in sustainable agriculture by enhancing soil fertility and promoting crop productivity. This study aimed to validate the effectiveness of five biofertilizer formulations on the growth and yield of Phaseolus vulgaris (Rose Coco) under greenhouse conditions at KALRO HRI, Kandara. Rose Coco was selected due to

its superior nitrogen-fixing nodulation observed in Limuru. The biofertilizer treatments consisted of different combinations of effective microorganisms (EM), biochar, wood vinegar, bioslurry, and cow dung manure, with a control treatment for comparison. The greenhouse experiment followed a randomized complete block design (RCBD) with three replications. Key growth and yield parameters were measured, and data were subjected to analysis of variance (ANOVA) to determine statistical significance among treatments. Where significant differences were detected, Fisher's protected least significant difference (LSD) test was applied for mean separation. The controlled environment minimized external influences such as pests and climatic variations, ensuring reliable results. ANOVA revealed significant differences among treatments ($p < 0.05$), with specific biofertilizer combinations showing a positive impact on plant growth and yield compared to the control. These findings highlight the potential of biofertilizers in enhancing bean production for smallholder farmers, reducing reliance on synthetic fertilizers while maintaining soil health. Further field trials are recommended to assess the long-term impact of these biofertilizers under natural farming conditions.

Keywords: *Biofertilizers, Rose Coco, ANOVA, Yield, Sustainable Agriculture.*

SUB12-003

YIELD PERFORMANCE OF KENYAN GRAIN AMARANTH ACCESSIONS COLLECTED FROM NORTH RIFT, KENYA

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ABSTRACT

Grain amaranth is a nutrient-rich pseudo cereal with superior essential amino acids, minerals, and vitamins compared to maize and wheat. Grain amaranths are classified into four species, A. hypochondriacus, A. cruentus, A. caudatus, and A. edulis. Two hundred and ten accessions from Uasin Gishu, Baringo, and Bungoma Counties, along with standard checks from Kenya Agricultural and Livestock Research Organization were evaluated for yield performance. The experiment employed a Randomized Complete Block Design with three replications at the University of Eldoret farm during July-September 2023 rainy season. Data on grain yield and yield attributes including terminal inflorescence length (TIL), terminal inflorescence width (TIW), number of panicles per plant (NoPP) and plant height (PH) were assessed and recorded. Analysis of variance revealed significant differences in yield ($F= 6.97$), ranging from 89.87 g (Acc. 23) to 6.31 g (GB 192) per plant. Eleven accessions (Acc. 23, 17, 111, 25, 145, 120, 97, 133, 173, 91, and 138) outperformed the best standard check variety Acc. 144

(68 g). Correlation analysis (P<0.05) showed significant relationships among attributes: TIL strongly correlated with TIW (r= 0.563); NoPP positively correlated with TIL (r= 0.543) and TIW (0.347); PH positively correlated with TIL (r=0.616), TIW (r=0.428), NoPP (r=0.613) and yield was positively correlated with all variables, with the strongest relationship observed with PH (r= 0.348). The Principal Component Analysis revealed 55.19% of the total variance accounted from attributes scored. The five morphological traits used revealed significant phenotypic variations among the accessions under study. The accessions that outperformed the standard checks are potential new varieties and can be used as parental lines in breeding programs.

Keywords: *Grain Amaranth, Accessions, Yield, Attributes*

SUB12-002

POLICY PRIORITISATION FOR VALUE CHAIN ANALYSIS

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ABSTRACT

The traditional approach to value chain development centered on the farmer. The farmer-first approach initially prioritized raising productivity for resource constraints farmers, then helping farmers overcome marketing constraints. Where as the logic of this approach is sound, the dynamic environment with which food systems have evolved has led to the approach being less effective, and therefore value chains that are not fulfilling their potential. This approach resulted in a long list of unaffordable policy and investment recommendations, most of which are focused in agriculture, and had limited focus on private sector needs, market dynamics and economy wide impacts. Following the successful food systems dialogues held by the United Nations Food and Agriculture Organization (FAO), there is renewed focus to shift the traditional approach of value chain development to agricultural food systems transformation. The Bureau of Food and Agriculture Policy (BFAP) and the International Food Policy Research Institute (IFPRI) have developed a new approach for value chain analysis changes the historical focus of value chain analysis development. The Policy Prioritization for Value Chains (PPVC) is a market-centred approach that is more inclusive and places more emphasis on the role of the private sector in value chain development. The PPVC approach first identifies market opportunities that exist, then looks at what is required to take advantage of this market opportunities and finally looks at the capabilities of smallholder farmers to participate in these opportunities. This way, the PPVC approach focuses on identifying value chains that can make significant contributions to job creation and economic growth, then prioritises investments and policies that upgrade these selected value chains and what is required to unlock the potential for the value chains during implementation of selected actions in value chain development.

SUB12-001

ASSESSMENT OF THE PROFITABILITY IN ORGANIC AND CONVENTIONAL FARMING SYSTEMS IN KENYA FOR SELECTED CROPS

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ABSTRACT

Smallholder farmers, policymakers, and other stakeholders have great interests in practical and workable solutions that promote investments into farming systems that are productive and profitable. We used crop-specific data templates collected over two years to compare the productivity and profitability of a sample of 204 organic and 645 conventional farms located in three counties in Kenya (Kirinyaga, Murang'a and Machakos). The effect and impact of organic farming on the profitability was evaluated using propensity score matching (PSM) where the observed estimated treatment (intervention) was compared to the untreated (control group). Further analysis was conducted using covariate balancing testing in the Stata package 2017. The results revealed that yields, costs, and revenues of some crops grown organically are higher than in conventional farming. We also found significant differences in profitability between organic and conventional farms for common beans and macadamia nuts. The profits of common beans increased by US$ 994/ha/year (35.3 %). The profits for macadamia nuts increased by US$ 5,263/ha/year (44.4%) in the three studied counties. The crops with greater productivity and profitability for organic interventions constitute a compelling reason for alternative investments options into organic farming as a way of improving livelihoods, especially in rural areas. Tackling the bottlenecks leading to lower profits in other crops could optimize the benefits from organic.

Keywords: *Organic Farming, Conventional Farming, Yields, Revenues, Costs, Profitability*

SUB-THEME: AGRIBUSINESS MODELS IN AGRI-FOOD SYSTEMS

SUB2-007

USING SOCIAL AGRICULTURE TO DIVERSIFY RURAL FAMILY INCOMES IN KENYA

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ABSTRACT

Chapter 2 Social agriculture is emerging as a powerful tool for improving rural livelihoods in Kenya. By blending traditional farming with community-driven activities such as care farming, agro-tourism, school gardens, and youth or women-led initiatives, smallholder families can expand their income sources while promoting social inclusion and environmental sustainability. For Kenya's small-scale farmers—especially women and youth—social agriculture offers more than just food production. It creates spaces for training, healing, and entrepreneurship, helping rural communities tackle poverty, social isolation, and climate challenges. Women, in particular, benefit as they take leadership in agro-based caregiving and community initiatives, boosting household incomes and their own agency. Social agriculture also supports climate-smart practices like agroecology, organic farming, and regenerative land use. These not only protect ecosystems and biodiversity but also build long-term soil health and resilience against climate shocks. At KSSFA, we view social agriculture as a vital strategy for inclusive rural development. It strengthens community ties, diversifies livelihoods, and helps farmers adapt to climate change. As more Kenyans embrace this model, we see a future where rural communities are not only economically empowered but also socially and ecologically resilient. Investing in social agriculture is investing in people, planet, and prosperity.

SUB2-006

GOAT FINISHING ON IMPROVED GRASS AND LEGUME SUPPLEMENTATION IN ARID AND SEMI-ARID LANDS: THE BUSINESS CASES

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ABSTRACT

Availability of economical and easily accessible feeds that are high in both quantity and quality is a crucial factor in sustainable livestock production. The study aimed to determine the profitability of finishing goats by supplementing using protein-rich leguminous feeds. In a completely randomized experimental design, a group of 15 mass-selected goat yearling goats, aged 13-15 months and an average body weight of 16.5±2.3kgs, were assigned into 5 diet experimental units of 3 animals each, for a period of 90 days, under feedlot system. Analysis of variance and economic viability analyses showed Brachiaria+Desmodium and Panicum max+Desmodium diets as the leading, with net weight gains of 6.7Kgs and 6.3Kgs and marginal gross returns of Ksh 2,010.0 and Ksh 1,890.0 respectively per goat at the prevailing market live body weight price of Ksh 300 kg-1, under the minimum efficient scale. The selection of a cost-effective legume and the right breed and genetics of the animal were an essential consideration for enhanced enterprise profitability.

SUB2-005

COST-BENEFIT ANALYSIS OF DAIRY VALORIZATION PATHWAYS IN KENYA

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ABSTRACT

The Kenyan dairy sector plays a crucial role in the national economy, yet it faces challenges related to low-value utilization of by-products such as whey, leading to economic inefficiencies and environmental concerns. This study applies a Cost-Benefit Analysis (CBA) framework to evaluate the economic feasibility of whey valorization at selected dairy processing facilities in Kenya. By systematically assessing production, processing, and marketing costs against expected financial and environmental benefits, this research

provides data-driven insights for policymakers, investors, and industry stakeholders. The study focuses on four dairy processors valorizing whey into high-value products, including whey yogurt, smoothies, and ricotta cheese. Financial viability is assessed using Net Present Value (NPV), Internal Rate of Return (IRR), and Benefit-Cost Ratio (BCR). Sensitivity analysis using Monte Carlo simulations evaluates the robustness of whey valorization under varying economic conditions. Findings indicate that whey valorization yields positive economic returns, with all processors achieving a BCR greater than 1, signifying financial feasibility. Notably, larger-scale processors benefit from economies of scale, while small-scale processors face higher per-unit costs, emphasizing the need for cooperative models and investment incentives. By positioning whey valorization within a circular economy framework, this study highlights its potential to minimize waste, enhance dairy sector sustainability, and contribute to Kenya's climate and food security goals. The results provide a compelling case for targeted policy interventions, including investment incentives, value chain strengthening, and technology adoption support. This research contributes to the growing body of literature on sustainable dairy by-product utilization and offers practical, evidence-based recommendations for scaling whey valorization in Kenya and beyond.

SUB2-004

THE ROLE OF AGRIBUSINESS MODELS IN ENHANCING SUSTAINABILITY WITHIN AGRI-FOOD SYSTEMS

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ABSTRACT

Agribusiness models play a pivotal role in enhancing sustainability within agri-food systems, aligning closely with the Sustainable Development Goals (SDGs). In the context of Kenya, these SDGs resonate strongly with the government's Bottom-Up Economic Transformation Agenda (BETA), which is anchored on the Fourth Medium Term Plan of Vision 2030. The need for transforming agri-food systems to foster socio-economic development and address pressing challenges such as poverty, food insecurity, health disparities, and gender inequality is urgent. However, key knowledge gaps and policy constraints remain, hindering the full potential of agribusiness models in contributing to the achievement of these goals. This paper explores the role of innovative agribusiness models in promoting sustainable agri-food systems that align with the SDGs, highlighting the importance of socio-economic and policy research in building resilient systems. By focusing on Kenya's BETA and Vision 2030, the study identifies how agribusiness can support poverty reduction, food security, health improvements, and gender equality while addressing critical policy and research challenges. This research underscores the interdisciplinary approach required to enhance the resilience of agri-food systems through sustainable agribusiness practices, policy innovation, and targeted socio-economic research.

SUB2-003

INNOVATIVE CIRCULAR ECONOMY AND AGRIBUSINESS MODELS FOR ENHANCING SUSTAINABILITY AND EFFICIENCY IN KENYA'S AGRI-FOOD SECTOR: LESSONS FROM GERMANY

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ABSTRACT

Kenya's food system faces numerous issues, including food insecurity, post-harvest losses, inefficient resource utilisation, and climate change. This study looks into innovative, cost-effective circular economy and agribusiness ideas from Germany's agrifood sector and evaluates their applicability in Kenya. A mixed-methods approach was used, including a comprehensive literature review, 45 key informant interviews, 16 case study analyses, 20 structured surveys, field observations, expert consultations and stakeholder workshops. The study analyzed key circular economy and agribusiness models the findings show that biogas production from agricultural waste decreased farm energy expenses by 43%, while solar dryers cut post-harvest losses by 67%. Precision agriculture increased crop yields by 86% while optimising resource consumption. Food rescue systems successfully repurposed 36% of extra food. Closed-loop supply chains reduced packaging waste by 98%. Aquaponic systems, which combine fish and vegetable production, used 92% less water and had a 78% nutrient recycling efficiency, resulting in 34% higher yields than soil-based systems. Solar-powered cold storage reduced post-harvest losses for perishable items by 55%, prolonging shelf life and enhancing market access. Blockchain-based traceability systems improved transparency and trust in value chains, reducing fraud and post-harvest losses. Contract farming models ensured stable markets and price security for smallholder farmers. Digital agricultural platforms provided farmers with real-time data on market prices, weather forecasts, and agronomic practices, improving productivity and profitability. Organised cooperatives in improved value chain efficiency and smallholder resilience, as seen in Germany's BayWa AG model. While the initial investment expenditures and training for these technologies remain a barrier, the long-term advantages make them economically viable in Kenya. Multi-stakeholder engagement, targeted policy assistance, infrastructure investment, and farmer training programs are all required for successful implementation. The study offers pilot projects, policy frameworks, public-private partnerships, and capacity-building initiatives to help these models adapt and scale in Kenya's agrifood sector.

SUB2-002

INCOME DIVERSIFICATION THROUGH AGRITOURISM AMONGST FARMERS IN MPUMALANGA, SOUTH AFRICA

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ABSTRACT

Diversification allows traditional agricultural operations to evolve, and agritourism is a significant way to continue new farming businesses. This paper aims to determine the impact of agritourism on the income diversification of farmers in Mpumalanga province of South Africa. A simple random sampling method was used to select 100 farmers in the study area. A Linear regression model was employed to determine factors influencing income diversification. The results show a very low participation in agritourism amongst farmers, however, agritourism participation may positively influence the level of income diversification. In addition, income diversification is influenced by location, infrastructure, distance to the market, access to extension services and years practice agritourism are significant factors influencing income diversification by the farmers. Conversely, distance to the nearest market and tourist attraction, awareness of agritourism, utilisation of building, access to training, land size was negatively influencing income diversification. To maximise the positive agritourism participation on income diversification, stakeholders should invest in farmer training, improve rural infrastructure, enhance extension services and develop diverse memorable agritourism experience for visitors. Furthermore, intensification of training and workshops through extension services focusing on the development of agritourism as a means to income diversification in the province is needed. Determining the factors affecting income diversification is very crucial for driving the policy and provides the framework for developing agritourism in the province. Keywords: Income diversification, Linear Regression Model, Agritourism, Mpumalanga Province

SUB-THEME: AGRICULTURAL MARKETING AND MARKET SYSTEMS

SUB5-020

AGRICULTURAL MARKET INFORMATION FOR DAIRY VALUE CHAIN

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ABSTRACT

Milk consumption in Kenya is rising with population growth, urbanization, rising incomes and changing lifestyles being the main drivers of this trend. Furthermore, world aggregate milk consumption is projected to increase because of the increasing population, urbanization and rising incomes. The high demand for milk and dairy products presents a huge opportunity to exploit fully the potential in the dairy industry. There is therefore a need to transform the dairy industry into a modern, commercial and profitable enterprise in order to close the demand gap. Due to this rapid growth, domestic demand is expected to more than double by 2030, increasing from 110 to 220 million litres, given population growth projections and current trends in milk utilization. There are therefore opportunities for investing in milk processing and value addition to serve the increasing market for processed dairy products in Kenya and the region. At farm level, longstanding issues include the poor quality and high cost of inputs and services, poor terms of trade and hence low prices for milk, and poor access to information and markets. At the market level, challenges include the quality and safety of milk, owing to the high proportion of raw milk channeled through the market; the cost of milk collection, transportation and distribution, due to poor infrastructure; and under-utilization of processors' capacity, owing to the higher demand for liquid milk than for high-value products. All of these issues should be addressed through a combination of training, information dissemination and policy that creates an enabling environment for honest trade and robust regulations. The quality and availability of dairy information continue to be challenging. The need for clearer policy and legal instruments is also unsatisfied, despite the many years and capital invested in development, formulation, Government's declared commitment to reforming the regulatory environment.

SUB5-019

PROFILING AGRO-DEALER CHARACTERISTICS AND OPERATIONAL MODELS IN KIRINYAGA, KAJIADO, AND NAIROBI COUNTIES, KENYA

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ABSTRACT

This study profiles the characteristics and operational models of tomato agro-dealers in Kirinyaga, Kajiado, and Nairobi Counties. This study highlights several constraints affecting the industry, including agronomic challenges (pests, diseases, and physiological disorders), inadequate post-harvest technologies, and poorly organized market infrastructures leading to volatile prices. A structured survey was administered using the ODK tool November 2022. The study included agro-dealers and tomato seed and seedling merchants. Agro-dealers demographic profiles (gender, education, and marital status), business operations (categories, staffing, supply sources, and input types stocked), interactions with input suppliers and current emerging market dynamics within the seed systems was undertaken. Key findings indicate that the majority of agro-dealers are stockist with 94.4% sourcing from multiple agrochemical and input suppliers, with product replenishment periods generally lasting between three to six months at 30% and 57%, respectively. Tomato seed take from one year 50% to 18 months at 17% to sale. The prices of different inputs for tomato is determined by suppliers 52% based on local competition 35%. Tomato varieties with high demand were Rio Grande (18.4%), Ansal F1 (10.5%), Cal J (9.2%) and Terminator F1 (6.6%). The tomato seed packaging sizes that the agro-dealers sold mostly were 10gm package size at 53.9%. Big Rock (5,000 seeds), Tunda F1, and Commando gave agro-dealers higher turnover (KES 400,000 to 300,000) moneywise compared to other tomato varieties in the last one year. Market challenges such as poor quality seeds, counterfeit products, and inconsistent supply were prevalent, affecting both local commercialization and the potential for broader market access. This study also reveals variations across counties in terms of market location, satisfaction with suppliers, access to finance, and adherence to contractual arrangements, highlighting the need for enhanced market infrastructure, farmer training, and improved regulatory controls to support sustainable tomato production in Kenya.

