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PRAECTICE

POTENTIALS OF AGROECOLOGICAL PRACTICES IN EAST AFRICA WITH A FOCUS ON CIRCULAR WATER-ENERGY-NUTRIENT SYSTEMS

D2.3 - Selection of Successful case studies of combination of agroecological practices

TIMELINE OF ACTIVITIES: M6-M15

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V2.5

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Abstract	The selection of successful case studies of a combination of best agroecological practices across East Africa was conducted to identify and rank the best practices based on positive climatic impacts and higher financial viability. This report presents best practices overall but also practices based on crops grown, animals kept, and preferences per agroecological zones. The results indicate the uniqueness of AE practices and AE zones, types of crops grown and AE zones, types of animals reared, and the scare of rearing and AE zones. The conclusions made so far indicate that climate resilience and returns on investment do not cut across the region or country but rather by agroecological zones.
Keywords	agroecology, resilience, climate viability, economic returns

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VERSION	DATE	DESCRIPTION OF CHANGE	LIST OF CONTRIBUTOR(S)
V1.0	30/11/2023	First Version sent to coordinator	UMU, UM, AFSA, SAT, AAA
V2.0	30/01/2024	Update of graphs	UMU, UM, AFSA, SAT, AAA
V2.5	13/12/2024	Changes based on feedback from Reviewers during the first Reporting Period: • Farm size, Number of employees, Educational status of the farm owner, Gender of the farm owner. This information is available in the Table 1 - AGROECOLOGICAL PRACTICES IN TANZANIA (page 17), Table 2 - AGROECOLOGICAL PRACTICES IN KENYA (page 19) and Table 3 - AGROECOLOGICAL PRACTICES IN UGANDA (page 21). Comments and analyses of the information provided for the three countries are made following the tables, in pages 18 and 22. • An homogenization of the document was made to facilitate the information given to the reader. As a result, a section was eliminated; however, content wise, the relevant information was keept.	List of contributors as list of authors

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*** R:** Document, report (excluding the periodic and final reports)

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

DATA: Data sets, microdata, etc.

DMP: Data management plan

ETHICS: Deliverables related to ethics issues

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EXECUTIVE SUMMARY

Across East Africa, there on going initiatives to promote farming practices that apply ecological and social principles to the design and management of food and agricultural systems. Integral to this is the need to ensure climate resilience and better financial returns to the farmers. This study characterized Agroecological practices that had been mapped out in T2.1 to select the best combinations in relation to diversity, synergies, efficiency, resilience, recycling, co-creation and sharing of knowledge, hhuman and social values, culture and food traditionsas given by FAO. Analysis focused on which practices led to better economic outcomes and climate resilience by country and in which agroecological zones where they found. Further analysis was conducted to understand the better options for crop and livestock by agro ecological zone.

This report indicates the ten best practices, crops grown and animals reared agroecologically. The best practices are non competitive intercropping systems, seasonal and plot crop rotations to ensure soil recovery and replenishing. There was reported crop diversity – the mixture related to food and medicinal plants all planted together. Farmers viewed rainwater harvesting for domestic use but also future production usage during the dry spells as a key adaption strategies where irrigation and national grid water does reach. Replacing external inputs with integrated soil fertility management strategics which include mulching, soil cover and application on livestock droppings. Lastly, there were on-farm based natural solutions to deal with pest and diseases

Notably throughout the study, discernible focus on agroforestry and soil fertility management across the three countries and adiverse range of animal rearing, extending beyond conventional livestock to include fish and bees. The results indicated an inclination not only underscores the farmers' awareness of the importance of these practices but also reflects their commitment to a sustainable transition. Collectively, the practices contribute significantly to both the ecological impact and financial viability of top farms in each country The integration of diverse farming techniques with sustainable approaches highlights the region's dedication to environmentally conscious and economically sustainable agricultural methods.

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ABBREVIATIONS

AAA	Africa Agribusiness Academy
AE	Agroecology
AFSA	Alliance For Food Sovereignty in Africa
DST	Decision Support Tool
SAT	Sustainable Agriculture Tanzania
UM	Univerza v Mariboru

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1 BACKGROUND AND RATIONALE

Agroecology as a concept and science over the years has evolved from advocacy for the application of ecological processes and agricultural production systems to now an acceptable science and innovative approaches that involve the design and management of sustainable agroecosystems that promote biodiversity, resource efficiency, and resilience (Milheiras 2022). The purpose is to ensure the agroecosystems function over time without causing harm to the supporting ecology, society, or economy; in other words, meeting the current needs without compromising the ability of future generations to meet their needs. a comprehensive and multidimensional design as adopted to assess and evaluate the best practices based on the ten elements of agroecology that encompass biodiversity, recycling, soil management, energy, water, circular and solidarity economy, knowledge and innovation, governance, health and well-being, and culture and food tradition.

Best practice examples will then be used to develop a decision support tool (DST) to assist smallholder farmers in adopting or advancing their agroecological practices by facilitating communication and efficient information sharing between them and agroecological advisors.

DST will be profoundly beneficial during challenges from shocks and disturbances from natural occurrences and socio-economic conditions. It will further help to sustainably concern the variety of life forms, species, and ecosystems in a given region, ensure resource use efficiency, avail food at all times to local farmers whether through production or economic ability to buy, control the gradual decline in a land's capacity to sustain biological and economic productivity and ensure adaptation to temperature, rainfall, and extreme weather events.

1.1 PURPOSE OF THE REPORT

The main purpose of agroecology best practices examples is to identify key practices that can be adopted across East Africa but also support the development of the DST development process and other co-creation and learning activities. It classifies the best practices of each of the countries and their characteristics.

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1.2 SCOPE

The selection of best practices is building up on activities undertaken in Task 2.1, precision mapping of agroecological practices across East Africa. The focus of this activity was, therefore, to use data collected on practices from Tanzania, Kenya, and Uganda. Data was further analyzed to focus on which practices led to better economic outcomes and climate resilience by country and in which agroecological zones where they found. The analysis was led by UMU with support from UM, AFSA, SAT, and AAA, participating as task partners.

The overall objective of the selection of mapping was to gain a deeper understanding of the current agroecological practice context in Eastern Africa to facilitate an accelerated transition to agroecology. The selection process specifically wanted to achieve the following specific objectives:

i. Profile 10 best practices across Eastern Africa
ii. Profile best crop-based practices by country and agroecological zones

1.3 DATA ANALYSIS AND METHODOLOGY

The complexity and diversity of the datasets from each of the three analyzed countries, Kenya, Tanzania, and Uganda, required a tailored approach to the analysis. Two different approaches have been utilized in the analysis. Since Tanzanian data included more information, we created a scoring system for selecting the best practices based solely on the dataset. At the same time, for Kenya and Uganda, we supplemented data with the weighting system curated for the analysis.

A supplementary statistical analysis of the agroecological practices, crops, and livestock rearing across Kenya, Tanzania, and Uganda was conducted alongside the primary analysis of best practices. It involved examination of datasets from each country to identify the most common practices, crops, and animals. We aggregated the data to represent the entire East African region, revealing the most common categories in these aspects. All farms in the analysis were labeled in the form "Farm+Country+Index, " such as "FarmTanzania1." Therefore, all results are presented with farm labels instead of farms' actual names. This comprehensive approach provided a nuanced understanding of the agroecological landscape in East Africa, highlighting both unique national trends and regional commonalities.

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The illustrations in the section below indicate the details in methodology of how study arrived at the best practices from each data set;

1.3.1 Tanzania

The Tanzanian dataset was subjected to comprehensive data preparation and standardization, ensuring the accuracy and reliability required for analysis. It consisted of 245 entries/farms across eight agroecological zones. Initially, the data underwent thorough cleaning to correct errors, inconsistencies, and irregularities. Cleaning was followed by a standardization process where various data elements were brought to a standard format, facilitating easy analysis and comparison.

A significant aspect of this phase was the transformation of some data columns to enhance analytical clarity. For example, the column "What benefits have you observed from using these practices?" was segmented into five distinct categories, each representing different benefits domains. These categories included Economic and Market, Agricultural Efficiency, Living Standards and Health, Environmental Sustainability, and Infrastructure Development. This segmentation allowed for a more structured approach to evaluating the multifaceted impacts of agricultural practices. Data preparation and cleaning was done in Microsoft Excel.

The Tanzanian dataset encompassed a range of data critical for assessing the farms. It included detailed Agroecological practices like agroforestry, reforestation, crop diversity, and integrated soil fertility management. Financial indicators were also analyzed, such as the scale of farming operations and wage-based activities from the column/question named "What is your occupation?" (Crop farming subsistence - less than 10 acres, Crop farming commercial - more than 10 acres, Livestock farming Subsistence - less than 10 acres, Livestock commercial - more than 10 acres, Fishing activities/Fish farming, Forestry activities, Self-employment, Wage-based activities/causal laboring). The dataset uniquely provided insights into observed benefits from these practices, categorized into areas mentioned before. This comprehensive array of data enabled an in-depth farm evaluation, focusing on climate mitigation and financial viability.

