



# INDIGENOUS KNOWLEDGE AND SUSTAINABLE DEVELOPMENT



**Editors:**  
Tom Kwanya, Peter Matu



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The Technical University of Kenya • Nairobi, Kenya

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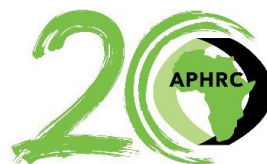
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## 29. The Role of Indigenous Knowledge in Agriculture: A Case Study of Kesses Sub County, Uasin Gishu County

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### Abstract

*Kenya has a rich diversity of indigenous knowledge systems, which have been passed down from generation to generation. This knowledge includes traditional agricultural practices, crop and livestock management, soil and water conservation, pest and disease management and seed saving and selection, amongst others. The rationale of the study was to investigate the role of indigenous knowledge in agriculture, with a case study of Kesses Sub County situated in Uasin Gishu County. This area was selected due to its rich soils and ideal climatic conditions, which makes it a conducive agricultural centre within the county. The objectives are to identify indigenous knowledge practices of farmers in agricultural production for food society, investigate the use of indigenous knowledge by farmers, and identify the benefits and limitations of indigenous knowledge to sustainable agriculture. A mixed method approach was adopted using interviews and structured questionnaires to collect data. The sample consisted of 71 farmers randomly sampled from 100 farmers. Three agricultural officers were purposively sampled. Qualitative data was collected from agricultural officers, while quantitative data was collected from farmers. Qualitative data were analysed using content analysis, while quantitative data were analysed using tabulation methods. Findings indicate that despite the introduction of modern farming techniques, the majority of farmers still rely on indigenous knowledge. Practices include mulching, organic manure usage, non-tillage pest control, soil fertility management, weed control, and traditional methods of planting, harvesting, and storing crops and livestock. The study concludes that while indigenous knowledge remains prevalent, much of it is not documented. Therefore, it recommends the recording and further research of indigenous practices for preservation and dissemination.*

**Keywords:** *Indigenous knowledge, Agriculture, Farming, Kesses, Kenya*

### 1 Introduction

Agriculture has always been a vital aspect of human civilisation, playing a crucial role in sustaining communities and ensuring food security. In many parts of the world, traditional agricultural practices have been deeply intertwined with the cultural heritage and indigenous knowledge of local communities (Koohafkan & Altieri, 2011).

Masekoameng and Molotja (2019) argued that there is no single definition of indigenous knowledge (IK). IK is usually described as indigenous knowledge from the community, the knowledge that is still traditional or local knowledge that is only owned by particular communities. Indigenous knowledge is usually stored in the memory of traditional leaders, elders, and people who are considered experts in certain customs. It has yet to be explored and documented (Soh & Omar, 2012). These age-old practices passed down through generations, are often adapted to local conditions and have proven to be effective in enhancing agricultural productivity and resilience.

In the context of Kesses Sub County, located in Uasin Gishu County in Kenya, indigenous knowledge plays a significant role in shaping agricultural practices. It is renowned for its fertile soils and favourable climatic conditions, making it an agricultural hub in the region. However, it is the indigenous knowledge held by the local communities, particularly those belonging to indigenous ethnic groups, that has played a critical role in harnessing the full potential of the agricultural resources in the area. The study provides a valuable lens through which to investigate the role of indigenous knowledge in agriculture.

## 2 Statement of the problem

Kesses Sub County is home to a substantial, untapped pool of indigenous agricultural expertise that can be used for managing soil and water resources, cultivating crops, caring for livestock, processing and storing farmer produce. Unfortunately, this valuable indigenous knowledge is at risk of extinction due to rapidly changing natural environments, the swift pace of economic, political, and cultural changes on a global scale and the adoption of modern farming methods. Moreover, the intrusion of foreign technologies and the impact of urbanisation also contribute to the disappearance of indigenous knowledge (Ngulube, 2002).

The problem is compounded by the soaring population growth, shrinking and fragmented land holdings, limited farmer participation in decision-making processes, the lack of training opportunities for farmers and extension workers, constrain the implementation of indigenous knowledge and as well as migration to urban centres (Ebanyat et al., 2010). With concerted efforts to document and preserve indigenous knowledge in detail, communities can avoid the loss of invaluable sources of indigenous knowledge, jeopardising the well-being of the local people and undermining agriculture. This situation raises the question of how indigenous knowledge can be conserved. Unless means for recording and preserving indigenous knowledge comprehensively can be found, some farmers risk losing primary sources of indigenous knowledge that are useful for the indigenous people and food security. The rationale of the study is to investigate the role of indigenous knowledge in agriculture, using a case study of Kesses Sub County, Uasin Gishu County. The objectives include identifying indigenous knowledge practices of farmers in agricultural production for food society, investigating the use of indigenous knowledge by farmers at Kesses Sub-County, and Identifying the benefits and limitations of indigenous knowledge to sustainable agriculture.