SUB5-018

TRANSFORMING COCONUT MARKETS: STRATEGIES FOR SUSTAINABLE GROWTH IN KENYA

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ABSTRACT

This paper explores the coconut marketing landscape in Kenya, analysing the structures, challenges, and opportunities within the coconut value chain. Drawing heavily on secondary data, complemented with qualitative and quantitative data from farmers, traders, processors, and policymakers, the study highlights inefficiencies in market access, pricing mechanisms, and distribution networks that limit the profitability and scalability of coconut products. Key findings indicate that fragmented marketing channels, lack of value addition, and inadequate infrastructure disproportionately affect smallholder farmers. The paper proposes innovative marketing strategies, such as cooperative models, digital marketplaces, and product diversification, to enhance market linkages and boost economic returns. These insights aim to inform policy and practice, promoting a more inclusive and sustainable coconut industry in Kenya.

SUB5-017

CONSUMER RESISTANCE TO INSECT-FORTIFIED BREAD IN GHANA: INSIGHTS FOR SUSTAINABLE PROTEIN POLICY AND MARKET DEVELOPMENT

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ABSTRACT

In the contest of food security and environmental sustainability, edible insects appear to be a good alternative protein source. However, consumer acceptance remains a vital constraint. This study analyses consumer preference and willingness to pay for palm weevil larvae-fortified bread in Ghana using a discrete choice experiment employing the mixed logit models. The empirical model revealed that sampled consumers prefer high-protein wheat bread that was certified over insect-fortified bread, which was significantly poorly valued. Consumers' resistance towards insect protein, serve as an important indicator for market development and policy design. Specifically, that certification, awareness campaigns, and product diversification would boost sustainable protein acceptance. The findings highlight recommendations for policymakers and actors in the food systems seeking to support resilient agri-food systems through socio-economic innovation.

SUB5-016

ASSESSING THE AFFORDABILITY AND AVAILABILITY OF TECHNOLOGY INNOVATIONS AND MANAGEMENT PRACTICES (TIMPS) AMONG PASTORAL FARMERS IN KAJIADO AND ISIOLO COUNTIES, KENYA

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ABSTRACT

Availability and affordability of key agricultural TIMPS is important in promoting adoption of technologies among pastoral farmers. This cross-sectional study utilizes primary data collected from 619 beef farmers to examine the factors that influenced availability and affordability of TIMPS in Kajiado and Isiolo counties of Kenya. Using a score on availability and affordability of selected TIMPs, a Seemingly Unrelated Regression model was applied to model the relationship between these variables as well as the farm and farmer characteristics that influenced them. The findings highlight that gender of the respondent negatively influenced both affordability *Coeff: -4.264, p= 0.000****) and availability (*Coeff: -2.738, p= 0.005***)* of TIMPs. Additionally, education level positively influenced both affordability (*Coeff: 1.334, p=0.000****)* and availability (*coeff: 0.629 p=0.025***)* of TIMPs. The findings further revealed that households that had borrowed credit scored higher for both affordability and availability of TIMPs. In general, this study highlights how variations in socio-economic and farm characteristics significantly affects availability and affordability of inputs among pastoral farmers. For enhanced adoption of TIMPs therefore, policy makers need to look for alternative ways to not only develop technologies, but also to make them available and affordable to the targeted farmers

Keywords: *Seemingly Unrelated Regression, Beef, Technology, Innovations, Management practices, Availability, Affordability, Kenya*

SUB5-015

BANANA MARKETING SYSTEMS AND CONSTRAINTS AMONG SMALLHOLDER FARMERS IN THARAKA NITHI COUNTY, KENYA

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ABSTRACT

In Kenya Banana (Musa acuminate L) production is among the most commercially attractive fruit sub-sector. It accounts for about 11% of domestic horticultural value creation and constitute approximately 35% of fruit production and marketing. In 2022, the fruit accounted for KES 26 billion value drop (7.1%) from previous 29 Billion in 2020 as a result of depressed farm gate prices in the main growing areas of especially Meru and Tharaka Nithi Counties. Despite banana being grown predominantly by smallholder farmers as staple food for both home consumption and income generation in Tharaka Nithi County, the markets are unstructured. This study sought to establish the marketing challenges affecting banana small scale farmers in Tharaka Nithi County the county hence, suggest possible ways of structuring the markets for enhanced access by all genders. The study used a combination of multi-stage purposive and systematic random sampling through a structured questionnaire administered to small scale-farmers in two sub-counties of Tharaka Nithi County; Mwimbi and Igambangombe. Some of the challenges affecting banana marketing were 65% lacked accessible markets,75% poor market linkages and information,70% lack of collective marketing groups,69% poor market price, 81% poor road network and 65% exploitation from brokers and middlemen. Although banana farming is a very lucrative business with high returns, small-scale farmers in Tharaka Nithi were not reaping full benefits due to lack of market information where only 6% were trained, lack of formalized market linkages, and exploitation by intermediaries. Therefore banana farmers need to be trained on how to access marketing information, link to the markets and be organize in marketing groups.

SUB5-014

AN ASSESSMENT OF TOMATO MARKETING STRATEGIES BY SMALLHOLDER FARMERS IN KAJIADO COUNTY, KENYA

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ABSTRACT

In Kenya, vegetables represents an important cash crop for small-scale growers and the crop is associated with increased rural incomes, living standards, nutrition and employment. Vegetables are cultivated mainly by smallholder farmers, contributing approximately 60% of the country's agricultural exports. Among vegetables, tomatoes stand out as economically significant, supporting rural livelihoods through food security and income generation. However, inefficiencies in tomato marketing persist due to limited access to reliable market information and structured outlets at the farm level. This study assessed the diversity of tomato market channels available to smallholder farmers in Kajiado County and analyzed the distribution and preferences among these channels. Findings revealed that while the majority of farmers utilized multiple marketing channels, middlemen remained the dominant outlet due to convenience, despite contract markets offering the highest producer prices. The study highlights the importance of enhancing farmers' access to diversified market opportunities and timely information to improve income stability and resilience. Practical implications include the promotion of direct-to-consumer marketing, aggregation centers, and contract farming models adapted to local realities.

Keywords: *Tomato Marketing, Smallholder Farmers, Market Channels, Kajiado County, Kenya, Contract Farming*

SUB5-013

BOOSTING THE FINGER MILLET VALUE CHAIN IN WESTERN KENYA

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ABSTRACT

In Kenya, finger millet is important for food and nutrition security, and incomes of smallholder farmers. Its drought resistance, high nutritional content, and ability to grow well under minimal inputs make it a valuable subsistence crop in Kenya, as well as potentially, many other parts of Africa. In Kenya, it is grown mainly in the dry areas of the Western, Eastern, and Lake Basin regions. Strengthening the finger millet value chain is crucial to food and nutrition security in the region and this research aimed to identify how this could be achieved. A total of 168 value chain actors were surveyed in the Bungoma, Kakamega, and Busia counties of western Kenya. Financial and market performance analyses were carried out across the nodes of the value chain. Strengths, weaknesses, opportunities and threats were identified across all nodes of the chain. The results showed that all nodes of the finger millet value chain were financially viable. Upgrading opportunities were identified and recommendations for boosting the value chain were made. These included strengthening the connectivity of actors in the value chain, increasing mechanisation in production to reduce the manual labour involved at various stages of finger millet production and processing, improved quality standard checks, capacity building on value addition, production up-scaling measures, and standardizing the units used to sell finger millet. These actions when implemented could boost the functioning of the finger millet value chain, improving the livelihoods of small holder farming communities.

Keywords: *Finger Millet, Value Chain Analyses, Market Performance, Upgrading Opportunities*

SUB5-012

MARKET AND CONSUMER PREFERRED GREEN GRAM (VIGNA RADIATE L.) CHARACTERISTICS FOR FOOD AND INCOME GENERATION IN SEMI-ARID AREAS OF THARAKA-NITHI COUNTY, KENYA

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ABSTRACT

Green gram (Vigna radiate L.) is an important legume crop suitable for semi-arid environments in Kenya. The crop is drought tolerant and plays crucial roles in provision of food, nutrition and income to climate change vulnerable farmers. Despite its numerous benefits, the crop's yields have remained low at 0.4 against the expected 2.0 t ha^{-1}. Among other challenges, inappropriate and limited knowledge on key players in the crop's value chain disposal are key. A study was therefore conducted to identify the main actors, their roles and the consumer preferred characteristics of green gram varieties in semi-arid zones of Tharaka-Nithi County in Eastern Kenya. The study used purposeful site selection, random sampling of the key actors (producers, traders and consumers) to collect data that was synthesized using SPSS software. Results showed that most (92.3%) of the green gram growers sell their produce individually to brokers (90.4%) and only a small fraction (9.6%) go to formal markets. It was further revealed that 55% of traders are women, while 45% are men. Distance to the market from the farm was found to be one of the main factors influencing whom to sell to, and that there are periods of the year with deficit or/and surplus of the commodity with the main preferred characteristics being grain size, colour, cooking duration and taste.. Ndengu-Biashara, Karembo, KS20 and N26 were singled out as varieties with such qualities. Conclusions arrived at were that the majority of traders in Tharaka are women who dispose the grains to brokers individually and that the transport to market is an important factor that influence whom to sell to. The study recommended promotion of varieties with preferred characteristics, and enhancement of collective marketing skills.

Keywords: *Consumers, Characteristics, Green Gram, Preferred, Traders*

SUB5-011

ASSESSMENT OF BANANA AND PLANTAIN MARKETING STATUS IN KENYA

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ABSTRACT

Banana and plantain production and marketing plays a crucial role in poverty alleviation and food security. It employs about 80% of the rural community, accounts for 11% of domestic horticultural value creation and constitute approximately 35% of fruit production and marketing value. Banana performance is constrained by inadequate market accessibility, inadequate preferred varieties, disorganized markets and limited post-harvest and value addition practices. This study investigated the status of banana and plantain marketing in main markets in Kisii, Mombasa, Nairobi and Nakuru Counties. Specifically, the study investigated cooking banana and plantain varieties and sources; market linkages, volumes, price, channels, constraints and opportunities. A total of 299 market traders were purposely selected and interviewed. Data was analysed using SPSS for the descriptive analysis (mean, medium and mode) and ranking for comparison drawing. Results revealed gender disparities in the various levels of marketing. Dominant informal markets included local markets, groceries and roadside stalls while the formal markets comprised of major supermarkets and grocery shops in upmarket shopping malls. The most demanded cooking varieties sold in all the markets included Ng'ombe, Uganda green, *Surio, Gichagara* and *Kienyeji* while plantain varieties were Mkono wa Tembo, *Munju* and *Mabuu*. Low volumes of all varieties was recorded. The variety, source and market location determined the price the banana is sold.. Several linkages were noted in all the markets from simple to complex channels. Wholesale margins were higher in Nairobi markets. The study established that the market for plantain was poorly developed due to scarcity and lack of awareness. Study recommendations: development of marketing strategies to improve marketing margins, product aggregation, improved post-harvest handling and value addition and promotion of plantain production, marketing and utilization.

Keywords: *Banana, Plantain, Markets, Varieties, Price, Margins*

SUB5-008

CROP PRODUCTION DIVERSITY OR MARKET ACCESS? WELFARE OUTCOMES AMONG SORGHUM-GROWING HOUSEHOLDS IN RURAL KENYA AND UGANDA

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ABSTRACT

This study looks at market participation versus farm production diversity among sorghum farmers in Kenya and Uganda. Using data from 2,398 households, the research examines if selling crops or growing diverse crops better improves food security in dryland areas. Results show both approaches help household welfare in different ways. Farm diversity increases food consumed from farms, with each additional crop or livestock type linked to a 20.8% increase in food value and 17.7% increase in annual non-food spending. This suggests growing varied crops provides a foundation for food security, especially where markets are limited. Market participation of sorghum slightly improves dietary diversity, with a 10% increase in selling sorghum linked to a 2.02% increase in household dietary diversity. While selling sorghum doesn't significantly change food consumption values, it positively affects annual non-food spending (0.15% increase per 10% higher market participation) and farm investments (15% increase per 10% higher market participation). In villages with better market connections, farm diversity significantly affects food purchases, suggesting both approaches work well together when infrastructure is good. But in villages with poor grain markets, a 10% increase in sorghum market participation is linked to a 15% increase in farm spending. The research concludes policies should support both approaches based on local conditions. Better market access could improve food security through both pathways, while diverse farming remains crucial in remote areas. Income from sorghum sales lets farmers invest in better farming practices, potentially increasing overall farm productivity.

SUB5-007

ECONOMICS OF CUSTOMER SATISFACTION LEVELS OF KALRO PRODUCTS AND SERVICES: A BEHAVIORAL ECONOMICS PERSPECTIVE

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ABSTRACT

Economics of Customer Satisfaction Levels of KALRO Products and Services: A Behavioral Economics Perspective Abstract Customer satisfaction is a significant proxy indicator of product utility and service quality in agricultural research organizations. This study analyzes the degrees of customer satisfaction with KALRO products and services. According to the Theory of Behavioral Economics, the study investigates to what degree customers' perception, cognitive bias, and experience influence satisfaction with KALRO products and services. There was a systematic survey of the clients of KALRO, for example, farmers, agribusiness companies, and extension agents. The information was gathered regarding product quality, availability, price, service quality, and responsiveness to customer need. The descriptive statistics were employed in analysis for measuring satisfaction levels, while the Random Utility Model (RUM) was applied to estimate relative weights given to different attributes that influence satisfaction. In addition, an ordinal logistic regression model was used to establish the key determinants of satisfaction levels. The study brings into perspective the customer experience of KALRO's services and products and presents evidence-based recommendations on how to enhance the delivery of services and innovation in products. The findings will aid the organization in positioning its products and services to meet customers' requirements and, in the process, enhance its role in the agricultural sector.The study stresses the need for explicit interventions to improve customer interaction, inclusion, and accessibility to KALRO innovations. Subsequent studies will examine explicit interventions to optimize economic benefits of KALRO's services among diverse customer groups.

Keywords: *Customer Satisfaction, Behavioral Economics, KALRO Products, Agricultural Services, Socioeconomic Factors*

SUB5-006

ASSESSING PRODUCTION COST AND PROFITABILITY OF ON-STATION GROWN SORGHUM IN NAKURU COUNTY

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ABSTRACT

The Sorghum is a vital cereal crop cultivated for food, fodder, and industrial purposes, particularly in arid and semi-arid regions. This study was conducted on an on-firm trial at KALRO Beef Research Institute, the paper examines the cost and profitability of sorghum farming by analyzing production expenses and economic returns among the ASAL population. Key cost components include inputs such as seeds, fertilizers, pesticides, labor, and machinery. Profitability is determined by factors such as yield levels, market access, government policies, and price fluctuations in both domestic and international markets. Sorghum's tolerance to drought and lower input requirements make it a cost-effective alternative to crops like maize and wheat in water-scarce regions. A Net Present Value financial decision tool was used to establish a standardized approach for evaluating alternatives in decision-making. The results highlight the economic viability of adopting the Sorghum fodder over a 10-year project period. The study demonstrates a positive return, recommending the adoption of sorghum farming as a solution to fodder and feed challenges in ASAL region

Keywords: *Sorghum, Net present Value*

SUB5-005

ASSESSING THE FACTORS INFLUENCING THE LEVEL OF COMMERCIALIZATION OF AFRICAN INDIGENOUS VEGETABLES AMONG SMALLHOLDER FARMERS IN BUNGOMA COUNTY

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ABSTRACT

African Indigenous vegetables in Kenya are produced and marketed primarily by women. However, identifying a direct niche market for these vegetables poses a challenge, as African Indigenous Vegetables are typically purchased by intermediaries who resell them in urban markets at retail prices. Therefore, this study aims to improve the livelihoods of AIV producers in Kenya by assessing the impact of vertical market linkages on the commercialization of AIVs. A multistage sampling method was utilized to select 384 respondents in the study area. Results from the Household Commercialization Index and fractional regression indicated that several factors significantly influence the commercialization of AIVs among smallholder farmers: the education level of the farmers, land size, distance to markets, AIV yields, production costs for AIVs, average prices, and value added. The results demonstrated that the highest level of commercialization is achieved when smallholder AIV farmers engage in producer-processor and producer-final consumer linkages. The study recommends enhancing these linkages by adopting payment methods that benefit farmers, formalizing their relationships with processors to ensure steady demand, and guaranteeing better prices for the produced AIVs. It is essential to build the capacity of smallholder farmers to understand the business-related benefits linked to the various combinations of vertical market linkages. Prioritizing interventions and policies that support vertical market linkages by developing capacity and infrastructure, disseminating market information, and formalizing relationships can further advance the development of vertical market linkages among smallholder farmers.