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Central to the methodology was creating a scoring system designed to evaluate the farms based on positive climate impacts and high financial viability for the farmer. It involved identifying and weighing various variables relevant to the analysis. Agroecological practices and financial indicators were meticulously selected, with differential weights assigned to reflect their importance. Notably, sustainable practices such as intercropping, crop rotation, agroforestry, and reforestation were given higher weights, acknowledging their significant contribution to sustainable agriculture. Higher weights were assigned regarding the financial aspect when farms were considered commercial, and there was no need for supplemental wage-based activities/causal laboring.

The evaluation consisted of two primary scores:

The Climate Impact Score (CIS) aggregated the weighted scores of agroecologocal practices, supplemented by scores from the environmental sustainability category.

The Financial Viability Score (FVS), which focused on the economic aspects of farming, assigned more significant weight to commercial activities and incorporated additional metrics reflecting economic benefits and improving living standards.

Both scores underwent normalization on a scale from 0 to 1 to ensure comparability. The final score for each farm, an average of the normalized CIS and FVS, provided a comprehensive assessment of each farm's sustainability and financial viability performance.

Ranking and Comparative Analysis:

In the final phase of the analysis, farms were ranked within the country and within their respective Agroecological zones based on their combined scores. This ranking was instrumental in identifying the top-performing farms in each zone, providing insights into the effective distribution of sustainable practices and their financial implications across different regions of Tanzania. This analysis was conducted in Python using the Anaconda distribution, leveraging packages "pandas" and "numpy" for data processing and analysis.

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Broader context and limitations

While robust and comprehensive for the Tanzanian context, this methodology was one component of a broader study encompassing Tanzania, Uganda and Kenya. The unique characteristics of three datasets needed different analytical approaches tailored to suit their specific data structures. Despite a comparatively broad dataset, the Tanzanian methodology acknowledges the inherent limitations. In our analysis of Tanzanian farms, fundamental limitations include the dependency on data quality and completeness, potential oversimplification due to the scoring and normalization processes, and subjectivity in assigning weights to various practices and financial indicators. In conclusion, despite its limitations, this analysis offers insights into Tanzanian agroecology, enhancing our understanding of climate mitigation and the financial viability of agroecological practices.

1.3.2 Kenya and Uganda

The analysis of datasets from Kenya (49 entries/farms across one AE zone) and Uganda (79 entries/farms across two AE zones) utilized two primary datasets supplemented by a scoring reference file created by the team of agroecology experts. These datasets comprised detailed, descriptive information about various farms, emphasizing agroecological practices, crops, and animals. The initial data preparation phase involved data cleaning to correct any discrepancies, errors, or inconsistencies. This step ensured the accuracy and reliability of the data for the subsequent analysis.

A significant task in data preparation was the manual creation of matrices from the descriptive data collected. These matrices were methodically categorized into three distinct sections: agroecological practices, crops, and animals, represented in a binary format (0 or 1) to indicate the absence or presence of each values in the respective farms. Data preparation and cleaning was done in Microsoft Excel.

The analysis was founded on a unique scoring system derived from a ranking reference file, which agroecology experts provided. This file contained scores ranging from 1 to 3, assigned to various agroecological practices, crops, and animals, with a higher score indicating a more positive impact on climate and financial viability.

The scoring process involved mapping these expert scores to the corresponding elements in the Kenya and Uganda datasets.

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Each farm's score was calculated using the following formula:

Individual Scores: For each farm, the individual scores for climate impact and financial viability were calculated for agroecological practices, crops, and animals. This calculation was achieved by summing the scores of each present value (practice, crop, or animal), as indicated by the binary values in the datasets.

Total Scores: The total climate and financial scores for each farm were computed using the formula:

a) *Total Climate Score = (2 × Climate Score of Practices) + Climate Score of Crops + Climate Score of Animals*

b) *Total Financial Score = (2 × Financial Score of Practices) + Financial Score of Crops + Financial Score of Animals*

c) *Combined Total Score = Total Climate Score + Total Financial Score*

This scoring formula emphasized the importance of agroecological practices by doubling their contribution to the total scores.

1.4 ANALYSIS FRAMEWORK AND REGIONAL SCOPE

The analysis aimed to identify and highlight farms that exemplified the best cases of agroecological practices in terms of their positive climate impacts and financial viability. Farms were ranked based on their combined total scores, with a higher score indicating a more effective and sustainable agroecological approach.

It is important to note that the data collection was geographically limited, with the Kenyan data covering one agroecological zone and the Ugandan data encompassing two zones. This limitation provided a concentrated view of agroecological practices in these regions, though it did not encompass the full diversity of practices across the countries. Analysis was conducted in Python using the Anaconda distribution, leveraging packages "pandas" and "numpy" for data processing and analysis.

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1.5 RESULTS COMPILATION AND DOCUMENTATION

The culmination of this analysis involved integrating the calculated scores back into the original datasets for Kenya and Uganda. The enhanced datasets, now enriched with detailed scores and rankings, offered a comprehensive view of each farm's performance in agroecological practices. As with Tanzania, the top-performing farms were identified for a more detailed review, encompassing an examination of their specific practices, crops, animals, and agroecological zones. This detailed analysis provided valuable insights into the effective implementation and impact of agroecological farming in these regions.

1.6 ABOUT FIGURES, TABLES AND REFERENCES

The next sections present results on the 10 best-selected case studies of agroecological practices by country; due to the diversity of datasets, it was agreed that four cases will be selected from Tanzania, three from Kenya, and three from Uganda. Furthermore, there is a basic statistical overview of AE practices, crops grown, and animals reared by countries and by the whole East African region.

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2 TABLES

2.1 TANZANIA

Here, results indicate the farms that scored higher on agroecological practices; each farm was given a number; the study wanted to find out the uniqueness of each farm in their agroecological transitions and what exactly made them agroecological.

TABLE 1 AGROECOLOGICAL PRACTICES IN TANZANIA

Farm name	**FarmTanzania33**	**FarmTanzania34**	**FarmTanzania70**	**FarmTanzania32**
AE zone	Central zone	Central zone	Central zone	
Farm size (acres)	12	14,5	14	2
Farm owner education	Primary school	Primary school	Secondary school	Primary school
Farm owner gender	Female	Female	Male	Male
Number of employees	0	3	2	0
Market Access	Agro-Processing and Value-Addition Chains	Agro-Processing and Value-Addition Chains	Agro-Processing and Value-Addition Chains	Local markets
AE practices	Intercropping, Crop rotation, Cover cropping, Rain water harvesting, Apiculture, Agroforestry	Intercropping, Crop rotation, Agroforestry, Rain water harvesting	Crop rotation, Rain water harvesting, Intercropping	Intercropping, Contour farming, Crop diversity, Agroforestry, Integrated soil fertility management, Cover cropping, Crop rotation
Crops	Millet, Maize, Ground nuts, Sunflower, Fruit trees, Vegetables	Maize, Millet, Ground nuts, Vegetables, Sim-sim, Sunflower	Maize, Millet, Sunflower, Cotton	Vegetables, Fruit trees, Banana, Cassava, Maize, Beans, Sweet potato, Irish Potato, Other
Animals	Cattle, Poultry ,Pigs	Cattle, Pigs, Rabbits, Poultry	Poultry	Goats, Cattle

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Trend	Focus on diverse agricultural practices emphasising agroforestry with beekeeping and diversified crop growing techniques.	Focus on diverse agricultural practices emphasising agroforestry and diversified crop growing techniques.	A strong inclination towards sustainable crop management practices, such as intercropping and crop rotation.	A diverse range of agroecological practices and crops showing a commitment to both soil health and sustainable farming practices.

General trends and observations in Tanzania

In Tanzania, the Central zone emerges as a key region for agroecological farming, evidenced by the location of three of the top farms within this area. These farms exemplify a broad array of agricultural practices, with a notable emphasis on diversity. Practices such as intercropping and crop rotation are prevalent, playing a crucial role in enhancing sustainability. Additionally, there is a discernible focus on agroforestry and soil fertility management among these farms. This inclination not only underscores the farmers' awareness of the importance of these practices but also reflects their commitment to sustainable agriculture. Collectively, these practices contribute significantly to both the positive environmental impact and financial viability of selected top farms in Tanzania. Among agroecological farms in Tanzania, local markets are the primary access points for selling their produce. However, the top selected farms have been taking advantage of Agro-Processing and Value-Addition Chains the most. Farm owners in Tanzania predominantly have a background in primary education. Employment on the farms is minimal, but two of the four agroecological top-rated farms in Tanzania have employees.