## 3 Literature review

Indigenous knowledge of agriculture is handed down from one generation to another through symbols, art, oral narratives, proverbs, and performances such as songs, storytelling, wise sayings, riddles, and dances (Daimai & Parhi, 2021). However, in times without numbers, historians remind us that indigenous knowledge refers to the knowledge that is accumulated, transferred/transmitted, and explored intergenerationally through cultural practices, norms, and beliefs. Scholars have defined Scholars who have indigenous knowledge differently.

Ajayi and Mafongoya (2017) defined indigenous knowledge as the cumulative body of knowledge, practice and belief, evolving by adaptation processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with their environment. It is clear from these sampled definitions that indigenous knowledge is passed down from one generation to another. In most rural parts of Kenya, especially in communities where formal education has had an insignificant impact, oral art remains the most important means of transmitting knowledge and skills as a way of maintaining societal continuity from one generation to the next (Chepchirchir et al., 2019).

Nnadi et al. (2013) state that indigenous knowledge is required for food production if agricultural sustainability and food security are to be achieved. Similarly, Asaba et al. (2006) explained that the application of indigenous knowledge ensures continued food security. More so, Olatokun Wole and Ayanbode (2009) emphasise that the extent of the adoption of indigenous knowledge can measure improvement in agricultural productivity and food availability.

Echoing the same sentiments, Nnadi et al. (2013) emphasise that indigenous knowledge is an essential asset with regard to the social capital of local people and constitutes their primary resources for their livelihoods. For instance, farmers, predominantly in developing countries, have planned agricultural production by using their indigenous knowledge to ensure food security and sustainable agricultural production. In a similar vein, Dey and Sarkar (2011) argue that indigenous knowledge is very relevant to the conservation of natural resources, climate adaptation, and food production. It should be noted that since indigenous knowledge is a cultural and adaptive system of knowledge, it is dynamic and constantly changing to accommodate new realities (Kwanya, 2013; Ross, 2011). Viewing indigenous knowledge from the livelihood assets perspective, Ihenacho et al. (2019) contended that indigenous knowledge is the social capital of people with low incomes.

In Africa, Akullo et al. (2007) studied the application of indigenous knowledge in agricultural production and farm management in Uganda. They discovered that although indigenous knowledge contributes significantly to agricultural development, local farmers face the challenge of incorporating their indigenous knowledge into new knowledge to produce better results.

This study addresses several critical gaps in the existing literature on indigenous knowledge in agriculture. First, it explores the diverse modes of transmission, highlighting the cultural significance of practices such as oral narratives, proverbs, and art. Secondly, the study underscores the practical importance of indigenous knowledge for achieving agricultural sustainability and food security, as demonstrated by previous research. It also delves into the social capital and livelihood implications of indigenous knowledge, particularly in developing countries. Moreover, it recognises the challenges faced by local farmers in integrating indigenous knowledge with modern agricultural practices, as revealed in a study from Uganda. Finally, the study acknowledges the dynamic nature of indigenous knowledge, which constantly adapts to new realities.

This study identified numerous gaps in the existing literature on indigenous knowledge in agriculture. Firstly, it attempts to investigate the cultural importance and role of various modalities of transmission, such as art and oral histories, in knowledge transfer, something that has been acknowledged by earlier research. Second, although indigenous knowledge has been recognised as having practical value for agricultural sustainability and food security, this study aims to further investigate its significance, especially in areas where formal education has had little effect.

Thirdly, the study aims to highlight the social capital and livelihood implications of indigenous knowledge, particularly in developing countries, going beyond mere recognition to understanding its practical implications for farmers' lives. The study acknowledges the challenges faced by local farmers in integrating indigenous knowledge with modern agricultural practices, shedding light on the practical difficulties encountered in leveraging traditional wisdom alongside contemporary techniques. Lastly, the study recognises the dynamic nature of indigenous knowledge and its adaptation to new realities, providing insights into its resilience and relevance in contemporary agricultural contexts.

#### 4 Theoretical framework and research methodology

Indigenous knowledge of agriculture can be explained using several models for the application of knowledge management in developing countries. It is possible to approach Indigenous knowledge of agriculture from the perspective of critical theory, analysing the connection between knowledge and power relations, with the goal of liberating indigenous farmers from forms of domination. Since knowledge management models give fresh perspectives and offer a variety of potential remedies for knowledge management techniques, they can also be used to explain indigenous agricultural knowledge. These knowledge management models are specifically used to provide a thorough explanation and as a theoretical perspective (Tella, 2007).