Keywords: *African Indigenous Vegetable, Commercialization, Smallholder farmers, Household, Vertical Market Linkages.*

SUB5-004

CATALYZING CASSAVA PROCESSING CAPABILITIES AMONG THE SMALLHOLDER FARMERS AS A TRIGGER TO IMPROVED PRODUCTION AND MARKETING SYSTEMS IN KENYA

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ABSTRACT

Cassava farming ensures food security and provides income for farmers in Kenya. Despite the importance of cassava, the production and marketable amount among the farmers continue to remain low. Farmers fail to grow cassava due to storage and transportation issues. Moreover, the post-harvest losses are more than 23% for freshly harvested roots, leading to low marketable amount. Currently, the smallholder farmers process fresh cassava using rudimentary and low capacity traditional methods, leading to post-harvest losses due to post-harvest physiological deterioration. To address the processing challenges therefore, research developed cassava processing technologies with high capacity. However, there was lack of farmers' awareness on the technologies. The research question was; would the promotion of improved fresh cassava processing techniques increase production and marketable cassava in Kenya. This study was conducted in Busia and Kisumu Counties in Kenya in established farmers' cassava processing and marketing groups. A cross-sectional household survey was used. A stratified random sampling method was used to select households which were participating and non-participating in the cassava processing groups. Univariate and multi-variate methods of data analysis and Stata software were used. Results indicated that, the mean area under cassava cultivation increased by 39% for the participating and 13% for the non-participating farmers from the year 2019 to 2023 in Busia County. In Kisumu County, the increase in area planted with cassava was 63% and 0.33% for the farmers participating and non-participating, respectively in the year 2019 to 2023. The mean production in kgs per acre increased by 47% and decreased by 38% by the participating and non-participating, respectively in the year 2019 to 2023 in Busia County. Therefore, this study concluded that, improved capabilities of the smallholder farmers in fresh cassava processing increased production and the area under cultivation.

Keywords: *Cassava systems, Food security, Sustainability*

SUB5-003

MARKET OUTLET SELECTION AMONG SMALLHOLDER CATTLE FARMERS IN RURAL TANZANIA: BUILDING BRIDGES FOR FOSTERING PARTICIPATION IN LIVESTOCK MARKETS

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ABSTRACT

Agricultural markets play a crucial role in enhancing smallholder farmers' participation in markets, leading to improved welfare and economic growth. There is a scarcity of studies on market outlet choices among smallholder cattle farmers, particularly in Africa where markets are fragmented and weakly integrated. Subsequently, there is a limited understanding of the drivers of choices of market outlet and implications on fostering market participation among beef farmers for improved socio-economic transformation. In that light, this study was conducted to elucidate the factors determining market outlet decisions among beef farmers in Monduli and Longido districts, Tanzania. Multistage sampling method was employed to identify beef farmers in the selected rural areas. A semi-structured questionnaire was used to collect data from 400 smallholder cattle farmers identified through a simple random sampling. Analysis of the collected data involved estimation of descriptive statistics and econometric analysis. Pairwise correlation test corroborated the suitability of the multivariate probit model to determine the factors influencing the choice of market outlet among beef farmers. Results showed that, age and extension services positively and significantly influenced market outlet choices ($p<0.01$). Contrariwise, sex, group membership, distance to the nearest main road, tropical livestock unit (TLU), off farm income and shock occurrence negatively and significantly influenced market outlet decisions. The findings evince that, agricultural extension services and distance to roads are imperative in influencing smallholder farmers' outlet choices. The study highlights the need to bridge extension services and improve infrastructure to enhance beef farmers' participation in rewarding livestock market outlets.

Keywords: *Beef Farmers, Commercialisation, Livestock Markets, Market Outlets, Multivariate Probit, Rural Tanzania*

SUB5-002

ASSESSING SPATIAL PRICE ARBITRAGE IN MALAWI'S MARKETS

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ABSTRACT

This study sets out to establish empirical evidence of improved spatial price arbitrage efficiency in Malawi maize markets. The study pulls data from a number of sources to estimate the transaction costs between 2006 and 2024. Using Baulch (1997) Parity Bound Model as modified by Zant (2012) this study finds evidence indicative of improved level of spatial arbitrage efficiency across Malawi's maize markets. With appropriate supporting policies in place, findings of this study are positive of likely success of franchising ADMARC social markets which would lessen government's fiscal burden of having to subsidize both production through fertilizer subsides and consumption of maize through ADMARC social markets. A successful franchise arrangement would also take care of hoarding behavior of the private players in the maize market thorough properly instituted incentives and other deliberate policy measures. Additionally, the development of better infrastructure (in particular better transport linkages and storage facilities) may be expected to play an important supporting role in promoting structured maize markets in Malawi**.**

SUB5-001

REVOLUTIONIZING COOPERATIVE MARKETING THROUGH BRANDING

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ABSTRACT

Kenya has 7,898 agricultural cooperatives, including dairy, coffee, and multi-produce societies, which play a crucial role in supporting smallholders through bulk purchasing, better prices, and access to credit and training. However, challenges like market liberalization, inefficiencies, and competition from private firms hinder their growth. This project explores how effective branding can revolutionize cooperative marketing, especially in the context of digital and global trends. 2. Problem Statement Despite advancements in agri-marketing, cooperatives in Kenya have yet to fully embrace

branding, a proven strategy for market entry and profitability. While some cooperatives have succeeded, more can be done to enhance their competitiveness and visibility in international and digital markets. 3. Research Objectives to learn from successful cooperatives that have adopted branding. To identify knowledge gaps in cooperative marketing. To provide policy recommendations for improved market penetration. 4. Research Questions can branding transform diverse market systems like online marketing, value-added products, and exports? What lessons can be drawn from successful branding in global cooperative marketing? What policy guidelines can enhance market penetration? 5. Methodology This study will use a mixed-methods approach, guided by the Self-Determination Theory. Data will be collected from successful branding cases like Ketepa Tea, Kenchick, and KCC, as well as from online sources like agribusinessspace.com. The research will also contrast successful cooperatives with failed ones to identify key factors for success.

SUB-THEME: CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGIES

SUB8-039

GENDER MAINSTREAMING

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ABSTRACT

I'm Gelito Inácio Franco Sululu, with a degree in Fauna and Eco-tourism, a Masters in Rural Development and National Representative of the Commonwealth Youth Climate Change Network in Mozambique. Mozambique is a poor country and the target of major tropical cyclones such as Gombe, Idai, Eloise, Kenneth, Shallane, Dineo, Freddy, Álvaro, Filipo, Gormane, El Nino, Olga , Chido and is currently being ravaged by the major tropical cyclone Jude. Causing human losses, millions of hectares of degraded land, loss of biodiversity and loss of public and private infrastructure. With the project called Youth Led Ocean Protect, funded by Stellenbosch University of Cape Town, South Africa, we have already restored more than 200 hectares devastated by major tropical cyclones (recovery of lowlands for agricultural production and environmental management), creation of community agendas for the sustainable use of land and other natural resources, Mapping and micro-zoning of community lands, creation and formalisation of natural resource management committees, creation of agro-livestock associations (inclusion of marginalised women, girls and young people in the creation

of self-employment through agricultural production and job creation through the green economy), sensitising communities on planting trees and mangroves in areas devastated by major tropical cyclones as a way of mitigating landslides or erosion, raising community awareness on retreating from flood-prone and landslide-prone areas, raising community awareness on collecting plastic bags from the aquatic and terrestrial environment, including gender in decision-making on the sustainable use of land and other natural resources, and intensifying the practice of conservation agriculture to contribute to the fight against hunger, chronic malnutrition and poverty. Our activities are being carried out in the villages of Ngoo, Chia, Mbueca and Mala in the Partial Reserve of Lake Niassa, Mozambique.

SUB8-038

MICRO CLIMATE MODIFICATION BY SHADING AS A STRATEGY TO CLIMATE CHANGE RESILIENCE AND PRODUCT DIVERSIFICATION IN TEA PRODUCTION

Korir, R.K[1*], Kerio, L.C[1], Ramkat, R.C[3], Ayiemba, P.O[1], Maritim, T [1, 2], Kamunya, S.M[2] and Muoki, R.C[1]

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ABSTRACT

Tea consumption has increased in recent years, due to the health benefits associated with its rich biochemical content. However, varying climatic conditions and glut in the market have had pronounced effect on the productivity and profitability of tea production respectively. The objective of this study was to evaluate the effects of shading on yield and quality in tea as a strategy for mitigation of climate change and environment manipulation for product diversification. The trial was conducted on a commercial tea cultivar TRFK 31/8, maintained under three different shading regimes; 30, 60 and 90%, over three seasons (warm/wet (WW), hot/dry (HD) and cold/wet (CW)) of the year. An unshaded regime was used as the experimental control. Monthly mean seasonal yields were studied alongside chlorophyll and caffeine contents in black cut, tear and curl (B CTC) and green orthodox (GO) tea products. Moderate shading (30%) had the highest monthly mean seasonal yields with highest yields in CW followed by WW and finally HD seasons. Chlorophyll content increased with shading with WW season accumulating higher levels (43.9 mg/g). Caffeine content also reduced with shading with highest levels registered in the HD season (3.5%). Caffeine content in the products depicted that B CTC had higher levels (3.5%) compared to GO (3.1%). Product diversification

can be adopted in existing tea populations in production of unaerated tea products under moderate shading (30 and 60%) during cold season and production of high quality aerated tea products during warm/hot seasons of the year while maintaining optimum yields. Integration of agro forestry trees at spacing and canopy with equivalent shading levels in existing tea plantations would be a cost effective strategy.

Keywords: *Monthly Seasonal Yields, Chlorophyll and Caffeine*

SUB8-037

MICRO CLIMATE MODIFICATION BY SHADING AS A STRATEGY TO CLIMATE CHANGE RESILIENCE AND PRODUCT DIVERSIFICATION IN TEA PRODUCTION.

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ABSTRACT

Tea consumption has increased in recent years, due to the health benefits associated with its rich biochemical content. However, varying climatic conditions and glut in the market have had pronounced effect on the productivity and profitability of tea production respectively. The objective of this study was to evaluate the effects of shading on yield and quality in tea as a strategy for mitigation of climate change and environment manipulation for product diversification. The trial was conducted on a commercial tea cultivar TRFK 31/8, maintained under three different shading regimes; 30, 60 and 90%, over three seasons (warm/wet (WW), hot/dry (HD) and cold/wet (CW)) of the year. An unshaded regime was used as the experimental control. Monthly mean seasonal yields were studied alongside chlorophyll and caffeine contents in black cut, tear and curl (B CTC) and green orthodox (GO) tea products. Moderate shading (30%) had the highest monthly mean seasonal yields with highest yields in CW followed by WW and finally HD seasons. Chlorophyll content increased with shading with WW season accumulating higher levels (43.9 mg/g). Caffeine content also reduced with shading with highest levels registered in the HD season (3.5%). Caffeine content in the products depicted that B CTC had higher levels (3.5%) compared to GO (3.1%). Product diversification can be adopted in existing tea populations in production of unaerated tea products under moderate shading (30 and 60%) during cold season and production of high quality

aerated tea products during warm/hot seasons of the year while maintaining optimum yields. Integration of agro forestry trees at spacing and canopy with equivalent shading levels in existing tea plantations would be a cost effective strategy.

Keywords: *Monthly Seasonal Yields, Chlorophyll and Caffeine*

SUB8-036

ANALYSIS OF OPEN FIELD TOMATO VARIETIES IN KENYA: CURRENT AND EMERGING PARADIGMS IN PHYTOPATHOGENIC RESISTANCE UNDER THE CHANGING CLIMATIC PATTERNS

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ABSTRACT

This review analyses the current array of open field tomato varieties accessible to farmers in Kenya, focusing on their disease resistance potential and yield capabilities amidst the changing climatic conditions. The horticulture sub-sector in Kenya continues to grapple with substantial challenges stemming from unpredictable weather patterns informed by climate fluctuations, plant disease pressure, and dynamic market requirements. This paper consolidates published findings on commercially available and newly introduced open field tomato varieties, assessing their performance in Kenya's varied agro-ecological zones. It summarizes the resistance of these varieties to key tomato diseases such as tomato yellow leaf curl virus (TYLCV), bacterial wilt, early blight and late blight, in addition to their yield consistency under conditions of heat stress and drought. The review also synthesizes the economic consequences of variety selection and highlights viable tomato breeding programs designed for specific agro-ecological settings within Kenya. In conclusion, the review outlines research gaps requiring immediate interventions and cites recommendations for synergizing sustainable tomato productivity in Kenya through improved variety selection and adoption.

Keywords: *Agro-Ecological Zones, Disease Resistance, Climate Resilience, Variety Selection and Yield Stability*

SUB8-035

EFFECTS OF UREA-MOLASSES MINERAL BLOCK SUPPLEMENTATION ON PERFORMANCE OF DORPER SHEEP ON BUFFELGRASS DIET IN KENYA

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ABSTRACT

The research study evaluated the effects of varying levels of Urea-molasses mineral block supplements on the weight gain, feed intake, digestibility, and cost-benefit of Dorper sheep. Twenty-four intact male Dorper rams with an average weight of 30.9 ± 0.8 kg were randomly allocated to 4 treatment diets (6 replicates per treatment). Treatment one (T1), the control, was fed a basal diet of 250 grams of ground maize and buffel grass hay offered ad libitum. The other treatments were fed the basal diet in addition to supplementation of urea molasses mineral blocks at 40g (Treatment 2), 80g (Treatment 3), and 120 g (Treatment 4) per day per animal. The experiment consisted of a 90-day feeding period and a 14-day digestibility study with 7 days of acclimatization and 5 days of data collection. The feed intake, feed conversion efficiency, and digestibility of T4 were significantly higher than that of the control. T4 had the highest daily dry matter feed intake and weight gain after the ninety-day feeding period at 953.6 g/day and 44.5 g/day, respectively. Meanwhile, T1 had the lowest daily dry matter intake and weight gain at 798.8g/day and 16.3g/day, respectively. T4 also had the best feed conversion efficiency with an FCR of 21.6, while T1 had the lowest FCR with a feed conversion efficiency 52.4. The cost-benefit analysis also showed that the control (T1) was the least profitable, with a cost-benefit ratio of 0.599, while T2, T3, and T4 had the highest cost-benefit ratios of 1.175, 0.883, and 1.036, respectively.

SUB8-033

AN ANALYSIS OF THE BENEFITS AND COSTS OF BIODIGESTERS: A CAPITAL BUDGETING APPROACH

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ABSTRACT

Survey data covering 101 biogas digester owning households from Nandi County was used to extract information on costs and benefits of biodigester technology. These benefit components comprised time savings associated with use of the technology, which were monetized for the purposes of the study. Other components such as gas and bioslurry, an end product of anaerobic digestion were also monetized after making appropriate assumptions. On the other hand, acquisition as well as operation and maintenance costs of the biodigester comprised the main cost components. Assuming a discount rate of 5.2 percent, Net Present Values (NPV) were derived after assuming a useful life of 20 years for the biodigesters. The estimated undiscounted payback periods were in line with values reported in previous studies. In order to infuse a probabilistic risk assessment on these NPV estimates, Monte Carlo simulations were implemented using the maximum and minimum values of the different components in the NPV calculations as arguments. Results generally revealed that biodigesters are profitable and viable investments. However, while the results are favorable, this study recommends that other approaches which incorporate the true nature of the technology under study be used to compare and contrast results. Since this technology has a significant sunk cost element, it is recommended that the use of real options approach be considered as an alternative tool for evaluating the costs and benefits.

SUB8-031

WHO LISTENS TO RAINFALL FORECASTS? ACCESS TO AND USE OF SEASONAL RAINFALL FORECASTS IN SMALLHOLDER AGRICULTURE

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ABSTRACT

Although seasonal rainfall forecasts serve as a critical step toward mitigating climate change impacts and improving smallholder farmers' welfare in developing countries, access to them among smallholder farmers is still low. We contribute to the literature on

climate information services by linking access to and use of seasonal rainfall forecasts. Using nationally representative cross-sectional data collected in 2019 from 7,241 smallholder farmers in Zambia, this study investigates the factors influencing access to and use of rainfall forecasts. The results of a Heckman two-stage selection model show that education, phone ownership, radio ownership, extension services, on-farm income, and membership in farmer groups are the main factors with a positive and significant influence on smallholder farmers' access to seasonal rainfall forecasts. Furthermore, the study showed that the probability of using seasonal climate forecasts increases when droughts were experienced in prior seasons. Specifically, owning a television and living in Agro-ecological Zone I influenced the farmers' access and use of seasonal rainfall forecasts. These findings suggest that governments and relevant stakeholders should prioritize the integration of climate information services and take proactive steps to raise awareness about climate information to strengthen farmers' resilience. Additionally, policymakers should focus on educating farmers about the localized effects of agroecological zones to enhance agricultural production and productivity.