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2.2 KENYA

Similar trends were analyzed for Kenya to understand the best practices by farm.

TABLE 2 AGROECOLOGICAL PRACTICES IN KENYA

Farm name	**FarmKenya37**	**FarmKenya26**	**FarmKenya36**
AE zone	Semi-humid	Semi-humid	Semi-humid
Farm size (acres)	19,8	7,4	7,4
Farm owner education	Diploma (Post-secondary, non-degree)	Certificate (Post-secondary, non-degree)	Institutional Markets
Farm owner gender	Male	Male	Male
Number of employees	12	8	3
Market Access	Online/ICT-Based Markets, National Markets, Institutional Markets	Local Markets, National Markets, Institutional Markets	Fair Trade/Organic Networks, Agro-Processing and Value-Addition Chains, Agro-Processing and Value-Addition Chains
AE practices	Agroforestry, Farm integration, Integrated pests and disease control	Farm integration, Integrated pests and disease control	Agroforestry, Apiculture
Crops	Banana, Collard Greens, Elephant Grass, Maize, Napier Grass, Other	Beans, Collard Greens, Cowpea, Elephant Grass, Maize, Napier Grass	Banana, Beans, Maize, Other
Animals	Cattle, Fish, Pigs, Poultry	Cattle, Fish, Pigs, Poultry	Bees, Cattle, Goat, Sheep
Soil	Ferralsols	Ferralsols	Ferralsols
Trend	Emphasis on integrated	Focus on farm	Diversification, focusing

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	farming approaches, combining diferrent crops and livestock with environmentally friendly practices.	integration and pest control.	on beekeeping, complemented by agroforestry practices.

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2.3 UGANDA

TABLE 3 AGROECOLOGICAL PRACTICES IN UGANDA

Farm name	**FarmUganda33**	**FarmUganda60**	**FarmUganda38**
AE zone	Victoria Basin	Lake Victoria Crescent Zone	Lake Victoria Crescent Zone
Farm size (acres)		1	1
Farm owner education	Secondary education	Secondary education	Primary education
Farm owner gender	Male	Male	Female
Number of employees	1	4	3
Market Access	Local Market, Community supported agriculture	Institutional Markets, Fair Trade/Organic Networks, Local Markets	Community-Supported Agriculture, Local Markets
AE practices	Agroforestry, Fish farming, Intercropping, Mixed cropping	Agroforestry, Farm integration, Integrated pest and disease control,Soil and water conservation, Soil fertility build up	Manuring, Mixed cropping, Mulching, Strip cropping
Crops	Aloe Vera, Avocado, Banana, Coffe, Eggplant, Jackfruit, Maize, Okra, Passion fruit, Pumpkin, Sugarcane, Tomato, , Yam, Other	Avocado, Banana, Cassava, Groundnut, Jackfruit, Maize, Mango	Avocado, Banana, Cassava, Coffee, Maize, Mango, Okra, Onion, Papaya, Tobacco, Tomato, Yam
Animals	Bees, Cattle, Fish, Poultry	Cattle, Goat, Pigs, Poultry, Rabbits	Cattle, Pigs, Poultry
Soil	Sandy loam	Sandy loam	Sandy loam

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Trend	Great variety of crops and animals combined with agrofroestry, intercropping, mixed cropping.	A diverse range of agroecological practices and crops showing a commitment to both soil health and sustainable farming practices	Diversification, focusing on manuring and stripcropping.

General Trends and Observations for Kenya and Uganda

In examining the agricultural practices of Kenya and Uganda's top farms, a distinct trend emerges towards integrated farming. This approach combines livestock, including traditional varieties, with crops and other agricultural activities, showcasing a comprehensive farming strategy. Notably, these farms exhibit a diverse range of animal rearing, extending beyond conventional livestock to include fish and bees, reflecting a versatile and holistic approach to farm management. In Kenya, agroforestry and apiculture (beekeeping) are prevalent practices, underscoring the farmers' recognition of their dual benefits in promoting ecological sustainability and financial viability. The farms across both countries have varied soil types, ranging from ferralsols in Kenya's semi-humid zones to sandy loam in Uganda's Victoria Basin and Lake Victoria Crescent Zone. Such diversity in soil types highlights the adaptability of these agricultural practices to different environmental conditions. Collectively, these observations illustrate a holistic approach to agroecology in these regions, where practices are chosen for their productivity and contribution to ecological balance, climate impact mitigation, and financial sustainability.

Statistical analysis indicates that agroecological farms in Kenya are of moderate size in the East African context, with most owners holding secondary education and depending on seasonal and family-based labor. Local markets serve as the primary outlet for their produce. In Uganda, farms are generally smaller, and owners primarily possess secondary education. Employment patterns show a greater reliance on full-time male labor, while family-based labor is more evenly balanced. Community-supported agriculture stands out as the leading market access strategy.

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These observations suggest that the most effective agricultural practices in East Africa integrate multiple farming elements, are adaptable to different environmental conditions, and balance productivity with sustainability. As such, these practices provide a practical framework for sustainable agriculture in the region and should be considered in developing agricultural strategies aimed at long-term sustainability and resilience in East Africa.

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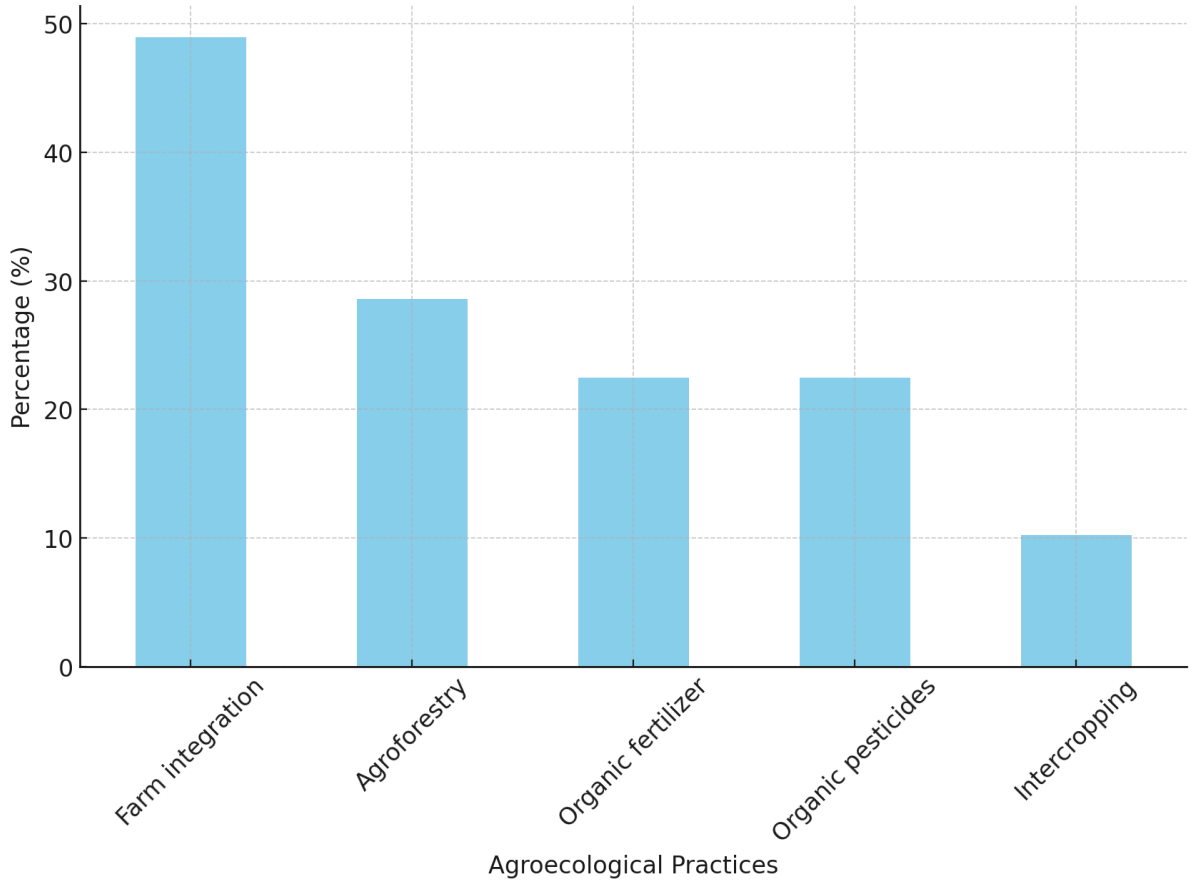
3 FIGURES