The research used a case study. Quantitative data was collected from farmers and qualitative data from agricultural officers. Data was collected using interview schedules and questionnaires. The study population was comprised of farmers and agricultural officers in the Kesses sub-county. The study targeted five agricultural officers who were purposively sampled and 100 farmers randomly sampled. Qualitative data were analysed using content analysis, while quantitative data were analysed using frequency distribution and cross-tabulation methods. Tables, charts, graphs and thematic discussions were used to present the data.

#### 5 Findings and discussion

One hundred (100) self-administered questionnaire copies were distributed among postgraduate students, but only 71 (71%) were returned. For face-to-face interviews with the Agricultural officers, out of the 5-library staff, only 3(60%) were interviewed. The expected number of interviews was not met due to the interviewees' busy schedules, preventing the researcher from interviewing them.

Table 1: Response rate

Category	Sample Size (N)	Response Rate (n)	Response Rate (n%)
Farmers (Questionnaires)	100	71	71%
Agricultural Officers (Interviews)	5	3	60%
<b>Total</b>	<b>105</b>	<b>74</b>	<b>70.5%</b>

The response rate was considered adequate based on Mugenda and Mugenda (2008), who observed that a 50% response rate is adequate, 60% is good and above, while 70% is rated very well; therefore, this was considered a good representation of the population.

##### 5.1 Demographics characteristics of farmers

This section of the questionnaire and interview schedule aimed to gather background information from the respondents, including their gender, age, level of education, length of library usage, the position of the key informant, and the working experience of Agricultural officers.

Table 2: Demographics characteristics of farmers

Gender	Frequency	Percentage
Male	40	56.3%
Female	31	43.7%
<b>Total</b>	<b>71</b>	<b>100</b>
Marital Status	Frequency	Frequency

<b>Gender</b>	<b>Frequency</b>	<b>Percentage</b>
Married	69	97.2
Single	2	2.8
<b>Total</b>	<b>71</b>	<b>100</b>
<b>Age</b>	<b>Frequency</b>	<b>Percentage</b>
50 years and above	38	53.5
41-50	20	28.2
31-40	10	14.1
20-30	3	4.2
<b>Total</b>	<b>71</b>	<b>100</b>

The findings revealed that 40 (56.3%) of the farmers were male, while the rest were female. These results show that almost an equal number of both male and female farmers participated in this study. This means that males who, by virtue of being head of the family and people who have access to land resources, engage more than females who only have access to their husbands' assets at the will of their husbands.

On marital status, a total of 2.5% indicated that they are single, while 82.5% indicated that they are married. Again, 9.2% and 5.8% are widows and widowers, respectively. The result shows that married people engaged in farming activities make up the majority of the population. The couple and the offspring complement one another's efforts, thereby reducing the stress that could have been in an individual working alone. The cost of labour is reduced too. In the same manner, more information on indigenous knowledge is likely to trickle in as each member of the farming is a prospective source of receiving information on indigenous farming practices.

It was also noted that 38 (53.5 %) of the farmers fall within the age range of 50 years and above, while 20 (28.2%) of the farmers fall within the range of 41-50 years. Another 10 (14.1%) of the respondents fall within the range of 31-40 years, and finally, 3 (4.2%) of the respondents fall within the range of 20-30 years. This implies that the majority of the respondents in the area are relatively older, and therefore, they may need more strength for farm work involving indigenous farming practices.

## 5.2 Indigenous knowledge practices of farmers in agricultural production for food society

Indigenous knowledge is the information that local people have established over time and continues to improve for use. It is founded on practice and understanding, often tried over time of use and entails adaption to the native values and environs. It is verifying that people have an intimate knowledge of many aspects of their surroundings and their daily lives and, therefore, are able to utilise it for survival. Table 2 Forms of indigenous knowledge practice of farmers.

**Table 3: Distribution of respondents according to indigenous farming practices (Multiple Responses)**

<b>Indigenous farming practices</b>	<b>Frequency</b>	<b>Percentage</b>
Mulching	68	95.8
Use of organic manure	71	100
Use of locally made pesticide	62	87.3
Non-tillage	47	66.2
Use of ash for seed treatment	31	43.7

From Table 3 above, it is evident that the majority of farmers, 68 (95.8%), apply and use indigenous practices such as mulching. Further, 71 (100%) of farmers use organic manure (100%), while 62 (87.3%) of farmers use locally made pesticide. 47 (66.2%) of the farmers apply and use non-tillage. However, 31(43.7%) of them apply and use ash for seed treatment. All the key informants (Agricultural officers 1,2, and 3), 3 (100%) collectively stated that there was extensive use of indigenous knowledge in the area, such as the use of organic manure, non-tillage to some extent and use of local organic manure.