Keywords: *Climate Change, Climate Information, Heckman Selection, Sub-Saharan Africa*

SUB8-030

SEEKING BEST AGRICULTURAL PRACTICES IN PRODUCTION OF SOYBEAN [*GLYCINE MAX* (L.) MERRILL] UNDER FURROW IRRIGATION IN LOWER KUJA IRRIGATION SCHEME, MIGORI COUNTY

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ABSTRACT

Appropriate agronomic management of soybean contributes significantly to grain yield. Soybean was introduced in Migori County to address negative effects on environment and health caused by tobacco and sugarcane sector that led to malnutrition and poverty. However, farmers experience low yields due to poor agricultural practices despite adequate moisture in irrigated areas. The objective of the trial was to determine best agricultural practices to improve soybean yields at Lower Kuja Irrigation scheme. Four trials were established in 2016. The first trial was on Di-ammonium phosphate (DAP: 18: 46:0) fertilizer application with three treatments at 0 kg/ha, 125 kg/ha and 250 kg/ha. The second was on weed management trial with four treatments (no weeding, weeding

once, weeding twice and weeding three times). The third trial was on spacing where two rows of soybean on a ridge spaced 30 cm apart were planted with an intra-row spacing of 5 cm, 10 cm and 15 cm. The fourth trial consisted of 3 rows of soybean on a ridge spaced at 15 cm apart with intra-row spacing of 5 cm, 10 cm and 15 cm. Ridges were 75 cm apart and a soybean cultivar named 'squire' established on the trials. Soybean grain yields increased significantly ($p \leq 0.05$) on application of DAP fertilizer. Results also indicated that there were no significant differences in soybean grain yield on weeding twice or thrice per season and spacing soybean at 30 cm inter-row and 5, 10 and 15 cm intra-row. Similarly, there were no significant differences on grain yield on planting 3 rows on a ridge spaced at 15 cm and an intra-row spacing of 5, 10 and 15 cm. Applying 125 kg ha^{-1} of DAP fertilizer on two rows of soybean spaced at 30cm on the ridge with an intra-row spacing of 10 cm, weeded twice per season would be a better agricultural practice at Lower Kuja Irrigation Scheme.

Keywords: *Soybean, Furrow Irrigation, Ridge, Spacing*

SUB8-029

HARNESSING APICULTURE FOR CLIMATE CHANGE ADAPTATION AND SUSTAINABLE LIVELIHOODS

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ABSTRACT

Apiculture offers an innovative and sustainable approach to climate change adaptation and livelihood diversification, particularly for rural communities. Bees not only support biodiversity through pollination but also enhance crop yields, sustain ecosystems, and offer diversified income streams. This review synthesizes current scientific literature, case studies, and field data to explore the intersection of beekeeping, climate resilience, and socio-economic development. The paper critically examines how apiculture contributes to ecological sustainability, enhances community resilience, and supports climate mitigation strategies. Further, it discusses the challenges faced by apiculture under changing climate scenarios and proposes actionable recommendations for policy support, research focus, and community-based interventions.

Keywords: *Apiculture, Climate Change Adaptation, Sustainable Livelihoods, Biodiversity, Socio-Economic Resilience.*

SUB8-028

ASSESSING THE PREPAREDNESS OF AGRIBUSINESS SMES IN KENYA TO CHANGING CLIMATIC CONDITIONS: FACTORS AFFECTING PLANNING FOR FUTURE CLIMATE EFFECTS

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ABSTRACT

The most severe impacts of climate change are expected to occur in the near future, particularly in sub-Saharan Africa, where agriculture and the food system sectors are at risk. Agribusiness SMEs play a crucial role in driving economic growth in Kenya, relying heavily on these sectors. This study focused on identifying the factors that influence planning for future weather impacts among 383 agribusiness SMEs in Kiambu and Kajiado counties. The SMEs were surveyed on the presence of plans to deal with future impacts of climate change, the support received to put these plans in place, the resources' used and the constraints faced. The goal of the study was to identify and support initiatives that can help mitigate the effects of climate change in the future. The study categorized planning for future climatic effects into three groups: no planning, planning without support, and planning with support. A multinomial regression model was used to determine the factors that influenced the planning decisions of the SMEs. The results of the study showed that SMEs that planned for future climate impacts were more likely to use resources such as family and friends, other local businesses, and the media compared to those that did not plan for future impacts. This highlights the importance of having a support system in place as a resource for preparing for the potential impacts of climate change.

SUB8-027

CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGIES IN AGRI-FOOD SYSTEMS IN KENYA; A REVIEW

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ABSTRACT

The Kenya agricultural sector is among the key contributors to the country's economy in terms of food security and revenue generation. About 80% of the population is dependent on agriculture, which is mainly driven by rural. The agri-food systems are an important component of the global economy whose sustainability is crucial for the well-being of world population. Climate change attributable to long-term shifts in temperatures and weather patterns poses a significant threat to agri-food systems. There is thus a need for actions to be taken to mitigate its effect. The agricultural sector is among the readily available and cost-effective pathways to mitigate climate change. The sector promotes food security and increases the resilience of farmers and communities affected by climate change. Mitigation strategies in agri-food systems, include; sustainable agricultural intensification, change in diets, reduction in food loss and waste, enhanced emissions reduction, and removals. There is a need to use the available technological solutions and their feasibility for implementation, to realise the full mitigation potential within agrif-ood systems. In addition, factors like inadequate funding, knowledge gaps, and lack of international collaboration. May hinder the implementation of mitigation measures. Nevertheless, need to evaluate the impact of the mitigation and adaptation measures on marginalized and vulnerable populations and their communities.

Keywords: *Agriculture, Climate Change, Agri-Food Systems, Mitigation Strategies*

SUB8-026

FARMER AWARENESS AND MANAGEMENT OF AFLATOXINS IN FINGER MILLET IN WESTERN KENYA

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ABSTRACT

Finger millet (*Eleusine coracana* L.) is an important food crop in western Kenya, but contamination with aflatoxins is becoming a concern. However, farmer awareness and management strategies of aflatoxins in finger millet in the region is largely unknown. This study investigated the level of farmer awareness of aflatoxins and its management in finger millet in Bungoma, Busia and Kakamega counties of Kenya. Data was collected through structured interviews with farmers in Bungoma (n=93), Busia (n=83) and Kakamega Counties (n=158). The data was analyzed using descriptive statistics and chi-square. There were significantly more finger millet farmers in Busia (30.1%) compared to Bungoma (9.7%) and Kakamega (5.1%) (p=0.000). Overally, 66.2% of farmers were aware of aflatoxin contamination on crops, and 53.8% had seen aflatoxin on their crops. More farmers in Bungoma (28.6%) had experienced aflatoxin contamination in their finger millet compared to farmers in Busia (11.8%) and Kakamega (0%). In the three counties, only about 10% of farmers were aware of Aflasafe KE01, a biocontrol product used in pre-harvest control of aflatoxin in crops. Overall, the main pre-harvest activities practiced by farmers to reduce aflatoxin contamination in finger millet were weed management, selecting the right variety, and pest and disease management, respectively. All the respondents across the 3 counties dried their harvested finger millet by sun-drying on tarpaulins. Threshing was done mainly by hitting the finger millet on the tarpaulins. Most of the finger millet (83%) was winnowed and stored without sorting, grading and dressing with insecticides. The threshed finger millet was packaged in normal gunny bags (90%) and use of hermetic bags was minimal (10%). The bagged grain was stored

inside the main house, with no special store for the grain. This study indicates that the level of farmer awareness on aflatoxins in finger millet was moderately high in all the study areas. However, management strategies was not commensurate with the awareness and did not reflect the effectiveness to prevent and reduce contamination. There is need for capacity building of farmers on identification of symptoms of aflatoxin contamination in finger millet, predisposing factors and effective postharvest management practices to prevent contamination during storage, marketing and consumption. There is need to enhance availability of Aflasafe KE-01 to farmers in the region and extend its usage to finger millet. These interventions will help to reduce the risk of human exposure to aflatoxin contamination through finger millet utilization.

Keywords: *Finger Millet, Aflatoxin, Awareness, Control, Farmers, Kenya*

SUB8-024

A SURVEY OF AFRICAN ANIMAL TRYPANOSOMIASIS AND TSETSE FLY INFESTATION IN SELECT AREAS OF BUSIA AND BUNGOMA COUNTIES, KENYA

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ABSTRACT

African Animal Trypanosomiasis (AAT) is one of the major constraints which affect livestock that causes reduced milk and meat production, anemia and mortality in affected animals. The disease is a major hindrance to exotic cattle farming. A study was conducted from November 2024 to December 2024 to assess the prevalence of AAT in cattle as well as tsetse fly abundance in Busia and Bungoma Counties, Kenya. This was a cross-sectional survey and a total of 886 cattle from Nanderema, Bukhalalire, Adumai, kabukuyi, Kengatuny, Okerebwa and Adumai villages of Busia county, and Namaterema village in Bungoma county were screened for AAT using quantitative buffy coat technique and packed cell volume (PCV) established. Tsetse survey was done by deploying 20 biconical tsetse fly traps in thickets and along streams in Funyula. Butula, Teso north and Sirisia sub counties to estimate tsetse flies' distribution and density. Overall prevalence of AAT was 6.43% (95% CI: 4.96–8.20) with T. Vivax (4.51%) as the most prevalent species followed by T. congolense (1.81%) and T. brucei (0.11%). Differences in species prevalence was significant ($p = 0.002$). Cattle aged 25–48 months had the highest prevalence (26.87%) as those under zero-grazing recorded prevalence of 27.3%. Overall mean PCV for the study population was 25%, AAT positive cattle had significantly ($p < 0.001$) lower PCV (22.2%) compared to 27.0% in the trypanosomes negative cattle. Fly catches were not high and Glossina pallidipes was the most abundant

species with fly per trap per day (FTD) of 0.091 while G. fuscipes fuscipes was the least abundant with FTD of 0.013. The study confirmed that AAT is still endemic in pockets of Busia and Bungoma, Counties. There is need to investigate seasonal variations in AAT transmission and assess the role of biting flies in AAT transmission.

SUB8-023

AN ASSESSMENT OF FARMERS' KNOWLEDGE ON FALL ARMY WORM, ITS MANAGEMENT AND IMPACT IN MAKUENI COUNTY, KENYA.

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ABSTRACT

Fall Army Worm (FAW) (Spodoptera frugiperda ((J.E. Smith) is an exotic invasive insect pest of maize in Sub-Saharan Africa. It originated in Latin America and the outbreak was first reported in Nigeria, West Africa in 2016. In Kenya, the outbreak occurred at about the same period in grain basket parts of Trans Nzoia. The outbreak had devastating impact, as maize is staple food for many people in the country. Climate change—manifesting as rising temperatures, shifting rainfall patterns, and increased frequency of extreme weather events—has been linked to changes in pest dynamics. Since the outbreak of FAW in Kenya, farmers have suffered massive loses especially when the control of the pest was not well known. A household survey was carried out to assess farmers' knowledge and management strategies for FAW in Makueni County. This survey is a component of the project "integrated Fall Armyworm management technologies demonstration", which is being conducted by KALRO in collaboration with CIMMYT. A sample size of 160 farmers was selected and interviewed face-to-face using a predetermined questionnaire mounted on ODK. The collected data were analysed using MS Excel and IBM SPSS version 20. Majority of the farmers interviewed in the two sub-counties indicated that they had observed various pests on their crops. The major ones that caused damage were FAW as reported by 99.4% of the respondents, second was Stem borers (63.8 %) and third seen pest was large grain borer (LGB) at 23.8%. Farmers reported loses of between 21-40% losses in yield as result of FAW damage. The interviewed farmers used a number of methods to control pests on their crops. The most common method used by almost all farmers was applying pesticides (97.5%), hand picking to remove the pest (3.1%) and natural enemies (3.1%). The study concluded that FAW was a major problem in the area.

Keywords: *FAW, Farmer Knowledge, Maize, Climate Change, Household Survey, Makueni County.*

SUB8-022

FROM AWARENESS TO ACTION: IMPLEMENTING CLIMATE CHANGE MITIGATION IN AGRICULTURE

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ABSTRACT

Climate change poses a significant threat to global food production and security, making the need for effective mitigation strategies in the agricultural sector increasingly urgent. This paper examines the current state of climate change mitigation efforts in agriculture, highlighting key challenges and opportunities for implementation. Through a comprehensive review of scientific literature, we explore a range of mitigation approaches, including sustainable farming practices, carbon sequestration techniques, and the adoption of renewable energy solutions. The findings demonstrate that a multifaceted approach, incorporating technological, managerial, and policy-driven interventions, is necessary to achieve meaningful emissions reductions and build resilience within agricultural systems. The paper concludes with a set of tailored recommendations to guide policymakers, researchers, and practitioners in transitioning towards a more sustainable and climate-smart agricultural future.

SUB8-021

LIVESTOCK CONTRIBUTION IN STRENGTHENING MARKET LINKAGES FOR ENHANCED ADOPTION OF CLIMATE SMART AGRICULTURAL TECHNOLOGIES AND INNOVATIONS

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ABSTRACT

Agriculture is the backbone of most African countries economies, contributing about 24% of GDP and supporting livelihoods for approximately 80% of the small scale farmers in the rural areas in Kenya. Kenya livestock sub-sector contributes 12% to national GDP and 42% to agricultural sector. Despite this, many countries experience low productivity growth; due to low adoption and low utilization of improved technologies and innovations. Therefore, there is need to understand factors that inhibit adoption of technologies and innovations so as to overcome them and accelerate adoption for improved productivity. The main objectives of this study were to assess the role of

livestock in production and marketing of the produce in the two value chains, assess livestock contribution in strengthening market linkages for enhanced adoption of climate smart agricultural technologies and innovations (CSATI) and propose policy recommendations to strengthen market linkages for enhanced adoption of CSATI. Purposeful site selection was done when selecting the three sub-counties of Kalama, Mwala and Yatta. Sample frames of the randomly selected locations were developed and two locations were randomly selected in each ward. Sample frames of the sub-locations were developed and two sub-locations were randomly selected from the selected locations. Sample frames for all the households in the selected sub-locations were developed and random sampling of households was done. Sample size for each sub-location was allocated depending on the sub-location population. Data was collected and analysed by use of SPSS software. Results showed that the main type of transport owned was oxen and the main land preparation equipment used was oxen plough. Therefore, It concluded that livestock plays pivotal role in strengthening market linkages through provision of cheap and reliable transport for both inputs and outputs, hence enhancing adoption of CSATI for improved household incomes and food security.

Keywords: *Climate, Innovations, Livestock, Smart, Technologies*.

SUB8-020

AGRO-PASTORALISTS' PERCEPTION ON CLIMATE CHANGE IN MARSABIT COUNTY, KENYA

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ABSTRACT

The life time experience contributes to knowledge of risk analysis and adaptive actions, and peoples' perceptions are drivers to possible intervention measures that can be initiated by affected communities and help guide development partners, government agencies and decision makers to build sustainable adaptation measures under the framework of climate change. Knowledge on these phenomena is important in nature-based livelihood which leads to adaptation and mitigation of climate perturbations. The objective of the study was to assess frequently experienced hazards as perceived by agro-pastoralists and analyze temperature and rainfall trends in Saku Sub-County in Marsabit County, Kenya from 1980-2020. The research design was a survey with a sample size of 373 households in Karare, Marsabit Central (Dakabaricha) and Sagante/Jaldesa wards. Mann Kendall test and Sen's slopes were used to analyze temperature and rainfall trend using XLSTAT software which was sourced from Kenya Meteorological Department in Nairobi. The main climatic hazards cited by the respondents were drought (93.7%) and pests and diseases (64.3%) and the least was heat-waves (4.8%). There were decreasing rainfall

and increasing maximum temperature trends which were significant in the months of August and September while the minimum temperature trend significantly increased in all the months. The study unveiled changing climatic trends with declining rainfall, increasing temperatures, and shifting precipitation patterns. These changes, coupled with the dominant hazard of drought and pest and diseases, accentuate the urgency for climate smart interventions. Agro-pastoralists in Marsabit County should have a timely access to weather information in order to make important decisions.

SUB8-019

UNLOCKING THE POTENTIAL OF CASTOR (RICINUS COMMUNIS L.) FOR PHYTOREMEDIATION IN KENYA

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ABSTRACT

Rapid urbanization industrialization and modern agricultural operations have considerably contributed to the inflation of pollutants besides heavy metals such as manganese, cadmium, lead, iron and arsenic into the terrestrial and aquatic environment. Results from previous studies in Kenya indicate that some analysed sites, particularly some soils, lakes, rivers and their aquatic organisms, had relatively higher concentration levels of heavy metals. These metals are non-biodegradable and toxic, posing negative effects ranging from soil and water degradation to long-term effects on ecological balance and public health. Phytoremediation is one of the promising and effective strategies to achieve natural decontamination. It is economical, environmentally safe and user friendly unlike other practices. Phytoremediation encompasses the elimination of metals by plants via the intake and aggregation into organic matter (phytoextraction) or even the alleviation of the effects of heavy metals in soil by exudation of biological material by the plant roots. The castor oil plant (Ricinus communis L) has several desirable and special features for phytoremediation namely; fast propagation and growth rate, resilience and tolerance to the polluted habitat. Despite scientific information gleaned from different experimental phytoremediation research setups indicating the potential of castor as a phytoaccumulator of several metals, it remains scantly implemented. In recent years, the government of Kenya has encouraged castor oil plant cultivation for biodiesel production. This paper proposes harnessing this opportunity by coupling this efforts with phytoremediation. In addition, it helps to quickly identify priority areas for remediation interventions as reported in earlier studies in Kenya.