3.1 KENYA

FIGURE 1 TOP 5 AGROECOLOGICAL PRACTICES IN KENYA



When looking at Kenya's five most utilized agroecological practices, "Farm Integration" emerges as the most prevalent practice among Kenyan farms, with nearly 49% incorporating this approach. This indicates a strong inclination towards integrating various farming activities. Following closely, Agroforestry is practiced on about 29% of farms. This practice, which combines agriculture and forestry to create more sustainable land-use systems, has shown significant adoption. Additionally, "Organic Fertilizer" and " Organic Pesticides" are equally shared, practiced on approximately 22% of the farms each. This reflects a growing awareness and adoption of organic farming methods. "Intercropping,"

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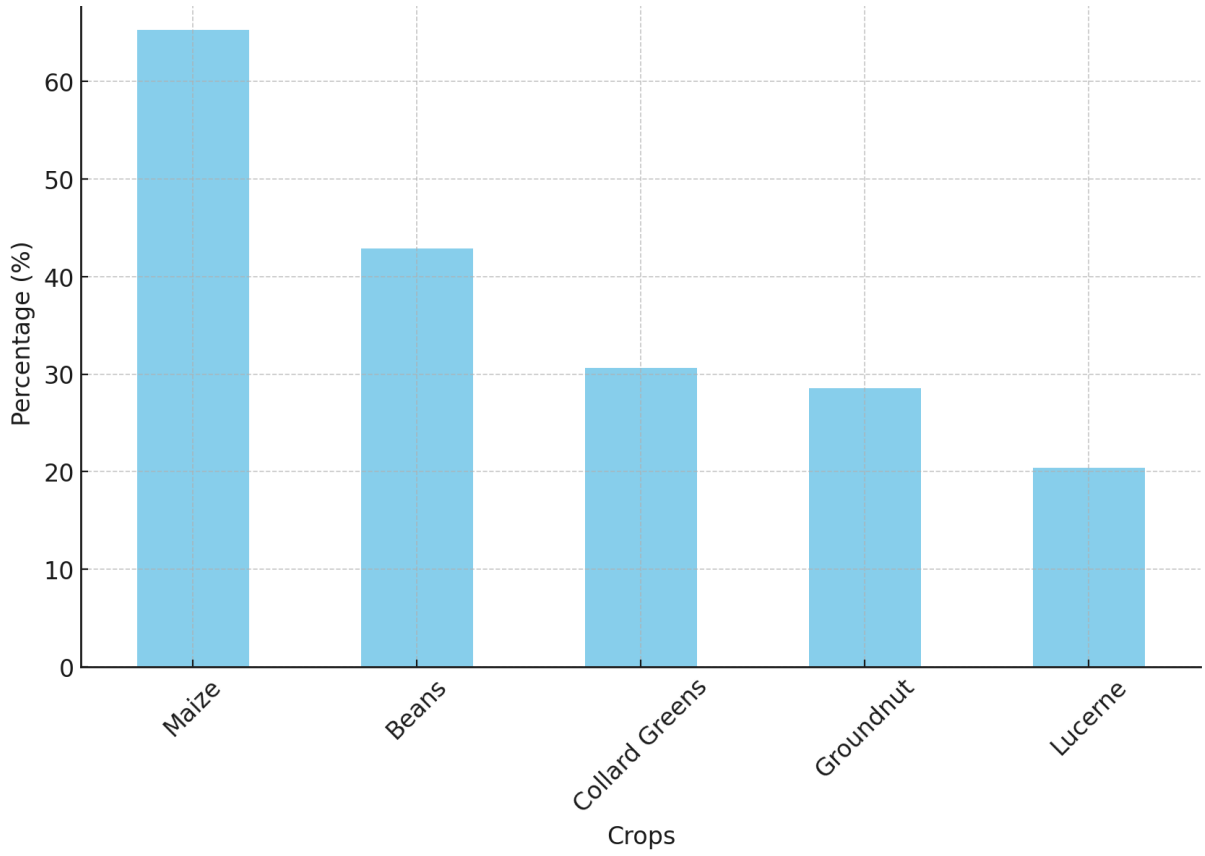
practiced on about 10% of farms, rounds out the top five practices. Apart from the top five agroecological practices identified, there are no other practices in the Kenyan dataset, with a percentage higher than 10%. This suggests that the top five practices – farm integration, agroforestry, organic fertilizer, organic pesticides, and intercropping – are distinctly more prevalent than other practices in the dataset.

FIGURE 2 TOP 5 CROPS IN KENYA



As revealed by the dataset, maize is the most predominant crop in the Kenyan agricultural sector, cultivated by 65.31% of farms, highlighting its vital role as a staple food. Following maize, beans are grown in 42.86% of farms, signifying their importance as a dietary staple and for their soil-enriching properties. Collard Greens, an essential vegetable in local cuisine, are grown in 30.61% of farms, while groundnuts, crucial for nutrition and soil health, are cultivated in 28.57%. Lastly, Lucerne, primarily used

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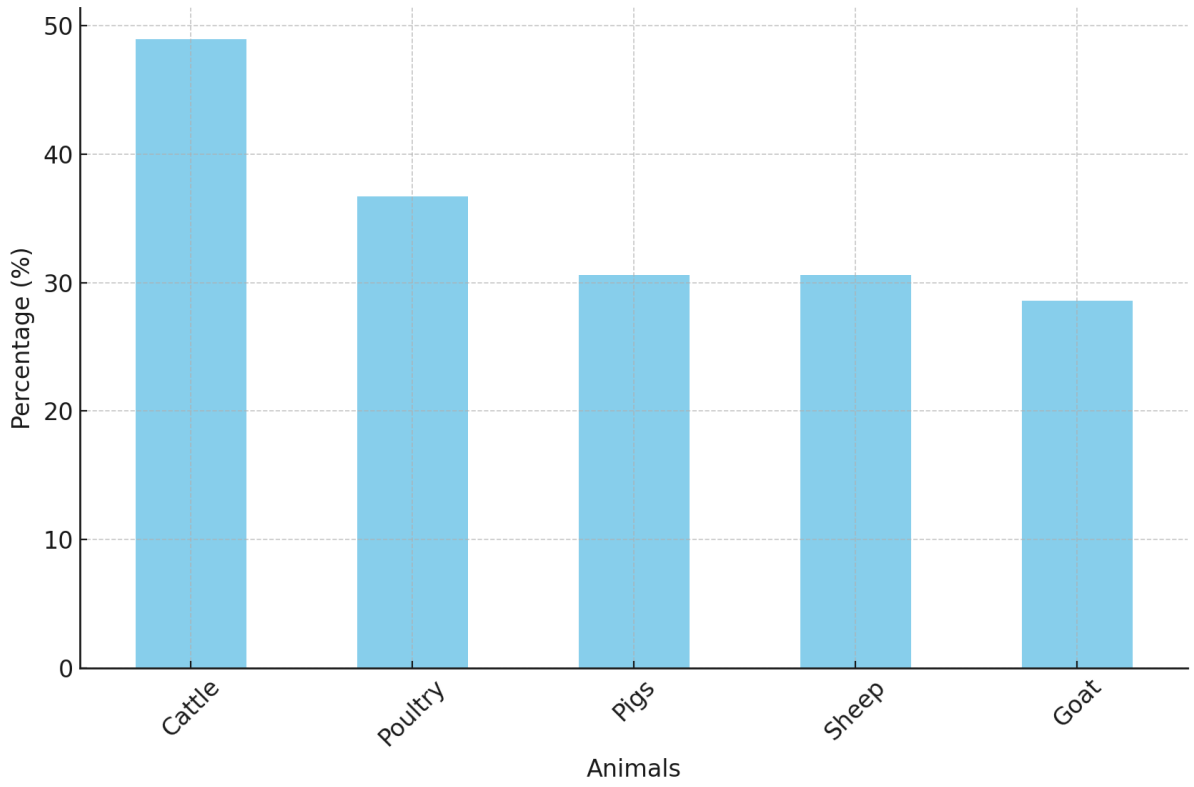
as animal fodder, is grown in 20.41% of farms, indicating a link between crop and livestock farming. This dataset reflects a diverse agricultural landscape in Kenya, focusing on staple crops and those supporting sustainable farming practices.

In addition to the previously identified crops, the Kenyan dataset reveals notable cultivation of bananas, elephant grass, sorghum, soybeans, and tubers, each grown by approximately 20% of farms.

FIGURE 3: TOP 5 ANIMALS REARED IN KENYA



In the livestock sector, 'Cattle' rearing is a primary activity for nearly 49% of the farms surveyed. This highlights the importance of cattle in Kenya, both for dairy and meat production. 'Poultry' farming is also significant, with about 37% of farms engaged in it, indicating its role in providing meat and eggs for consumption and trade. 'Pigs' and 'Sheep' are each reared by approximately 31% of the farms, demonstrating their relevance in the Kenyan livestock sector. Finally, about 29% of farms practice' Goat' rearing, adding to the diversity of livestock farming in the region.

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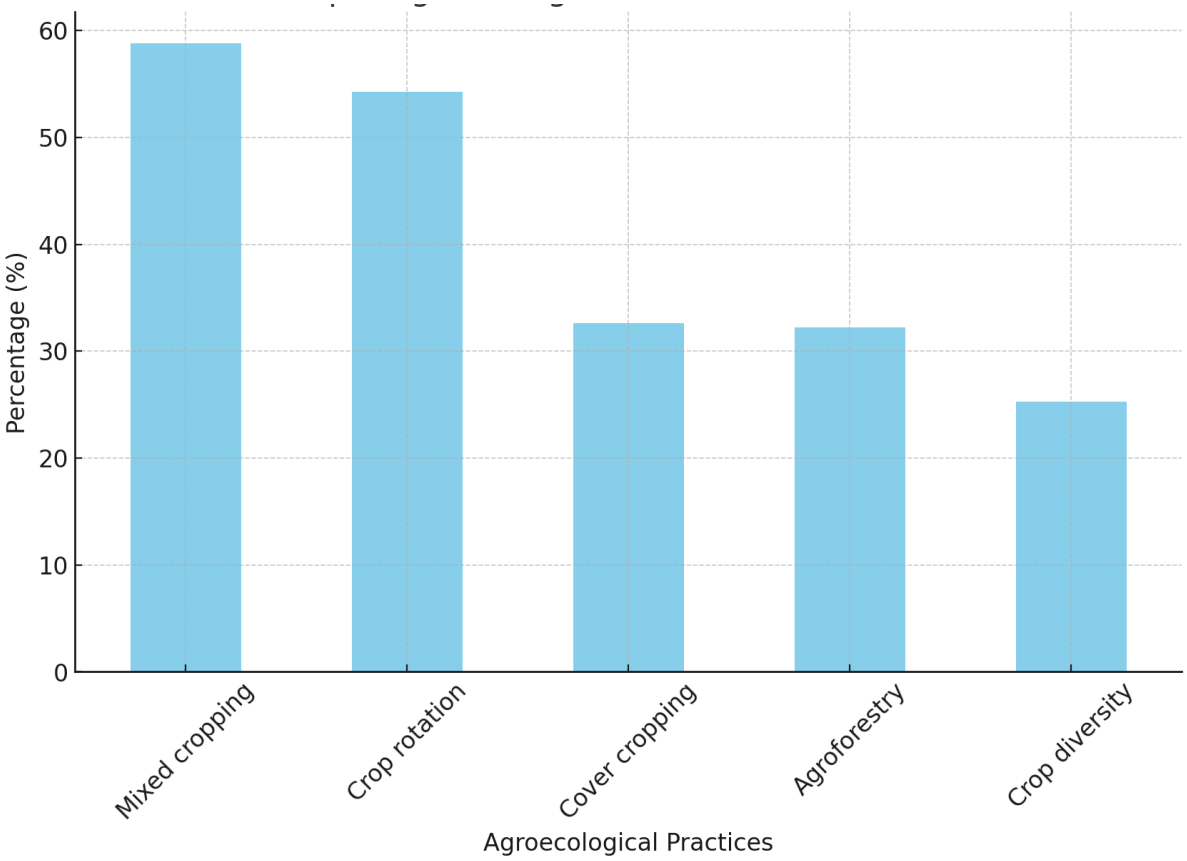
3.2 TANZANIA

FIGURE 4: TOP 5 AGROECOLOGICAL PRACTICES IN TANZANIA



Tanzania's most common agroecological practice is 'Mixed cropping, ' practiced on 58.78% of farms. This is followed closely by 'Crop Rotation,' utilized in 54.29% of farms, indicating a strong preference for practices that enhance soil fertility and biodiversity. 'Cover Cropping' and 'Agroforestry' are used in approximately 32% of farms, reflecting an inclination towards sustainable farming practices. Additionally, 'Crop Diversity' is evident in 25.31% of farms, highlighting the importance of diverse cultivation for ecological balance and risk mitigation. Contour farming (11.02%) and rainwater harvesting (22.86%) are significant practices emphasizing sustainable land management and efficient water use.

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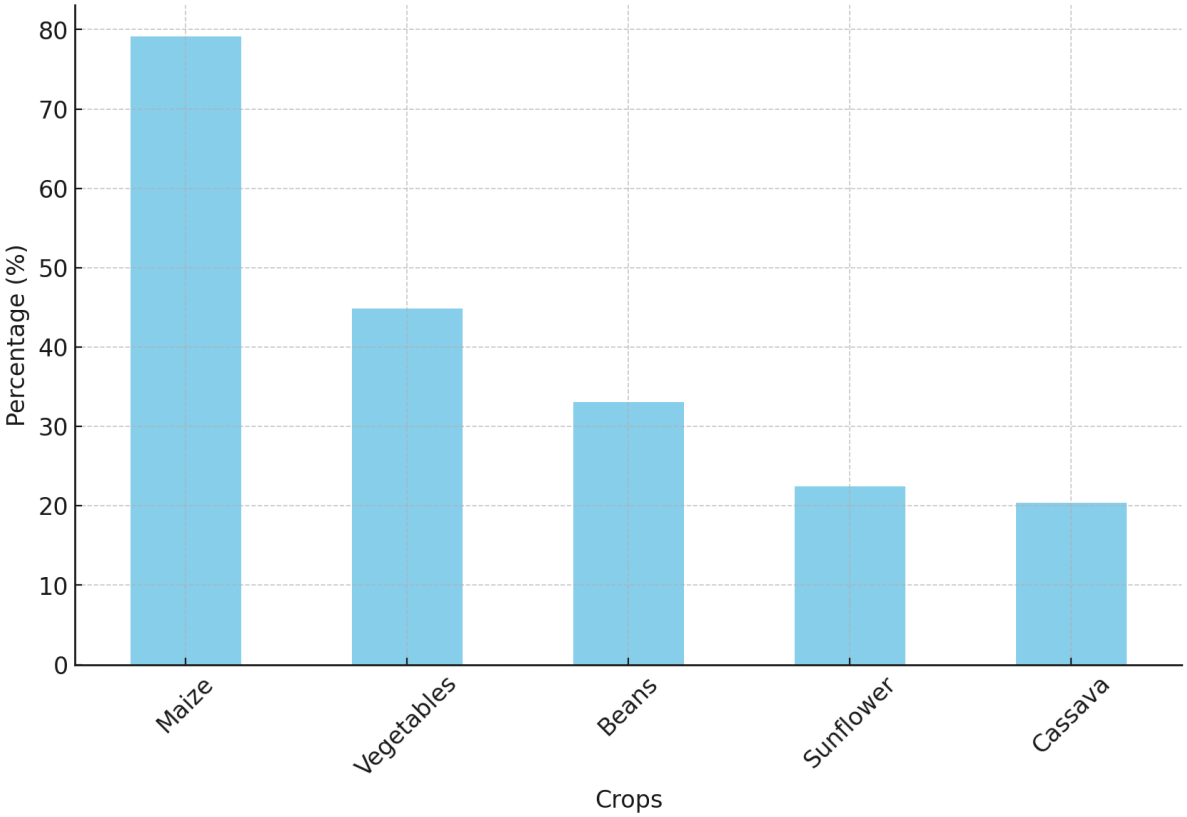
FIGURE 5: TOP 5 CROPS IN TANZANIA



'Maize' emerges as the most widely cultivated crop, with 79.18% of Tanzanian farms growing it, underlining its significance as a staple food. 'Vegetables' collectively form the second most common crop category, grown in 44.90% of farms, emphasizing varied and nutritious food sources. 'Beans' are cultivated in 33.06% of farms, playing a crucial role as a food source and in maintaining soil health. 'Sunflower,' found in 22.45% of farms, indicates its relevance possibly for oil production and as a cash crop. 'Cassava,' cultivated in 20.41% of farms, adds to the diversity of staple crops, which is especially important in regions prone to harsh conditions. The crop profile also includes Rice (20.41%) and Millet (14.69%), signifying a diverse range of staple grains.