Keywords: *Heavy Metals, Phytoremediation, Castor Oil Plant*

SUB8-018

ADOPTION AND IMPACT ASSESSMENT OF IN SITU SOIL AND WATER CONSERVATION TECHNOLOGIES IN CROP PRODUCTION IN KAJIADO COUNTY.

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ABSTRACT

In Kenya's arid and semi-arid lands (ASALs), soil moisture conservation is crucial for improving crop and pasture production due to characteristic high day temperatures and low soil moisture holding capacities in the region which account for 80% of the landmass. Techniques like deep tillage, sub-soiling, and ripping are particularly effective. These methods help increase soil moisture retention by breaking up compacted soil layers, allowing water to penetrate deeper and reducing runoff hence significant soil moisture storage capacity. The study aims to increase moisture availability to agricultural crops by adopting soil and moisture conservation and water harvesting techniques. In-situ soil moisture retention techniques were evaluated using agronomic methods (mulching and contour ploughing) and mechanical methods (*Zai* pits and raise beds/double dug beds). The results showed that *Zai* pits and raise beds/double dug beds when used together with soil fertility improvements (fertilizers, manure, rotational and controlled grazing) can significantly boost crop and forage yields for upto 50-100%, improve farmers' and pastoralists' livelihoods and resilience in the degraded rangelands in comparison to conventional methods. Majority of farmers (78%) reported that they *strongly agree* that these technologies have increased (in their last 2-3 harvests) their farms' crop productivity compared to the previous yields. On the impact of nutritional security, majority (72%) *strongly agreed* that their households' nutritional security has indeed improved. The practices also improve carbon content in the soil hence better greenhouse gas sequestration. In conclusion, using manure with *in-situ* soil moisture conservation improves Water Use Efficiency (WUE) by crops planted in semi-arid lands. Therefore, these strategies, approaches and technologies should form part of the farming systems in semiarid lands since they are sustainable, with low-cost and high impact results.

Keywords: *Carbon Sequestration, Crop/Pastures Yields, Improved Livelihoods and Resilience, In-Situ Soil Moisture, On-Farm Rainwater Harvesting, Semi-Arid Lands, Soil Fertility Improvement and WUE.*

SUB8-017

THE HIDDEN GEM: IMPROVED TECHNOLOGIES INNOVATIONS AND MANAGEMENT PRACTICES FOR COMMERCIALIZATION OF THE FRUIT SUB-SECTOR IN KENYA

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ABSTRACT

The fruit sub-sector contributes to food, nutrition security and economic development. Despite its importance, many opportunities for growth and improvement remain untapped. The hidden gem of the fruit sub-sector is anchored in the use of appropriate technologies, innovations, and management practices (TIMPs), and improved commercialization strategies. This study explores the key areas that can help unlock the potential of the fruit sub-sector. The objectives are to present appropriate TIMPs in fruit production for enhanced efficiency, innovation in fruit marketing, commercialization, and environmental considerations. The approach was a desk review to gather, analyze, and present the information in a structured and comprehensive way. A systematic literature search was conducted to identify relevant studies, reports, and articles that highlight the latest TIMPs within the fruit sub-sector. The search was carried out using several databases including Scopus, Google Scholar, Web of Science, and agricultural science databases. Although there are many best bet TIMPs currently under development or ready for adoption by fruit farmers' production and productivity of some of the value chains does not reflect this. It was observed that very few farmers have adopted precision agriculture, use of biological controls, practice food safety, pre-and-postharvest technologies, or use superior germplasm which are the game changers in developed countries. TIMPs that compound soil health, soil conditions, and environmental factors have recently been presented for some fruit value chains e.g. mango, avocado, banana, citrus and passionfruit. Moreover, there is a gap in extension, knowledge and technical skills required to embrace best bet production, processing and marketing practices. Sustainable agronomic practices e.g. integrated pest and disease management, organic farming, and climate smart water conservation technologies and are being promoted to reduce the environmental footprint of fruit production. The fruit sub-sector has potential for growth, but realizing it requires a focus on using TIMPs.

SUB8-016

ECONOMIC ANALYSIS OF MANGO FLOWER INDUCTION TECHNOLOGIES IN KENYA

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ABSTRACT

Mango flower induction technologies are the techniques used to trigger the flowering process in mango to achieve off-season mango production or early flowering and increase yield. It is of high economic value in mango production through increased revenue generation. The objective of this paper is to analyze the economic importance of the effects of growth regulators thus Ethrel and Potassium Nitrate on mango production in Kenya. It analyzes the effect of the growth regulator on the benefit of mango production in comparison to the cost through a Cost Benefit analysis and Gross Margin Analysis. The experiment involves a trial set up at KALRO HRI. Three mango varieties namely Tommy Atkins, Van Dyke and Kent were treated with growth regulators which included Ethrel and Potassium Nitrate. Bark ringing technique was applied to each of the varieties above and a control experiment set up using plain water. Data was collected on the yield/acre and yield/plot of each of the mango varieties. Data analysis was done using Cost Benefit Analysis and Gross Margin analysis under the different techniques of production applied to them for the 2020/2021 production seasons. From the above trial it was identified that application of the growth regulators significantly increased mango yield thereby resulting to more revenue for the farmers. Ethrel works best on Van Dyke followed by Kent and lastly Tommy Atkins. Potassium Nitrate **w**orks fairly well with Van Dyke and Kent while being poor with Tommy Atkins. Bark ringing works well with all the three mango varieties. From the Control experiment Kent is a superior variety followed by Van Dyke while Tommy Atkins trailed behind. Ethrel and Potassium Nitrate increased the production of mango by breaking alternate bearing and acting as flower induction agents as identified in this study. This technique will greatly enhance the economic value of mango and encourage farmers to involve in production and export alongside use as staple food and employment generation tool.

SUB8-014

POTENTIAL ENVIRONMENTAL RISKS DURING FALL ARMYWORM MANAGEMENT STRATEGIES BY SMALLHOLDER FARMERS IN BOMET COUNTY, KENYA

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ABSTRACT

Climate change and conducive weather brought the sudden rise of fall armyworm (FAW) *Spodoptera frugiperda* (J.E Smith) as an invasive pest within Africa possessing grave implications to smallholder farmers with reference to potential environmental risks and household food insecurity. In Kenya, the first FAW invasion detection reported in Bomet County in 2016 prompting the indiscriminate use of pesticides that could undermine the environment, human health and food security. Since the invasion of FAW in Kenya, there has been limited research on potential environmental risks during FAW management strategies by smallholder farmers. Based on smallholder farmers' households' disparities through food supply network, FAW invasion can obstruct the accomplishment of households' nutrition security with environmental unsustainability. Different smallholder farmers' households from Bomet County were purposively enumerated using structured questionnaires, checklists for farmer groups and key informants. The analysis of data used descriptive statistics. The results showed FAW management practices that were likely to lead to environmental risks and perceived ill health related to pesticides use with either male or female farmers being the primary pesticides handlers. The results further indicated FAW invasion contributes to households' food decline leading to household food insecurity. There is need for research and service providers to create awareness for farmers on climate changes, change their food preferences that are insusceptible to FAW, and better FAW mitigation strategies mainly on the use of pesticides that are more biodegradable and less polluting to the environment thereby, decreasing on occupational exposures to pesticides and to family members

SUB8-013

CLIMATE CHANGE ADAPTATION STRATEGY FOR FOOD AND NUTRITION SECURITY IN PASTORAL AREAS, KAJIAO COUNTY

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ABSTRACT

Food and nutrition security in the Arid and Semi-Arid areas (ASALs) is highly threatened by the environmental features excercabated by climate change and culturally construed factors such as acceptability of food components that are non - aligned to animal nutrition especially among the original Maasai households in Kajiado County. Due to Climate change, the pastoralists are slowly changing into agro-pastoralism to caution households from slipping into famine, since, dependence on livestock farming is threatened by harsh weather conditions leaving the community exposed to perpetual famine. Introduction of small-scale drip irrigation by KALRO through a project funded by International Atomic Energy Agencies (IAEA)came in handy to small- scale households' in Kajiad0o Central, giving them an opportunity to grow food crops as an alternative to livestock farming.The study was done to determine the social and economic contribution of the drip irrigation technologies and the influence on crop diversification at the household level for enhanced food and nutrition security. The study targeted 155 farmers practicing small-scale drip kits technologies in three wards of Kajiado County. Ten (10) key informants sourced from community local leaders, ward agricultural extension officers and Kenya Agricultural and Livestock Research Organization participated. Data was collected using questionnaires, coded to open data kit (ODK) software, then imported to excel for analysis. The data showed that some crops that were grown such as maize, was continually grown before and after the introduction of the drip kits technologies. Millet, sorghum ceased to be grown after the introduction of the technology, variety of vegetables and fruits were introduced and became acceptable in the community. Production of foods for sale, and, growing crops off-season were the benefits accrued from the technology.

Keywords: *Small-Scale Drip Kits, Crop Diversification, ASALs*

SUB8-012

BIOCHAR FOR IMPROVING HUMIC NITISOL PROPERTIES AND MAIZE (ZEA MAYS)

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ABSTRACT

The study examined the role of biochar in improving soil fertility and maize productivity, positioning its application as a strategic signal of intent and capacity to enhance agricultural sustainability in resource-constrained farming systems. Conducted at the Kenya Agricultural and Livestock Research Organization Kakamega experimental field centre during 2022, the experiment utilized a Randomized Complete Block Design. Biochar was applied at 5 t ha^{-1} and combined with NPK (23:23:0) fertilizer at planting and calcium ammonium nitrate for topdressing (each 200 kg ha^{-1}). Maize (Hybrid 624) was grown in 5m×3m plots, with key crop (leaf surface area, stem girth, maize height and yield) assessed alongside key soil parameters. Biochar derived from sugarcane bagasse and coffee husks significantly enhanced soil physical and chemical properties, including moisture retention, porosity and bulk density, soil pH and nutrient levels (K, Fe, and total N). Maize yields following biochar treatment alone (average 7.6%) were comparable to those obtained using NPK fertilizer alone (9.3%). Combining biochar with fertilizer further improved maize yield (15.9%), demonstrating complementary benefits derivable from biochar-fertilizer mixtures. The findings underscore the potential for biochar alone or combined with fertilizer to benefit sustainable agriculture, warranting further evaluation of applications tailored to address specific soil and cropping systems.

Keywords: *Biochar, Carbon Sequestration, Climate Resilience, Maize Productivity*

SUB8-010

SUSTAINABLE MAIZE PRODUCTION FOR FOOD SECURITY: CLIMATE RESILIENCE THROUGH INTENSIFICATION AND TILLAGE PRACTICES IN NAKURU COUNTY, KENYA.

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ABSTRACT

Maize-based mixed farming constitutes approximately 70% of agricultural households engaged in this practice, with maize serving as a vital staple crop often intercropped with beans in the East and Central Africa region. Despite its significance, maize production faces an estimated annual decline of 15% due to the adverse effects of climate change, posing critical challenges to national food security amidst a growing population. A study was conducted in Nakuru County during 2023 and 2024, aimed at evaluating the potential of diverse cropping systems and tillage practices in enhancing the climate resilience of smallholder farmers while bolstering food security. Specifically, the study investigated the impact of strip cropping and tillage methods on maize yields within intercropping systems. The experimental design employed a Randomized Complete Block Design (RCBD) in three farmers' fields in Rongai, Njoro and Elementaita wards. Treatments included conventional ploughing with pure maize, conventional ploughing with maize-bean intercrop, no-till maize pure stand, rotational no-till maize pure stand, rotational no-till beans, no-till with four-row maize/bean strip cropping, and no-till with two-row maize/three-row bean strip cropping. Data on grain yield and yield attributes for both crops were subjected to analysis of variance (ANOVA) using GenStat software version 14, with mean separation conducted using Duncan's Multiple Range Test (DMRT) at a 5% significance level. Results from 2023 revealed significant ($P<0.05$) differences in maize yields across tillage practices and cropping systems, with the two-row maize/three-row bean strip cropping under no-till resulting in significantly ($P<0.05$) higher yields compared to other treatments except for pure maize stands and rotational systems. Bean yields were highest under rotational no-till practices involving beans intercropped with maize. In 2024, the four-row maize-bean strip cropping under no-till demonstrated significantly ($P<0.05$) superior performance in maize yield compared to other systems, while rotational bean systems excelled in bean production. The consistently high yields observed for the four-row maize-bean strip cropping system and rotational bean systems suggest their suitability for adoption in tested areas to enhance food security and climate resilience among smallholder farmers.

Keywords: *Maize-Based Mixed Farming, Tillage Practices, Cropping Systems, Climate Resilience and Food Security.*

SUB8-009

REVIEW: UNDERSTANDING THE IMPACT OF PEST RESISTANCE AND THE GROWING ANTIMICROBIAL RESISTANCE CRISIS THROUGH ONE HEALTH APPROACH ON CROP YIELD AND HEALTH CONSEQUENCES IN KENYA

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ABSTRACT

Kenya's agricultural sector is crucial to the nation's economy; however, it is facing threat that has serious implications for crop yield, public health, and environmental sustainability. Pest resistance to pesticides and antimicrobial resistance (AMR) is a growing crisis crop production. Over-reliance on chemical pesticides overtime to combat pests gradually has resulted in the evolution of pest populations that no respond to pest control methods. This has led to increased pesticide use, further exacerbating the cycle of resistance, threatening crop yields, human health and environment. Pesticide overuse also facilitates the spread of AMR, as chemicals affect not only pests but also soil and water bacteria, promoting the survival of resistant bacterial strains. The situation is compounded by the environmental impact of pesticide residues, which contaminate soil, water, and food crops, increasing the risk of pesticide-related health issues. These resistant microbes can pass from plants, animals and humans to each other via countless environmental pathways such as water, soil and food, creating a cycle of disease risks intensifying the problem of AMR. The concept of One Health, which recognizes the interconnection of animal, human and environmental health, offers a comprehensive approach to addressing AMR in agriculture. This review examines how one health approach can help in monitoring, evaluation and management of pesticide resistance and AMR. Additionally, it evaluates the critical need for enhancing policy, regulation, and awareness creation to avert AMR risks across different industry. Importance of multi-sectoral collaboration under the One Health framework will enhance development of integrated solutions to protect ecosystems and human health. The strength of this approach is necessity to adopt sustainable agricultural practices, strengthen regulation and build global collaboration to ensure a future in which antibiotics will continue to be effective and agriculture systems will be resilient to AMR issues.

SUB8-007

EFFECTIVENESS OF MITIGATION MEASURES ON FOOD SECURITY IN NAROK COUNTY'S CROSS-BORDER CONFLICT ZONES, KENYA

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ABSTRACT

Food insecurity remains a persistent challenge in conflict-affected regions worldwide, where violence negatively impacts agricultural production, market access, and food distribution systems. This study examines the effectiveness, sustainability, and community perception of mitigation measures implemented to address these challenges, focusing on how well interventions have improved or have not improved food availability, access, and stability in this conflict-prone region. Employing a mixed-methods approach, the research combines quantitative surveys (n=180 households) with qualitative interviews (n=20 key informants) to evaluate intervention outcomes. Findings show significant implementation gaps: while 51.4% of respondents were aware of mitigation programs, nearly half (48.6%) lacked knowledge of existing initiatives. Moreover, 61% of respondents identified challenges in the implementation of these programs, citing issues such as poor communication, lack of transparency, and minimal community involvement in design and execution. Although some reduction in conflict incidents has been reported—with certain areas noting up to a 40% decrease—food security outcomes remained concerning. Only 33.4% of respondents rated mitigation actions as effective or very effective, and just 29.5% believed the interventions were highly sustainable. In contrast, 45.7% perceived them as having low or no sustainability. These findings underscore the urgent need for participatory, context-specific strategies that integrate conflict resolution with food system resilience, ensuring that interventions are both locally grounded and structurally sustainable.

Keywords: *Food Security, Conflict Mitigation, Pastoral Communities, Intervention Effectiveness, Kenya, Cross-Border Conflicts*

SUB8-005

TOWARDS A GREEN ECONOMY: LEVERAGING BEAN-COFFEE INTERCROPPING TO IMPROVE RURAL LIVELIHOODS IN COFFEE GROWING REGION IN KENYA

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ABSTRACT

Intercropping coffee with beans presents a strategic and sustainable approach to improving productivity, resilience, and income for smallholder farmers, particularly in coffee growing regions in Kenya. This agro-ecological practice addresses the inherent challenges of coffee's long maturation period by integrating fast-growing legumes such as beans, which offer short-term income and contribute to soil restoration. Leguminous beans enhance soil fertility through nitrogen fixation, organic matter deposition, and improved microbial activity, reducing the need for synthetic fertilizers and supporting climate resilience. Weed suppression is another significant benefit, with the dense bean canopy limiting weed growth and reducing reliance on chemical herbicides. Some bean species also release allelopathic compounds that naturally inhibit weed development. These attributes are particularly valuable in regions with limited access to mechanized weed control, lowering input and labor costs while promoting ecological balance. Economically, intercropping maximizes land-use efficiency and provides income diversification, which is critical during coffee's early, non-productive years. The sale of beans helps improve cash flow, mitigate market risks, and build economic resilience. Environmentally, intercropping enhances biodiversity, prevents soil erosion, and improves water-use efficiency, aligning with climate-smart agriculture principles. Despite its benefits, intercropping requires careful management to avoid competition for resources and navigate increased agronomic complexity. Challenges such as variety selection, pest and disease management, and access to technical knowledge underscore the need for extension services and farmer training. With targeted donor investment in capacity-building and input support, intercropping has the potential to drive sustainable rural development, support regenerative farming, and contribute to broader climate and environmental goals.