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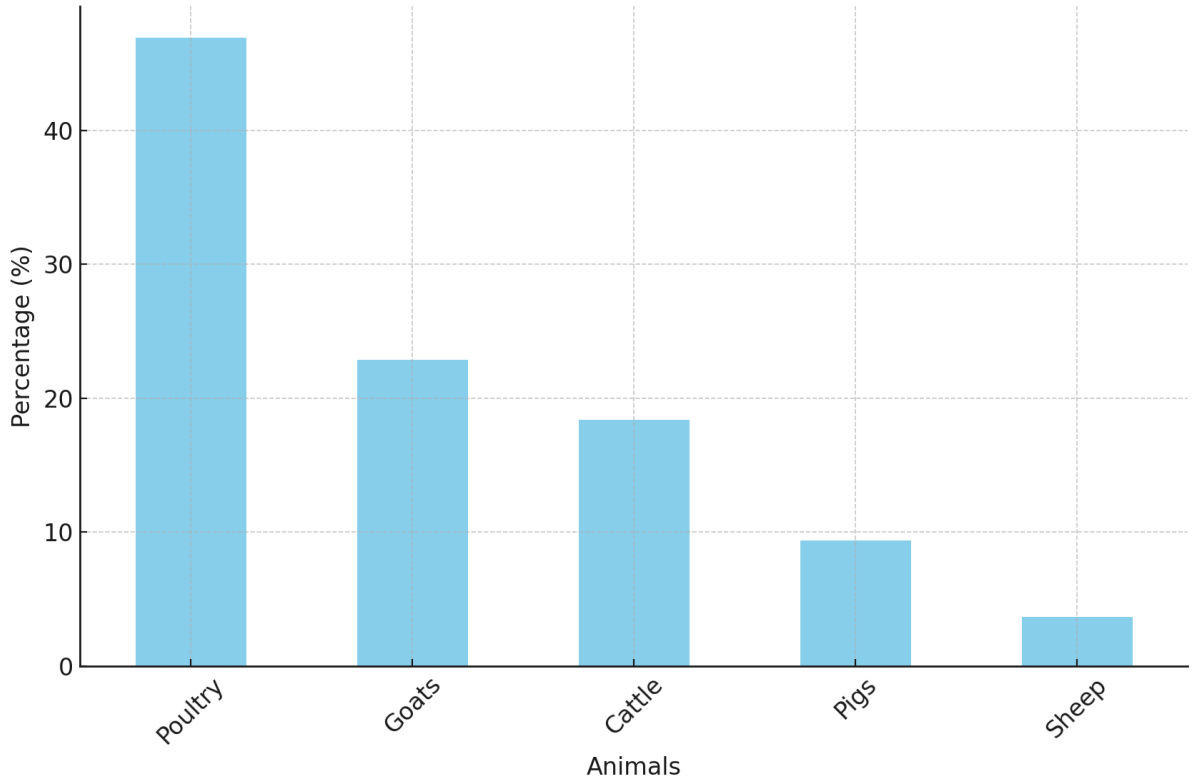
FIGURE 6: TOP 5 ANIMALS REARED IN TANZANIA



Regarding livestock, 'Poultry' farming is most prevalent, practiced by 46.94% of farms, highlighting its role in providing a source of meat and eggs. 'Goats' and 'Cattle' are also significant, reared in 22.86% and 18.37% of farms, respectively, indicating their importance in the agricultural system for meat and dairy products. The presence of 'Pigs' and 'Sheep,' although less common, with 9.39% and 3.67%, respectively, adds to the variety of livestock-rearing practices in Tanzania.

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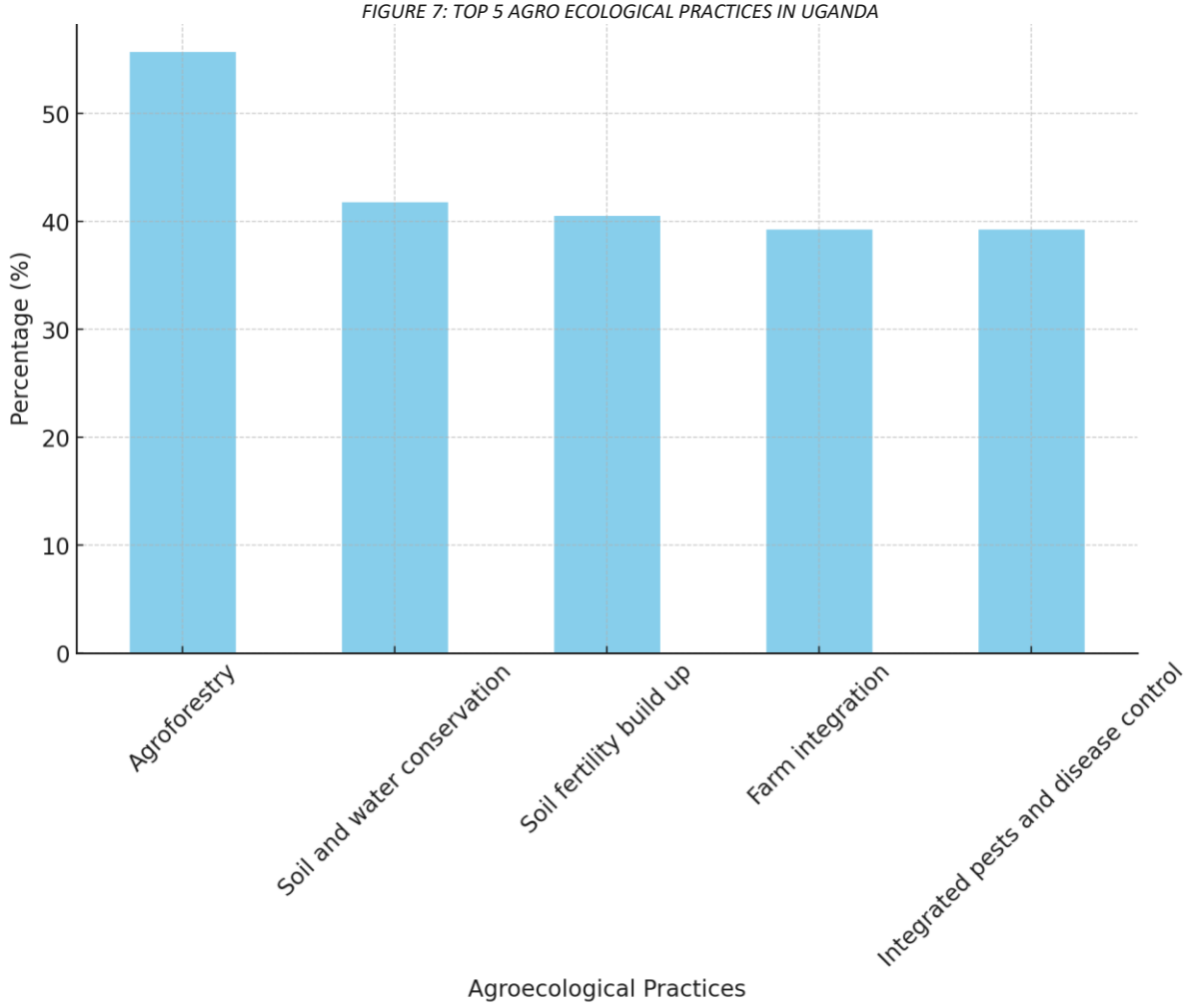
3.3 UGANDA

FIGURE 7: TOP 5 AGRO ECOLOGICAL PRACTICES IN UGANDA



Agroforestry' is the most prominent agricultural practice in Uganda, adopted by 55.70% of farms, highlighting an emphasis on integrating forestry and farming for sustainable land use. 'Soil and Water Conservation' practices are observed in 41.77% of farms, indicating a strong focus on preserving these essential resources. Close behind, 'Soil Fertility Build Up' is practiced by 40.51% of farms, demonstrating a commitment to maintaining soil health. 'Farm Integration,' found in 39.24% of farms, and 'Integrated Pests and Disease Control,' also at 39.24%, show a holistic approach to farming that integrates various agricultural aspects for efficiency and sustainability. Beyond the top five, Mixed Cropping is notably

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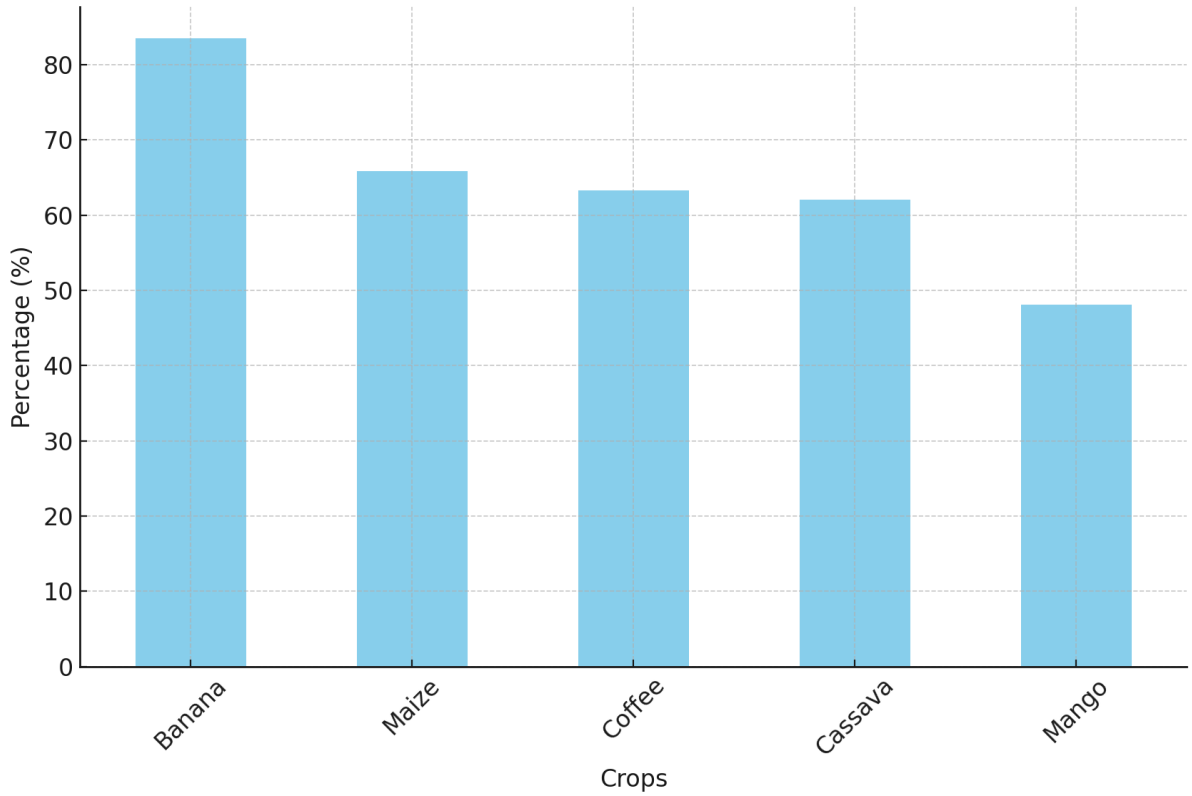
prevalent at 34.18%, emphasizing diverse and integrated farming methods. Manuring (18.99%) and Mulching (16.46%) highlight a focus on enhancing soil health.

FIGURE 8: TOP 5 CROPS IN UGANDA



In crop cultivation, the banana' is the most widely grown, with an impressive 83.54% of Ugandan farms cultivating it, reflecting its importance as a staple food and economic crop. 'Maize,' another critical staple, is grown in 65.82% of farms. 'Coffee,' a major export commodity for Uganda, is cultivated by 63.29% of farms, highlighting its economic significance. 'Cassava, ' grown on 62.03% of farms, is valued for its resilience to harsh conditions. 'Mango,' cultivated by 48.10% of farms, adds to the diversity of crops, indicating a mix of staple and fruit cultivation. Despite not being in the top five, avocado and Yam stand out with significant cultivation percentages of 40.51% and 34.18%, respectively. Eggplant (18.99%) and Groundnut (17.72%) also feature prominently.

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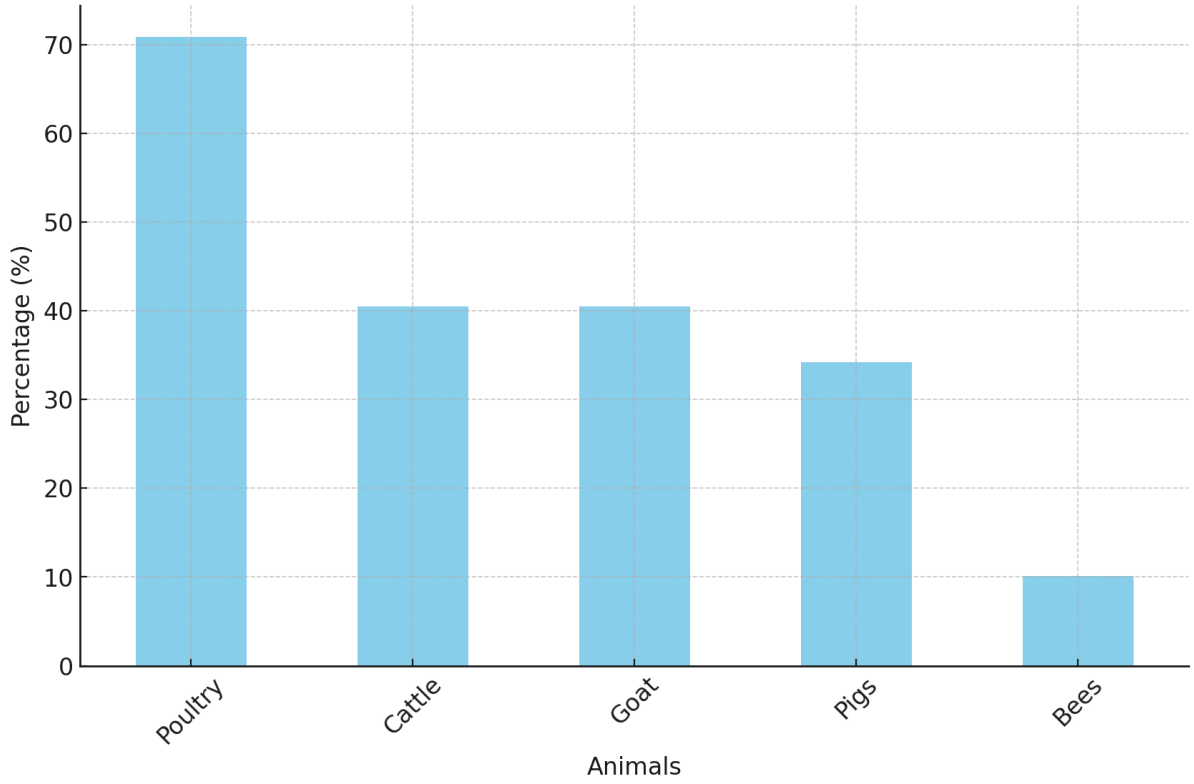
FIGURE 9: TOP 5 ANIMALS REARED IN UGANDA



Regarding livestock, 'Poultry' rearing is most common, practiced by 70.89% of farms, underscoring its role in providing a quick source of protein and income. Cattle and goat rearing is practiced by 40.51% of farms, which indicates their importance for meat, milk, and cultural practices. 'Pigs' are reared in 34.18% of farms, reflecting their growing popularity. 'Bees,' though less common at 10.13%, indicate the presence of apiculture, contributing to biodiversity and offering honey as a product.

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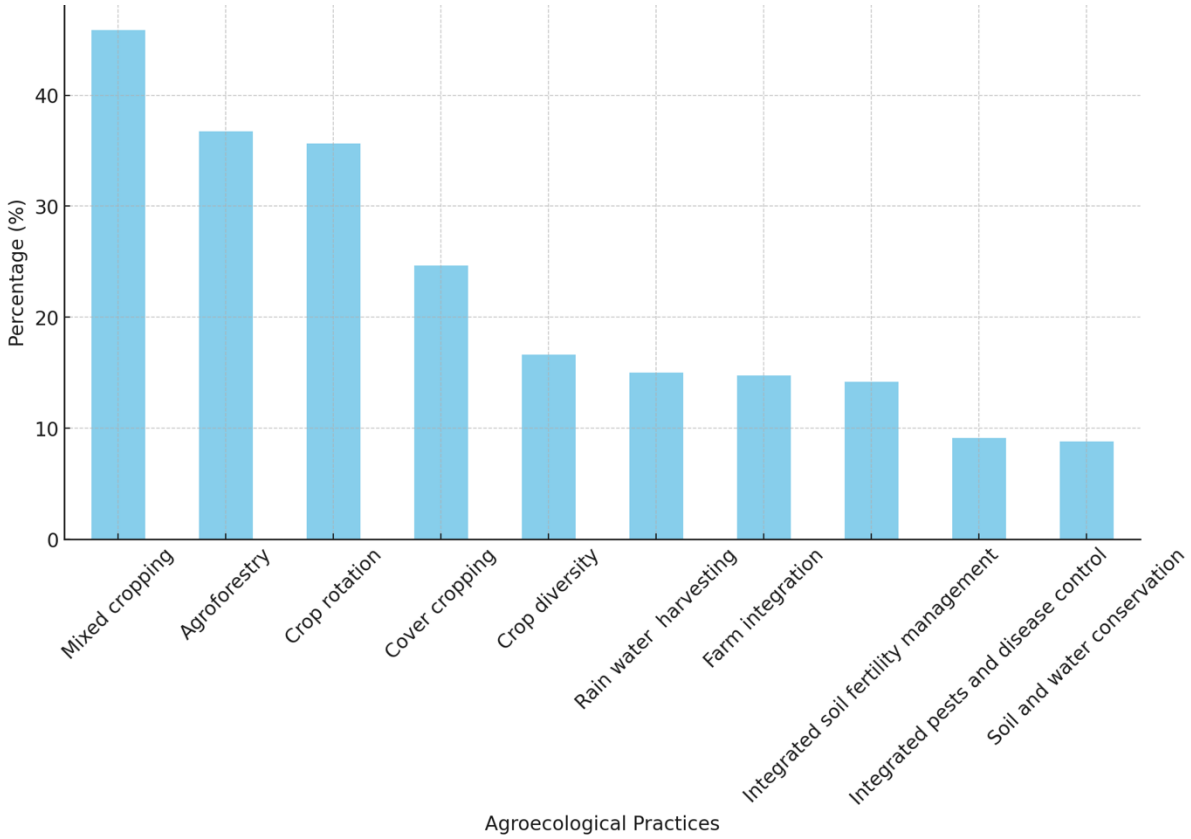
3.4 EAST AFRICA

In this section, the term East Africa, is used to describe the analysis of the three cpuntries previously mentioned, Kenya, Uganada and Tanzania.