SUB8-006

AGRO PASTORAL COMMUNITIES' PERCEPTIONS ON INDIGENOUS BROWSE RESOURCES OF THE NORTH CENTRAL RIFT REGION, KENYA.

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ABSTRACT

A survey of indigenous browse resources and their utilization by agro pastoral communities of the north Rift region of Kenya was carried out by KALRO (Kenya Agricultural and Livestock Research Organization) – Perkerra in 2014. The main objective of the survey was to obtain the agro pastoral communities' views on their perceptions regarding the indigenous browse resources which they normally resort to during the dry seasons to feed their livestock, besides the numerous other uses such browses are normally subjected to, and, on top of the crucial role such indigenous browse/vegetation play in the wake of climate change, such as the provision of ecosystem services and environmental resilience. The agro pastoral communities covered in the survey include the Tugen (in Baringo Central and Mogotio sub-counties), the Samburu (in Samburu Central sub-county), the Pokot (in East Pokot sub-county) and the Il Chamus (in Marigat sub-county). The type of land tenure system practised in the study sites ranged from private ownership in Bekibon, Cheplambus and Oterit sites, to communal land tenure system of ownership in Angata Rongai, Sirata, Tangulbei, Loyamorok and Longewan sites. All the agro pastoral communities covered in the survey generally keep cattle, goats, sheep, camels, donkeys and poultry to varying degrees. The survey used the focused group discussion (FGD) methodology in gathering information from the field. Each agro pastoral community has an assortment of indigenous browse resources for use during the dry seasons of forage scarcity. The components fed to livestock range from the bark, twigs, shoots, leaves, flowers, pods and fruits. Other than use as forage, the indigenous browse resources have a myriad other uses among the agro pastoral communities covered, such as medicinal uses of indigenous browse resources for both humans and livestock.

SUB8-004

CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGIES IN THE AGRI-FOOD SYSTEM

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ABSTRACT

Climate change poses a significant threat to global agri-food systems, affecting food security, biodiversity, and livelihoods. Adaptation and mitigation strategies are essential to enhance resilience and sustainability in agricultural production. This paper explores various adaptation approaches, such as climate-smart agriculture (CSA), conservation agriculture, agroforestry, and improved water management techniques. It also highlights mitigation strategies, including carbon sequestration, reduced greenhouse gas emissions, and the promotion of sustainable farming practices. The study emphasizes the role of technology, policy frameworks, and stakeholder collaboration in fostering a resilient food system. Drawing from global and local case studies, including Kenya's agricultural sector, this research provides insights into innovative solutions that enhance climate resilience and ensure food security. By integrating adaptation and mitigation measures, the agri-food system can transition towards a more sustainable and climate-resilient future.

Keywords: *Climate Change, Agri-Food System, Adaptation, Mitigation, Sustainable Agriculture, Food Security*

SUB8-003

EVALUATION OF BIOFERTILIZER AND PESTICIDE PERFORMANCE OF BLACK SOLDIER FLY LARVAE *(HERMETIA ILLUCENS)* FRASS ON FARMING OF KALES *(BRASSICA OLERACEA)*.

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ABSTRACT

The farming of edible insects is on the increase globally due to its ability to promote the circular economy through reduction, reuse and recycling resources. The challenge however concerns resultant frass, which is a potential environmental pollutant. Frass however, has great potential as it contains valuable nutrients and bioactive compounds

and can potentially be used to replace expensive chemical fertilizers and banned control agents posing a challenge to vegetable farming. This research investigated application of black soldier fly frass as both biofertilizer and biocontrol agent on kales (Sukuma wiki). The study's specific objectives were to investigate the effect of BSFL frass on growth performance of Sukuma wiki, assess the pesticidal activity of BSFL frass from different feeding substrates on kales; and determine the effect of fermentation on frass efficiency as a pesticide. The study used a randomized complete block design to arrange the experimental plots. Three frass types generated by rearing BSFL on selected substrates were used to grow kales at a rate of 50 grams per plant in potted pots in a field. The performance was assessed by counting the number of leaves in a plant and measuring the leaf surface area. The frass was then mixed with water in a ratio of 1:1, and filtered to produce frass tea, which was sprayed on the kales at a weekly rate of 100ml per plant for 4 weeks and performance was measured by counting the number of pest spot attacks on the vegetables and counting number of insect larvae collected per plant. Lastly, frass from the most potent substrate was selected, and fermented for 2 and 4 days respectively to produce "frass tea" and sprayed and performance measured as above. The data obtained was analyzed in SPSS using ANOVA and the results presented in graphs and tables. Results for objective one showed that kales grown on frass from chicken+fruit+brewery waste treatment had superior growth with mean value of 1.01±0.8 for number of leaves and 2.15±0.02 for leaf surface area respectively compared to 0.47±0.1 and 1.16±0.10 respectively for the control. For objective two, frass tea from chicken+brewery waste was more effective as it recorded mean values 0.16±0.10a and 0.06±0.06a respectively for pest bites and number of larvae collected respectively compared to 0.87±0.09b and 0.42±0.17b respectively for the control. For objective three, results showed that fermentation had no effect on frass performance as a biopesticide (0.69±0.10b leaf bites and 0.50±0.14b for number of larvae; for 2 days fermentation and 0.87±09b leaf bites and 0.62±0.17b number of larvae collected for four-day fermentation). Therefore, frass can be used as both an effective biofertilizer and biocontrol agent to replace conventional chemicals.

SUB8-001

ETHIOPIAN APPROACH" TO COMBATING DESERTIFICATION: THE CASE OF SEMI-ARID SAVANNA GRASSLANDS IN SOUTHERN ETHIOPIA

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ABSTRACT

This paper explores an innovative Ethiopian approach to combatting desertification, focusing on the semi-arid savanna grasslands in Southern Ethiopia. The study investigates the multifaceted strategies employed by Ethiopian communities, governmental bodies, and non-governmental organizations to address desertification challenges in the region.

Through an analysis of legislative frameworks, community engagement, afforestation programs, and sustainable land management techniques, this research highlights the efficacy of Ethiopia's strategy in reducing the effects of desertification. The results emphasize how crucial it is to build effective measures for halting desertification in fragile ecosystems by utilizing local knowledge, community involvement, and adaptive governance. In addition, this study also addresses how the Ethiopian approach may be applied to other areas with comparable environmental problems. In summary, this research adds significant perspectives to the worldwide conversation about desertification and provides useful guidance for sustainable land use.

SUB-THEME: INSTITUTIONAL AND BEHAVIORAL STUDIES IN AGRICULTURE

SUB11-009

BEST-WORST SCALING APPROACH FOR PARTICIPATORY IMPROVEMENT OF FINGER MILLET

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ABSTRACT

Finger millet (Eleusine coracana) is a drought-resistant crop that can thrive in low moisture and poor soil conditions, making it a promising solution to the increasing risk of malnutrition in Sub-Saharan Africa. Despite efforts by various organizations to breed improved varieties that can perform well in these environments, there is low uptake of finger millet farming in many areas in Kenya, including Kericho and Bomet Counties. The low uptake limits the potential of the crop to meaningfully contribute to better food security and improved livelihoods. To address this issue, we conducted an experimental study to understand the attributes that farmers consider important when choosing finger millet varieties, with the aim of increasing adoption rates. Farmers were presented with different choice sets and asked to choose the most and least preferred profiles. A maximum difference model (maxdiff) was implemented to identify the most important attributes. The study finds that color is the most important attribute, with farmers indicating a preference for light brown followed by white, black, and deep red with marginal utilities of 0.141, 0.018, -0.0.027, -0.132, respectively. The higher utilities for lighter colors can be explained by the household consumption preference.

Other important attributes are the finger structure, disease tolerance, snapping, and short varieties. Further assessment indicates that farmers have a higher preference for varieties with multiple desirable attributes. The results also indicate higher marginal probabilities for such varieties, signaling potential demand. Consequently, the study recommends the development of varieties that capture the preferred traits. This strategy can increase the uptake of finger millet in Kenya and the Sub-Saharan Africa, hence better food security and improved livelihoods.

Keywords*: Finger Millet, Preference, Choice Experiment, Best-Worst Scaling*

SUB11-008

INSTITUTIONAL ARRANGEMENTS AND THEIR INFLUENCE ON ADOPTION OF IMPROVED PRACTICES THROUGH DAIRY INNOVATION PLATFORMS IN KENYA

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ABSTRACT

Chapter 3 Improved dairy practices can increase productivity and income for farmers while contributing significantly to food security objectives. However, uptake of these practices remains low. Their low uptake can be attributed to inefficient extension approaches. New approaches, such as the Innovation Systems (IS), have been promoted and actualised within Innovation Platforms (IPs). The IS approach allows for multi-stakeholder involvement and recognises that the innovation process transcends the technological aspects to social and institutional components. Existing studies have concentrated on socioeconomic characteristics influencing adoption, ignoring crucial institutional arrangements. The current study sought to explore the institutional arrangements influencing the adoption of improved dairy practices among participants in dairy innovation platforms in Kenya. A total of 255 respondents who were participants in dairy innovation platforms were interviewed. Data were analysed using the Principal Component Analysis (PCA) and the double hurdle models. Descriptive statistics analysis showed statistically significant differences between adopters and non-adopters with regards to education, herd sizes, and access to off-farm income. The Principal Component Analysis (PCA) generated four characteristics of institutional arrangements: Social capital, compliance with standards, contracts, and capacity enhancement. In the first stage, arrangements characterised by social capital and standards were the most critical drivers of adoption. In the second hurdle, institutional arrangements characterised by social capital, standards, capacity enhancement, and contracts determined the intensity

of adoption. The study proposes interventions that capitalise on information sources that farmers rely on, such as other farmers, and initiatives that encourage implementation and enforcement of dairy standards by relevant stakeholders to encourage adoption of improved dairy practices by farmers.

Keywords: *Dairy, Adoption, Intensity, Institutional Arrangements, Improved Dairy Practices, Innovation Platform.*

SUB11-007

ASSESSMENT OF MILK PRODUCTIVITY AT KALRO FCRI KITALE AS AN IMPROVEMENT STARTEGY

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ABSTRACT

Commercialization of dairy farming could help in meeting the increased demand of milk and dairy products, improve milk productivity and competitiveness of the value chain. KALRO FCRI Kitale dairy farming is one of the commercial activities that aims at increasing internally generated revenue. The study aimed to assess the relative benefits gained and costs incurred in the dairy milk enterprise at KALRO FCRI Kitale 2024. A survey was conducted in January 2025 using secondary data collected from dairy, accounts and supply and procurement departments. Data was collected on 20 Holstein Friesian lactating animals of different lactating stages and age. Cost Benefit Analysis (CBA) was used to assess the benefits gained and costs incurred in the milk enterprise and gross profit analysis was used to show the financial level of the enterprise. Average milk production per animal/day ranged between 5.6 to 10.2 litres and the milk was sold at KES 45, while total milk production per month ranged between 1,722.5 to 3,612 litres. Milk consumed by calves, on station use and spillage constituted 28% of the total milk produced. Casual labor and animal feeds constituted the largest proportion of total cost of production. The milk enterprise had a Cost Benefit Analysis ratio of 1.4 indicating the enterprise is expected to generate incremental value and had an economic benefit. The enterprise had a positive gross profit revealing that the revenue generated from milk sales could sufficiently take into account the variable costs and indicating the enterprise is profitable. The trends in both the Cost Benefit and gross profit analysis revealed that the

dairy enterprise is a viable commercial business worth to invest in. Efficient utilization of resources at the institute could play a key role in maximum resource management. The research findings can be used by the management to make informed decisions about improvement and sustainability of the dairy enterprise.

Keywords: *Milk Productivity, Cost Benefit Analysis, Gross Profit Analysis, Profit Maximization and Cost Minimization*

SUB11-006

ENHANCING RESEARCH AND LEADERSHIP SKILLS OF EARLY CAREER SCIENTISTS IN KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANISATION (KALRO)

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ABSTRACT

The Kenya Agricultural Research Organization (KALRO) is a premier institution dedicated to excellence in agricultural and livestock research, with a vision of transforming livelihoods. KALRO employs scientists with various educational backgrounds, including Bachelor's, Master's, and PhDs, and supports their career growth to enhance research productivity. Recently, KALRO hired a cohort of young scientists to fill gaps left by retiring researchers, as part of its succession and sustainability strategy. The target group for this study comprised early career scientists, specifically those with less than 10 years of experience, from 16 research institutes spread across the country. The research team developed an online tool that was distributed via email to the scientists through the human resources department. A total of 91 scientists responded to the questionnaire. The results showed that 26% of ECS had no experience in proposal development and writing, highlighting a significant skill gap that could hinder KALRO's productivity and funding success. Among those with experience, 49% of female and 45% of male ECS rated their skills as moderate. Only 26% rated their skills as high. About 75% of male and 66% of female ECS reported proficiency in data collection. However, 51% of female and 49% of male ECS rated their data analysis skills as moderate, with nearly a third indicating low proficiency. There was high reliance on Excel, with 87% of female and 73% of male ECS using it, which may limit their analytical capabilities. At least 57% of ECS have not published research papers, with more males (59%) than females (54%)

reporting no publications. The study revealed that while KALRO's ECS exhibit potential in their roles, there are notable gaps in essential skills that could affect their research productivity and overall effectiveness. There is need to capacity build these scientists for a smooth succession process and sustainability.

SUB11-005

ACTIVITIES PRACTICED BY MAIZE FARMERS TO COMBAT AND MITIGATE EFFECTS OF FALL ARMYWORM INFESTATION IN MASII, MACHAKOS COUNTY, KENYA

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ABSTRACT

Fall armyworm (FAW) has become the main pest of maize since invading the country in 2017. It's high reproduction rate coupled with lack of local natural enemies ensures that it colonizes a crop and completely devastates it in a short time. It is known to be tolerant to various pesticide molecules, making it more challenging to manage. The study was carried out to determine the level of knowledge of FAW and the management options employed by maize farmers in Masii ward, Machakos County in November 2024. A total of 134 maize farmers were randomly selected and interviewed through face-to-face meeting using a structured questionnaire in open data kit (ODK) software. Amongst the interviewees, 96.3% do not carry out any form of soil testing. However, majority frequently used mineral fertilizers such as NPK (45.5%), DAP (37.3%) and CAN (35.1%). About 92.5% of the interviewees reported using organic manures. Only 24.6% of respondents had received training on FAW management from County extension

staff (81.8%) and KALRO (69.7%). Of the interviewed farmers, only 50% were able to differentiate FAW from other pests. Yield losses of 26-50%, 51-75% & 76-100% in maize were indicated by 1.5%, 53.7% & 44.8%, respectively of the respondents. Various FAW management practices were in use where pesticides, handpicking and ash & soil, representing 92.9%, 73.0% & 69.0%, respectively. Most farmers (85.8%) recognized negative effects of synthetic pesticides on the environment as well as humans. Sources of information on management of FAW included agro chemical stores (95.4%), farmer-to- farmer (36.1%), extension (13.9%) as well as KALRO (0.9%). Most farmers (69.4%) were not aware of integrated pest management (IPM) of which 83.3% were interested in knowing and using the IPM techniques. The study notes the need for training farmers on IPM options to ease production costs and improve the pest management.

SUB11-004

PRODUCERS' VALUATION OF EXPORT TEA AND COFFEE AS POTENTIAL GEOGRAPHICAL INDICATIONS IN KENYA: A CHOICE EXPERIMENT ANALYSIS

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ABSTRACT

Globally, there is increased protection of unique origin products with geographical indications (GI) for environmental sustainability and income generation for the producers. Geographical indications provide consumers with information on the quality of the products hence reducing information asymmetry and creating opportunities for increased proportion of consumer prices that get to the producers. The Kenya agricultural export market is characterised by raw undifferentiated products. This reduces competitiveness for the producers since they are not able to negotiate for better prices. However, in the beverage crops export market, there exists opportunities for differentiating products based on characteristics inherent in the production region, thus generating considerable surplus for the target producers. Differentiating and promoting high value commodities as GIs would be dependent on, among others, the products comparative advantage, producer preferences and willingness to pay for the protection, as well as existing market demand. The objective of this study was to determine agricultural producers' valuation of attributes related to protection of two export commodities as geographical

indication in Kenya. The study focused on coffee from Murang'a County (n=135), and tea from Kirinyaga County (n=137), both reputed to draw preference from consumers due to their unique territorial-linked qualities. Choice experiment modelling based on Lancaster's consumer theory and econometric basis in the random utility maximisation was applied. The producers were presented with efficient choice sets featuring varying combinations of market and institutional attributes. The choice sets were developed in a participatory process through focused group discussion, literature review and key informant interviews. From the analysis, coffee producers were more likely to protect their commodities with geographical indications at regional level, provided they receive a minimum guaranteed return. Tea producers also valued minimum guaranteed return most but preferred factory level protection. Tea producers were less likely to protect their products as geographical indications as compared to coffee producers, who have higher variability in farm and factory management as well as commodity prices. Protection of export commodities as geographical indications may provide an additional solution to reducing marketing challenges and prices to producers. However, as evidenced from the analysis on tea, the protection must be accompanied by efficient field and factory management.

Keywords: *Choice Experiment, Export Commodities, Geographical Indications, Producers, Willingness-To-Pay*

SUB11-002

ADVANCING FRUIT CROP IMPROVEMENT THROUGH POLYPLOIDY: STRATEGIES AND APPLICATIONS

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ABSTRACT

Polyploidy is common in plants; some estimates indicate that 30–80% of living plants are polyploid, and numerous organisms exhibit signs of ancient polyploidy (paleopolyploidy) in their DNA. Polyploid plants can naturally occur through several mechanisms, such as the failure of meiosis or mitosis and the fusion of unreduced (2n) gametes. Autopolyploids and allopolyploids can be observed in both wild and cultivated plants. The majority of polyploids show hybrid strength compared to their parental species. Polyploidy frequently leads to advantageous modifications, such as greater fruit size, better taste, higher nutritional content, greater stress resilience, and longer storage

duration. These advancements arise from larger cell size, modified gene expression, and improved heterozygosity. Polyploid fruits such as bananas, watermelons, and strawberries illustrate the market success of polyploid cultivation. Progress in genomic technologies and molecular markers has enhanced accurate polyploid breeding, allowing scientists to focus on specific traits and speed up crop enhancement. In spite of these benefits, obstacles like decreased fertility, intricate inheritance patterns, and regulatory challenges remain.

Keywords: *Polyploidy, Colchicine Treatment, Ploidy Manipulation, Pineapple, Genome*

SUB11-001

COMMUNITY BASED LOCAL FOOD PROCESSING INITIATIVES: HOW DO THEY SURVIVE AFTER THE PHASEOUT OF DONOR SUPPORT?

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ABSTRACT

It is the wish of every stakeholder to see that donor-supported structures, such as Backyard Gardens (BGs), continue to operate beyond the donor support period. Various studies show that donor-initiated structures, often instituted at significant costs, experience difficulties regarding sustainability. This is because such structures reportedly cease to operate after their initial funding runs out, resulting in the wastage of human and financial resources that could have been invested more effectively. However, there is a dearth of information regarding the extent to which donor-initiated advocacy groups continue to serve grassroots communities years after the phasing out of donor support. The present study investigated the sustainability of BGs, taking a case of BGs initiated and supported by DanChurchAid in Malawi. Specifically, the study identified key factors that influence the continued operation of BGs after years of donor cessation. A combination of quantitative and qualitative approaches was used to collect data from 226 respondents and 16 BGs sampled from Karonga, Dowa, Lilongwe, Mwanza, and Neno districts from May to July 2020. Secondary data provided preliminary information and cross-validation of the data. Descriptive statistics, logit regression, and Critical Content Analysis were used to analyze the data. The study identified nine factors essential for the continued operation of BGs, namely: Age of the members, Marital status of the members, Availability of basic systems and procedures, Unity among members, Community contribution, Linkages and networking, Fundraising skills, and Availability of an exit strategy. The study recommends that supporting organizations develop exit strategies to concretize the phasing-out plan for supporting BGs. Donors and well-wishers should consider investing in weak institutional areas of BGs, such as BGs registration, fundraising, and organizational systems and procedures, which are critical to the institutionalization of the BGs

SUB-THEME: DISSEMINATION OF AGRICULTURAL RESEARCH OUTPUTS

SUB9-020

SCIENCE COMMUNICATION OF AGRICULTURAL RESEARCH OUTPUTS: A CASE STUDY OF KENYA AGRICULTURAL AND LIVESTOCK RESEARCH ORGANIZATION (KALRO)

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ABSTRACT

Agricultural Research Institutions (ARIs) and Development Organizations have made significant strides in developing climate-smart technologies, innovations, and management practices (TIMPS) aimed at enhancing productivity in crop and livestock systems. Unfortunately, many researchers continue to rely on limited communication strategies, often presenting their findings in academic seminars and conferences that do not engage farmers and policy makers directly. As a result, valuable innovations often fail to reach the very individuals who could benefit from them the most. This study examines the communication practices employed by the Kenya Agricultural and Livestock Research Organization (KALRO) to disseminate its research findings to farmers. Through purposive sampling, 29 KALRO researchers were interviewed to assess their communication methods. The results reveal a predominant reliance on traditional, top-down communication channels such as seminars and workshops, alongside the use of technical jargon that is difficult for farmers to understand. The study advocates for more inclusive, farmer-centred communication strategies. It highlights the potential of using local languages and digital platforms such as community radio, television, SMS, videos, and YouTube to broaden the reach and improve the clarity of research outputs. These approaches promote interactive, lateral communication, allowing farmers to engage more actively with the information provided. In conclusion, the paper stresses that agricultural development can only be realized when farmers have both access to and understanding of relevant innovations. Given the critical role farmers play in food production, the study calls for communication strategies that empower farmers through participation and feedback. The paper recommends that future extension services prioritize inclusive, accessible communication to bridge the gap between research institutions and the practical application of innovations in the field.

Keywords: *Science Communication, Agriculture, Research Output*

SUB9-019

AN ECONOMIC ANALYSIS OF DAIRY VALUE CHAIN: A CASE STUDY OF THE DAIRY ENTERPRISE AT KALRO DRC OL JORO OROK

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ABSTRACT

Nowadays technologies is being introduced in almost all aspects of life, political, economic, social education etc., Agriculture and specifically dairy farming is no exception. Consequently incorporating technology and innovation in the less advanced small scale dairy farming is rather relevant. Modern technologies and innovations can allow livestock products producers optimize their production and reduce environment impact as well as lower production cost. Activities like Milking, feeding, environmental control and reproductive performance are mostly likely to be affected by correct management decisions. Incorporating technologies, innovation and management practices in these decisions can make production easier and better. The aim of this study is to deepen knowledge in livestock technology innovation and management practices. We identified appropriate and potential livestock innovations for smallholder farmers and studied there impact on milk yield production and other farm activities. Using a binary logit model this paper therefore examines the impact of the attributed TIMPS to milk yield. The method used for TIMPS dissemination was training through extension service.

Keywords: *TIMPS, Innovation, Technology, Management Practice, Dissemination.*

SUB9-018

CALF SEX RATIO IN DAIRY CATTLE UNDER THE SEMI-INTENSIVE SYSTEM OF THE PRODUCTION: A CASE OF KALRO, DAIRY RESEARCH CENTRE – OL JORO OROK

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ABSTRACT

In Commercial dairy production, female calves are given preference and also regarded more valuable than male ones. This consideration is mainly based on the perception that female calves play a major role in the replacement and continuity of the dairy herd as

well as enhanced milk production. Due to this reason, many dairy producers often get disappointed by the lower ratio of female to male calves born per calving season. This necessitated this study at KALRO Dairy Research Centre, Ol Joro Orok to establish the factors that determine calf sex ratio in dairy cattle under semi-intensive system of production. The study involved analysis of data of calf sex in relation to their breed, month of birth, weight at birth, parity of the dam, age of the dam and the year of birth. The results from this study revealed that the overall sex ratio is almost balanced at 1:1 under no influence by external factors during the parity of the animals under study. The results further indicated that the month of birth had a significant influence on the sex of the calf with January and July having distinct patterns of distribution between male and females. These patterns could reflect the influence of seasonal factors, such as temperature, nutrition or hormonal cycles on sex determination. The study also revealed a significant relationship between calf sex and breed. Friesian breed showed a higher proportion for male calves than the Ayrshire and the crossbreeds. This could be due to the influence of; genetic and physiologic differences among breeds and also breed-specific management practices on calf sex. The study also concluded that parity of the dam, dam's age, birth weight and year of birth revealed no significant association with the calf sex.

Keywords: *Calf Sex Ratio, Semi-Intensive Dairy System, Breed, Parity, Month of Birth.*

SUB9-017

ARE AGRICULTURAL EXTENSION STAFF READY TO PROMOTE INDUSTRIAL HEMP (*CANNABIS SATIVA L*) PRODUCTION IN KENYA? THE CASE OF KILIFI COUNTY

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ABSTRACT

Industrial hemp, a non-psychoactive variety of *Cannabis sativa* with a tetrahydrocannabinol (THC) content of less than 0.3%, has gained attention worldwide as a versatile crop with applications in textiles, construction, food, medicine, and biofuels. In Kenya, where agriculture remains the backbone of the economy - accounting for about 20% of GDP and employing over 40% of the total population and more than 70% of the rural populace (CBK 2024) - the introduction of industrial hemp could represent a

transformative opportunity for job creation, enhanced food security, and environmental resilience. However, the adoption of this crop depends heavily on the willingness of two key groups: agricultural extension staff, who provide technical support and education to farmers, and the farmers themselves, who would cultivate the crop. This paper presents preliminary findings from a study assessing the willingness of agricultural extension staff to promote industrial hemp in Kenya, using Kilifi County as a case study. Data were collected through an online questionnaire targeting extension officers, exploring their knowledge, attitudes, and perceived challenges regarding industrial hemp as a viable crop. Descriptive statistics were used to analyse the results. Findings reveal that 66% of the respondents have heard of industrial hemp but all respondents lacked technical knowledge of the crop in terms of its agronomy. Over 80% thought that industrial hemp is same as marijuana or bhang underlying the socio-cultural stigma associated with the crop. While 61% express willingness to promote hemp, politics and unclear legal frameworks, resource constraints lack of training and uncertainties about the hemp market hinder readiness. The paper recommends targeted capacity-building, policy clarity, and public awareness campaigns to prepare extension services for hemp promotion.

Keywords: *Industrial Hemp, Agricultural Extension, Kilifi County, Kenya, Readiness, Willingness, Cannabis Sativa, Marijuana, Bhang*

SUB9-016

LEVERAGING KNOWLEDGE MANAGEMENT TO FOSTER RESILIENT AGRI-FOOD SYSTEMS THROUGH EFFECTIVE DISSEMINATION OF AGRICULTURAL RESEARCH OUTPUTS

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ABSTRACT

Building resilience in agri-food systems demands strategic dissemination and application of agricultural research outputs. While extensive socio-economic and policy research is continuously generated by institutions such as the Kenya Agricultural and Livestock Research Organisation (KALRO), its impact largely depends on efficient communication, accessibility, and usability of these insights by end-users, including farmers, extension officers, policymakers, and other stakeholders. Knowledge Management (KM) serves as a crucial facilitator in ensuring agricultural research excels academic and institutional boundaries to inform practical solutions. KM practices encompass capturing explicit and tacit knowledge, systematizing information through digital repositories, developing accessible platforms, and promoting interactive knowledge-sharing mechanisms like communities of practice, knowledge cafés, and farmer field schools. This paper emphasizes the vital role of KM in enhancing socio-economic and policy research

dissemination. By creating structured knowledge hubs and digital platforms, KM effectively connects researchers with policymakers and practitioners, facilitating real-time access to actionable insights. The integration of participatory approaches and ICT-based platforms further ensures feedback circles, enriching continuous learning and responsiveness within agri-food systems. Highlighting specific KM initiatives within Kenya's agricultural research landscape, the paper demonstrates practical strategies for optimizing dissemination, including open-access databases and mobile-based platforms that cater directly to farmers and extension services. Such mechanisms ensure research outputs are not only accessible but also contextually relevant and actionable. Strengthening KM practices enhances resilience by promoting informed decision-making, encouraging adaptive policy formulation, and empowering stakeholders across the value chain. Institutionalizing robust KM frameworks within dissemination processes ensures sustained socio-economic impact, in alignment with Kenya's Bottom-Up Economic Transformation Agenda (BETA) and the Sustainable Development Goals (SDGs).

SUB9-015

LIKELIHOOD OF FARMERS RECOMMENDING BIODIGESTERS TO FRIENDS AND NEIGHBORS, AND THE LIKELY ROLE OF NEGATIVE WORD OF MOUTH

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ABSTRACT

Biodigesters are a relatively minor, but important component as a climate change mitigation technology. Although introduced in Kenya more than 7 decades ago, the adoption of biodigesters has been relatively slow. While we know that subsidies can accelerate adoption, they are not the only means through which adoption can be accelerated. We hypothesize that part of this slow adoption speed has been caused by negative word of mouth (WOM) from unhappy prior adopters. Using both parametric and non-parametric methods, this study investigates the possibility of such an effect. Data was collected from a sample of 300 owners of biodigesters selected through a multi-stage sampling procedure. Respondents were drawn from five counties (Kiambu, Meru, Taita

Taveta, Kisumu and Kakamega). While 45 percent are likely to share recommendations with friends and neighbors, others are unsure, yet others are unlikely to do so. The result suggests that while prior adopters who are satisfied with the biodigester may recommend the technology to neighbors and friends, having a contract with biodigester construction enterprise (BCE) is an important characteristic determining the probability of recommending the technology. Owners of functional biodigesters too have a high probability of making these recommendations. However, the study estimates a non-zero probability (0.14) of people we categorize as "unhappy" prior adopters recommending the technology. This raises a number of fundamental questions. For example, what is the nature of the "recommendations" this category of persons will give if not spread negative WOM? Meanwhile, there is need for more effort by key players to reduce the number of non-functional biodigesters.

Keywords: *Non-Functional, Information, Biodigester, Satisfied*

SUB9-014

EVALUATING FEED AVAILABILITY AND UTILIZATION OF SUGARCANE BY- PRODUCTS FOR DAIRY CATTLE IN MALAVA SUB-COUNTY, KENYA

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ABSTRACT

Feed availability and quality is a major constraint to dairy cattle productivity in western Kenya. The situation is worsened through competition of land with other land uses in which sugarcane is prioritized. Sugarcane generates high quantities of Sugarcane tops (SCT) and bagasse after harvest and sugar milling respectively that is usually wasted. The study evaluated seasonal variation in forage and/or sugarcane based feeds availability and farmers knowledge in conservation and utilization of sugarcane by product based-feeds. Data was collected from a sample size of 400 respondents using cross-sectional and observational studies from three administrative wards in Malava Sub-County. Data was collected using questionnaires, interviews, focused group discussion, key informants and observation checklists. Pilot study was also conducted in Chemuche ward to confirm accuracy of the research instruments. Reliability of research instruments was tested using test-retest method. The Feed Assessment Tool (FEAST version 2. 2 1) was used to quantify seasonal availability of animal feeds, land holdings, livestock holdings, milk yield and dominant fodder crops in the study area. The Statistical Package for Social Scientists (SPSS version 25) was used to analyze descriptive data while inferential statistics was done using Chi-square. The findings revealed that SCT (29.7%), crop residues (25.2%) and green feeds from roadside, weeds and crop thinning (24.5%) were the dominant feed sources. SCT was available throughout the year while crop residues

were mainly available after crop harvest. Sugarcane variety CO-421 was preferred for feeding livestock because its leaves are broad with less hair and is softer than others. Majority of farmers never combined SCT with other forage feeds. Majority of farmers (72.1%) stored small amounts of whole SCT in open air while 29.1% stored under shed. The study found sugarcane by-products as under-utilized feed resource that requires further research and dissemination.

SUB9-013

EVALUATION OF SUGARCANE TOPS-BASED FEED RATIONS FOR ENHANCED DAIRY PRODUCTION AMONG SMALLHOLDER FARMERS IN MALAVA SUB-COUNTY, KAKAMEGA COUNTY, KENYA.