FIGURE 10: 10 BEST AGROECOLOGICAL PRACTICES IN EAST AFRICA



East Africa's rich and varied agroecological landscape blends sustainable practices and diverse crop and livestock choices. Mixed Cropping is the most prevalent practice, adopted by 45.84% of farms, reflecting a strategic approach to maximize land use and crop yields. Agroforestry, practiced by 36.73% of farms, illustrates an integration of farming and environmental stewardship. Crop Rotation and Cover Cropping, with 35.66% and 24.66% adoption rates, respectively, further indicate a focus on soil health and sustainability.

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FIGURE 11: BEST CROPS IN EAST AFRICA

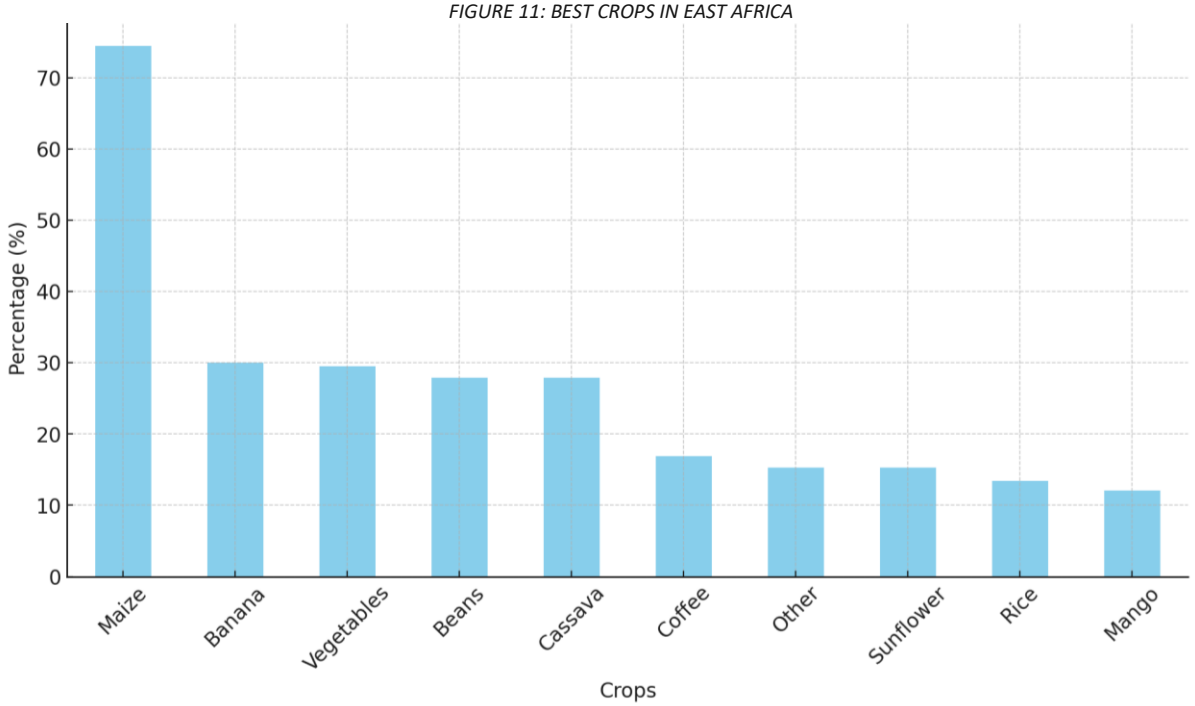
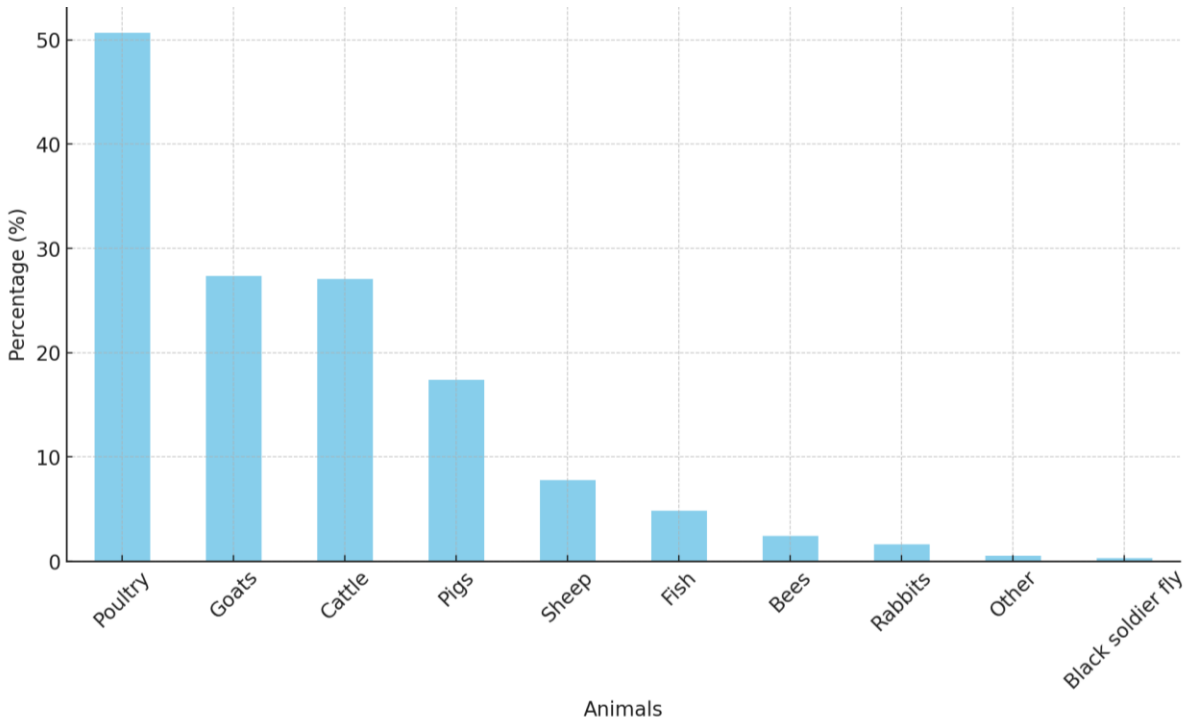


FIGURE 12: 10 ANIMALS REARED ACROSS EAST AFRICA



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Maize dominates the crop profile, cultivated by 74.53% of farms, signifying its central role as a staple food. The widespread growth of Bananas (30.03%), Vegetables (29.49%), and Beans (27.88%) underscores the importance placed on nutritional diversity and food security. In livestock, Poultry leads at 50.67%, highlighting its role in providing essential proteins and economic benefits. Goats, reared by 27.35% of farms, along with Cattle (27.08%) and Pigs (17.43%), reflect the diverse livestock-rearing practices that cater to varied dietary needs and agricultural livelihoods across East Africa. These percentages paint a vivid picture of a region that prioritizes a balance between sustainable farming, nutritional needs, and economic viability, showcasing the resilience and adaptability of its agricultural communities.

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4 CONCLUSIONS

In conclusion, analyzing agricultural practices in Kenya and Uganda provides insights for identifying the top 10 best practices in East Africa. For the final number of 10 practice examples, we selected four farms from Tanzania, three from Uganda, and three from Kenya. Such an approach was taken due to the difference in scoring methodology between Tanzania and the other two countries and the need for the versatility of agroecological zones in Kenyan and Ugandan datasets. Overall, the trend towards integrated farming, evident in all regions, successfully combines livestock, including traditional and unconventional types, with crops and other activities such as agroforestry and apiculture. This approach is productive and supports ecological sustainability and financial viability.

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