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ABSTRACT

Dairy farming is the most rapidly changing sub-sector of agriculture in Kenya, making up 6-8% of the nation's Gross Domestic Product and effectively reducing poverty. Agriculture serves as a fundamental pillar for both urban and rural populations, offering financial stability, employment, and nutritional assurance for smallholder farmers. This study aimed at evaluating sugarcane tops based feed technologies for enhanced feed availability among small holder farmers in Malava Sub-county, Kakamega County Kenya. The specific objectives of the study was to assess the nutritive value of various sugarcane tops based feed rations as utilized by the farmers. The study adopted a descriptive survey research design which focused on small holder dairy farmers within the sugarcane belt region. A simple random sampling technique was adopted to collect the necessary data. A sample population of 385 dairy farmers owning between 1 and 5 dairy cows and grow or utilize sugarcane tops were interviewed. Data collection was done using questionnaires, interview guide, secondary data and other key stake holders' records. Data was analyzed using descriptive statistics to determine the frequency distribution for the demographic profiles of participants. The data was tabulated using frequencies and percentages. The data was then interpreted and presented in the form of tables, figures and graphical column charts. Key findings revealed that while SCTs alone are insufficient, their combination with energy or protein-rich forages significantly improved their nutritional profile, 100% SCT control ration had the lowest Crude Protein (CP) at 5.1% while those who supplemented with desmodium or dairy meal reported average increase in milk yield of 1.5–2.3 liters/cow/day. These findings provided real time information that will enable small holder dairy farmers to sustainably utilize sugarcane tops as alternative source of dairy cattle feeds. Keywords: Dairy farming, sugarcane tops, feed technologies, smallholder farmers, nutrition, Kenya, socio-economic development

SUB9-01

ENHANCING FRUIT QUALITY OF AVOCADO (PERSEA AMERICANA) USING RIPENERS IN KITUI COUNTY, KENYA

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ABSTRACT

Significant postharvest fruit quality loses of Avocado (Persea americana) are experienced after the fruits have been harvested. An experiment was conducted to enhance ripening of the fruits while maintaining their quality. The experiment comprised of four treatments namely; ripening in open containers at room temperature, ripening in closed organic paper bags at room temperature, ripening in organic papers at 25o centigrade in an incubator, the last treatment was a farmer's practice where three unripe bananas were also enclosed together with the avocado in paper bags at room temperature. The sample size was five fruits in a completely randomized design. The cumulative number of ripe fruits for treatments and absolute number of fruits were significant different ($p \leq 0.01$) in the fourth day of incubation but not significantly different ($p \geq 0.05$) in third day, fifth day, seventh day and ninth day -when all fruits had ripened. Ripening at 25o centigrade had the highest number of ripe fruits (4.3) on the fourth day that was not significantly different ($p \geq 0.05$) from paper bags (2.7) but was significant different ($p \leq 0.01$) from the other treatments. The avocado fruits also had the characteristic colour of ripe avocado. Ripening in the open took nine days and the fruits were of poor quality and shriveled. Bananas enclosed in paper bags also ripened in four days and had the characteristic colour of ripe banana. Avocado enclosed in organic paper bags accumulated ethylene that hastened ripening. Erickson and Yamata (1964 yearbook) reported that the best temperature for ripening Hass avocado was between 21 to 27o centigrade and that avocado incubated at 6o had not ripened within 32 days-the time limit of the experiment. To avoid postharvest loses, we recommend that excess avocado should be stored at low temperatures and that paper bags is a cheap method for ripening avocado for households

SUB9-010

THE ROLE OF FARMERS ATTRIBUTES AND PRACTICES IN INFLUENCING PESTICIDE RESISTANCE TO TOMATO PESTS IN KENYA

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ABSTRACT

Tomatoes are a crucial vegetable in Kenya, serving as a staple ingredient in a wide array of dishes enjoyed by the country's 50 million residents on a daily basis. Production of tomatoes is primarily carried out by small and medium-scale farmers, who face numerous challenges from pests and diseases. Of particular concern is the increasing prevalence of pesticide resistance. This study delves into the issue of pesticide resistance among tomato pests in Kenya, seeking to understand the factors contributing to its development. A random sample of 443 tomato farmers from four counties participated in interviews, providing insights into their tomato production practices, pest and disease management strategies, and perspectives on pesticide resistance. Pesticide resistance occurs when pests or diseases reappear after pesticide application and it was reported by 18% of the farmers. A probit model was utilized to analyze the factors influencing pesticide resistance. Results indicates that farmers who focus solely on growing tomatoes see a reduction in pesticide resistance. Furthermore, as tomato yields rise, the risk of pesticide resistance decreases. Farmers who irrigate more frequently, utilize rainfall and temperature data, conduct soil analysis, and correctly select spraying nozzles are less likely to encounter pesticide resistance. However, challenges arise in determining the pesticide to use. Farmers relying on their own experience or seeking advice from agriculture experts have an increased risk of pesticide resistance. Additionally, mixing pesticides to boost effectiveness also heighten the likelihood of pesticide resistance. To effectively manage pesticide resistance in tomatoes, a comprehensive approach is required.

Keywords*: Pesticide Resistance, Immunity of Tomato Pests, Resistance to Chemical Pesticides.*

SUB9-009

FARMER PREFERENTIAL INFORMATION PATHWAYS FOR ADOPTION OF CASSAVA TECHNOLOGIES, INNOVATIONS AND MANAGEMENT PRACTICES IN NAKURU COUNTY-KENYA

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ABSTRACT

In order to increase adoption of cassava Technologies, Innovations and Management Practices (TIMPs), appropriate cassava information must reach to the farmers at the right time. Information pathways are thus critical in channeling critical messages required by farmers. Different pathways have different effects on adoption. However, farmer information preferences are heterogeneous and driven by farmer socio-economic personal characteristics as well as the environments that they operate in. In order to successfully pass the information required for increased productivity, farmer preferences to these pathways must be understood. This is importance in supporting those channels that farmers most prefer in order to increase adoption. The objective of the study was to determine preferential pathways of uptake of cassava TIMPs among cassava farmers in Nakuru, County Kenya. The study employed a mixed-methods research design that used both qualitative and quantitative approaches to data collection. Purposive sampling was used to select wards that were suited for cassava production and random sample of 384 respondents determined using the Cochran's formula. The results showed that cassava was the 3rd priority crop for the farmers interviewed. From the descriptive statistics, farmer-farmer exchange systems were the most important means of passing cassava information. The econometric analysis showed that the significant pathways included farmer-farmer exchange, radio, credit access, electricity access and group membership. There's need to examine the importance of each pathway in terms of quality and appropriateness of information that is channeled through it.

Keywords: *Cassava, Information, Pathways*

SUB9-008

PARTICIPATORY BUNDLING OF PRIORITY TIMPs TO DRIVE COMMERCIALIZATION OF COFFEE VALUE CHAIN IN KENYA

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ABSTRACT

Agricultural sector in Kenya faces several constraints that limit farmers' ability to commercialize their value chains. Accordingly, Kenya Agricultural and Livestock Research Organization has over the years developed a wide range of modern technologies, innovations and management practices (TIMPs) that have the potential to address the key constraints and significantly transform smallholder farming. However, the challenge is how to effectively integrate priority TIMPs from among many research-proven options with greatest potential to maximize their impact, particularly in the context of market-oriented coffee farming in Kenya. This study aimed to apply a multi-phased TIMPs bundling process in order to prioritize five TIMPs bundles with the greatest potential impact on productivity, profitability, climate resilience and mitigation in coffee value chain. Bundling TIMPs is a strategic approach that involves combining multiple, synergistic and complementary TIMPs to address key constraints and/or meet specific market needs across the value chain. A systematic, participatory, iterative 9-step methodology was developed and tested on bundling climate-smart TIMPs for coffee value chain. Multi-criteria analysis was applied to prioritize coffee TIMPs based on their scores on climate-smartness and participatory ranking undertaken by key stakeholders at 3 levels. Results clearly indicated that TIMPs bundling enhanced the overall value proposition for farmers by optimizing the combination of individual TIMPs, thereby likely to accelerate their adoption. Through participatory prioritization of a comprehensive package of fewer solutions tailored to farmers' specific needs, TIMPs bundling promises good prospects to boost farmers' productivity, profitability, and resilience to climate change in the coffee value chain in Kenya.

Keywords: *Bundling, Commercialization, TIMPs, Participatory, Prioritization.*

SUB9-007

CLIENT SATISFACTION WITH AGRICULTURAL TECHNOLOGIES: THE CASE OF KALRO KAKAMEGA MKULIMA OPEN WEEK 2024

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ABSTRACT

Abstract Dissemination of agricultural research results is critical for ensuring that innovations reach stakeholders and improve farming practices. Dissemination of research results therefore is an important aspect of the research process. This study assessed client satisfaction with KALRO technologies during the Mkulima open week 2024 at the KALRO Non-Ruminant Research Institute in Kakamega, Kenya. Data was collected from 125 Research week respondents (farmers, civil servants, business person etc.) at the Institute in Kakamega using semi structured questionnaire, analyzed using descriptive statistics and presentation of the study adopted percentage and frequency distribution. A balanced gender representation (50% male, 50% female) and a significant youth presence (36% aged 18-35), indicating growing youth engagement in agriculture. Farmers constituted the majority of respondent (61.6%), with high interest in cassava and poultry technologies (51.2% visitation rate), while postharvest technologies receive minimal attention (10%). Over 93% of participants expressed intent to apply the knowledge gained and 87% found KALRO staff explanation clear and practical. However, outreach gaps were noted in neighboring counties like Bungoma and Busia. Based on the results the study recommends the explore use of digital platforms to complement physical exhibitions. An online portal where participants can access information about showcased technologies, watch demonstration videos, and interact with KALRO experts could extend the reach to more youths and impact of the exhibition leading to expand in outreach in underrepresented counties to ensure inclusivity and also promotion of postharvest technologies through interactive demonstration given their low visitation rates.

SUB9-006

TRANSLATING RESEARCH INTO ACTION: STRATEGIES FOR DISSEMINATING AGRICULTURAL POLICIES

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ABSTRACT

Agricultural research generates a wealth of insights and innovations to address global challenges in food production, environmental sustainability, and rural development. However, the effective translation of this knowledge into actionable policies remains a persistent challenge. This paper explores strategies for enhancing the dissemination and uptake of research-informed agricultural policies. Through a systematic review of the literature and case study analyses, we identify critical factors that facilitate the successful transfer of scientific evidence into policy and practice. The findings highlight the importance of multi-stakeholder engagement, strategic communication, capacity building, and adaptive governance frameworks. We conclude with a set of recommendations to guide policymakers, researchers, and practitioners in bridging the research-policy gap and catalyzing meaningful change in the agricultural sector.

SUB9-005

SCALING IMPROVED BEAN VARIETIES TO FORGOTTEN FARMERS THROUGH MULTISTAKEHOLDER PLATFORMS: IMPACT ON FOOD AND NUTRITION SECURITY IN WESTERN KENYA

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ABSTRACT

In sub-Saharan Africa, agricultural development programs have focused on smallholder farmers in general and forgotten Vulnerable and Marginalized Groups (VMGs), including widows, People living with HIV/AIDS and teenage mothers. Yet, VMGs comprise a substantial subset of smallholder farmers with special needs. Moreover, most agricultural programs use top-down approaches, leading to low technology uptake. As a result,

many agricultural organizations have adopted Multi-Stakeholder Platforms (MSPs) as a vehicle for scaling agricultural technologies. However, little empirical evidence exists on impact of MSPs on food and nutrition security. This study scaled Climate Smart KALRO varieties of bio-fortified beans (Nyota) in Busia and Migori Counties through MSPs. The objective of this paper was to assess effectiveness of MSPs in enabling VMGs to access selected improved bean varieties and credit; and evaluate impact of access to seeds of improved bean varieties on food and nutrition security. Three types of VMGs: widows, People living with HIV/AIDS and teenage mothers were purposively selected for the study. Using a Randomized Controlled Trial (RCT) design, MSPs and Control were assigned to six eligible VMGs. Panel data were collected from a random sample of 249 households with members in VMGs (117 households in Control and 132 MSP) in 2022 and 2024. Results show that significantly higher proportion of MSP (76.2%) households accessed improved seed compared to Control (11.8%) ($P<0.001$). Similarly significantly higher proportion of MSP (85.4%) households' accessed credit compared to Control (66.7%) ($P=0.001$). Metrics of food and nutrition security show that Household Dietary Diversity Score was significantly higher in MSP (8.98) compared to Control (7.51) ($P<0.001$). However, Months of Adequate Household Food Provisioning (MAHFP) was not significantly different between MSP (9.15) and Control (9.60) ($P>0.100$). This evidence highlights the need to promote MSPs as a vehicle for building resilient food systems.

Keywords: *Vulnerable, Uptake, Food Security, Innovation System, Participation, Impact.*

SUB9-003

EVALUATION OF DISSEMINATION PATHWAYS EFFECTIVENESS FOR CLIMATE ADAPTABLE TECHNOLOGIES IN AGROPASTORAL ECONOMIES OF KENYA

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ABSTRACT

Fodder production technologies, livestock husbandry practices, climate-smart agriculture practices, and integrated landscape management are currently and widely promoted initiatives as a control and productivity measure for livestock production, environment, and soil fertility improvement in arid and semi-arid lands of Kenya. Since they are relatively knowledge-intensive technologies, access to information about their efficacy is critical for maximum adoption and continued use. Given that different technologies may need different dissemination pathways for adoption, this study sought to identify the most effective dissemination pathway for scaling up the technology among many farmers while considering social dynamism such as gender, age, education capacity, affiliation to farmer groups or organization and having participate in fodder production training

initiative before. Descriptive analysis and logit regression was used to analyze data from 254 respondents randomly selected from the three counties of Taita Taveta, Narok, and Kajiado in the southern rangelands of Kenya. The results indicated that chronologically field days, farmer field schools, organized seed fairs, and farmer to farmers, compounded by well-targeted small investment innovation or seed funds had the greatest impact on the probability that a farmer in the study area would adopt these new promoted strategies for improving livestock productivity, environment, and soil fertility. Concerning social dynamic factors, all dissemination pathways were highly significant if the farmers are organized into producer groups although strategic efforts should target demonstrations through field school to intensify adoption. Strategic establishment of demo plots and ToTs (Train of trainers) managed, organized on-farm field days or county level agricultural shows, farmer seed funds and organize farmer learning tours (exchange visits) where appropriate can be used as alternative pathways to reinforce extension messages.

SUB9-001

CONSUMER WILLINGNESS TO PAY FOR AFRICAN INDIGENOUS VEGETABLES' VALUE-ADDED PRODUCTS IN KISII AND NAIROBI COUNTIES. A RANDOM PARAMETER CHOICE MODELLING APPROACH.

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ABSTRACT

African Indigenous Vegetables (AIVs) Value added products are rich in nutrients and contribute to diet diversification and planning. However, their consumption remains low due to various factors. This study evaluates consumer willingness to pay for AIVs Value Added Products in Nairobi and Kisii counties. The main purpose of this study was to understand how various product attributes influenced consumer preferences and willingness to pay. A choice experiment was adopted to elicit willingness to pay and a Random Parameter Logit model used to analyze it. A cross-sectional survey was carried among a pooled sample size of 277 respondents from Nairobi and Kisii counties. The results indicated that consumer willingness to pay for AIVs Value Added product attributes was positively influenced by cleanliness, source, certification, sweet taste, longer shelf life, and packaging. Generally, respondents from Nairobi had a higher willingness to pay compared to Kisii. In both counties cleanliness and source attracted the highest willingness to pay of Kshs 72 and Kshs 70 respectively. The findings of this study will enable production of AIVs with featured attributes to increase consumer acceptability and implementation of relevant policies in the AIVs value chain.

Keywords: *AIVs Value Added Product Attributes, Random Parameter Logit, Choice Experiment, Preference Heterogeneity, Nairobi, Kisii.*

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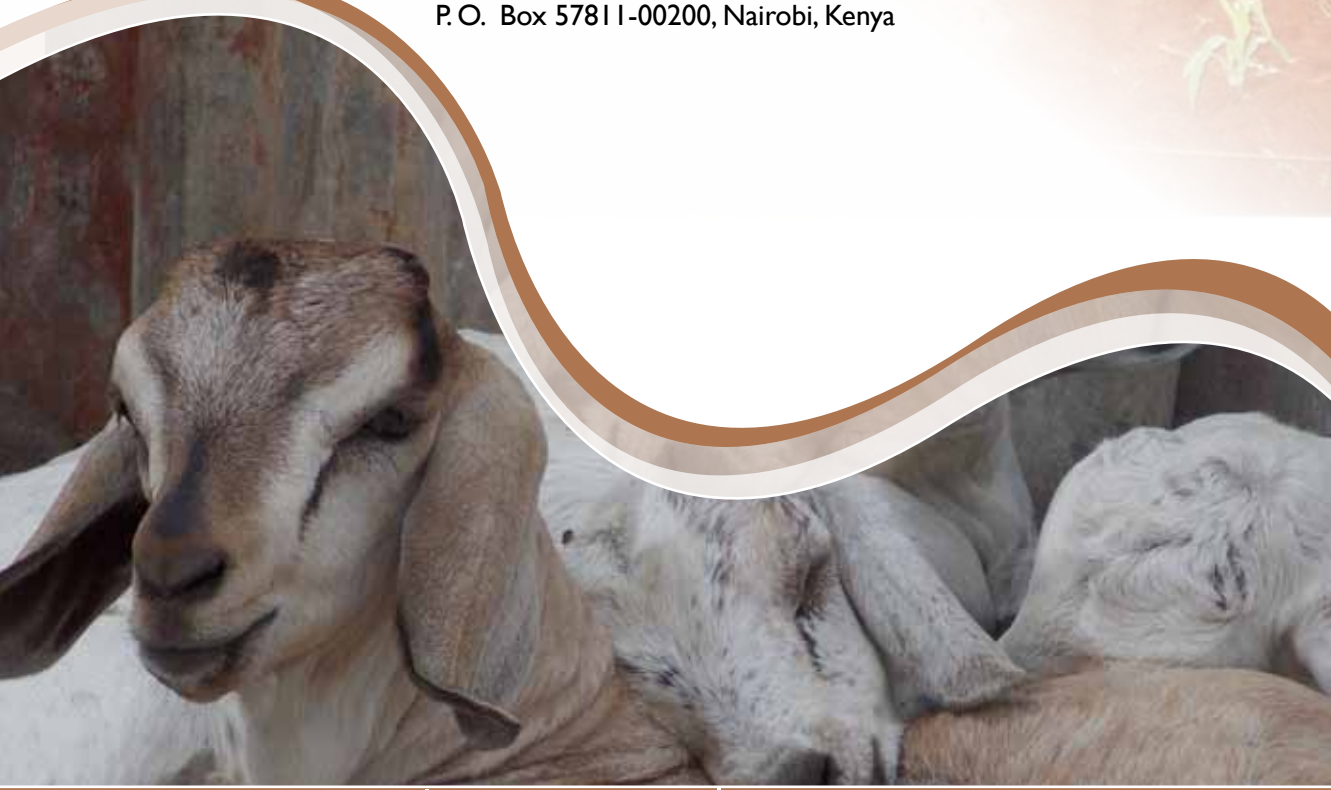

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