The findings are similar to those of Nnadi et al. (2013) in a study titled “Assessment of Indigenous Knowledge Practices for sustainable agriculture and Food Security in Idemili South Local Government Area of Anambra State, Nigeria”, revealed that the majority of the rural are farmers have vast knowledge of indigenous practices and that there was an extensive use of indigenous knowledge in the area such as mulching, use of organic manure, non-tillage, roasting and frying food, and use of locally made pesticides among others. A possible explanation for these results is that most rural farmers in the study area employed indigenous knowledge practices for their agricultural activities and that farmers appreciate the usefulness of conserving and protecting their farm practices so as to enhance their livelihood.

### 5.3 Extent of use of indigenous knowledge by farmers (Multiple Response)

According to Kunnie (2000), farmers in the developing world have long depended on indigenous knowledge for improved agricultural production. This explains why Stilwell (2010) suggests that the applicability of IK takes place in different seasons and periods. Such knowledge ranges from clearing land, tilling, selecting seed varieties for planting, planting, harvesting, and storage to identifying weather patterns.

Table 4: Extent of use of indigenous knowledge

The extent of use of indigenous farming practices	Often used	Not often used
Control of pests in the garden	61 (85.9%)	10 (14.1%)
Use of locally made pesticide	36(50.7%)	35(49.3)
Use of chemicals from industries	1(1.4%)	70 (98.6)
Maintenance of soil fertility	69 (97.2)	2(2.8%)
Use of organic manures	71 (100)	0
Storage technologies	53 (74.6)	18(25.4)
Traditional processing methods	64 (90.1)	7(8.9%)

The findings revealed that farmers often practised farming practices such as controlling pests in the garden, maintaining soil fertility, using organic manures, using storage technologies, and using traditional processing methods. In contrast, farmers did not often use locally made pesticides, chemicals from industries, and inorganic manures. Findings from interviews revealed that local farmers apply their indigenous knowledge of farming to a limited extent, such as controlling pests in the garden, maintaining soil fertility, using organic manures, and storage.

The study’s findings are in line with the results of the study by Nyota and Mapara (2008) on understanding Indigenous Knowledge: Bridging the knowledge gap through a knowledge Creation model for agricultural development, which revealed that indigenous knowledge ranges from clearing the land, tilling, selecting seed varieties for planting, planting, harvesting, and storage to identify weather patterns.

A possible explanation for these results is that farmers have their own indigenous knowledge that they apply and use in their daily farming activities. They rely on locally available materials



and do not need any specialised training, so they are often more cost-effective than modern farming technologies.

#### 5.4 Benefits of the use of indigenous knowledge

The use of indigenous knowledge in agriculture offers numerous benefits that contribute to sustainable and resilient farming systems, as shown in Table 5.

Table 5: Benefits of use of indigenous knowledge (Multiple Response)

Benefits of IK practices	Frequency	Percentages (%)
Seed preparation promotes early germination	67	93.4
Availability of healthy crops	63	88.7
Reduction of pest diseases	47	63.5
Less disruption of farm practices	33	46.5
Improve soil fertility	69	97.2
Reduced damage to food produce	34	47.9
Availability of diseases resistant crops	70	98.6

The majority of farmers demonstrated a high level of awareness regarding the benefits of indigenous farming practices. Notably, 70 (98.6%), 69(97.2%) and 67 (93.4%) of the farmers acknowledged the availability of disease-resistant crops, improved soil fertility, and seed preparation that promotes early germination as benefits. In comparison, 63(88.7%) of the respondents stated the availability of healthy crops as a benefit as a result of indigenous knowledge. However, 34 (47.9%) of the farmers of farmers recognised that such practices reduce damage to food produce, and finally, 33 (46.5%) of the farmers acknowledged the minimal disruption of farm practices.

Agricultural officer's interviews echoed the sentiments that farmers benefit from using their indigenous knowledge in their farming since they rely on locally available skills and materials and are thus often more cost-effective in terms of farming and food security. This situation meant a dire need for farmers to combine local indigenous knowledge with modern farming techniques that provide a powerful basis from which alternative ways of preserving local indigenous knowledge, managing resources and improving farming activities.

These findings support the views of Salami et al. (2020) in their study titled "The role of indigenous knowledge in sustainable urban agriculture and urban food security in Minna, Nigeria", which reveals that indigenous knowledge is result-oriented and, thus, highly indispensable in addressing local problems such as availability of healthy food, reduce food waste, improve soil fertility, reduction of pests and availability of disease resistance crop that adapt to environmental conditions.

The result shows that the majority of the farmers in Kesses Constituency, Tulwet Chuiyat ward, in the study area, rated the above practices according to the benefits they accrued from indigenous knowledge. This is true because people are familiar with indigenous practices and technologies; they can understand, handle, and maintain them better than introduced Western practices and technologies. Farmers are less dependent on outside supplies, which can be costly, scarce, and unavailable regularly. This could account for the high level of involvement in farming using indigenous knowledge practices.

### 5.5 Factors that limit the use of indigenous knowledge practices

Several challenges reduce the extent to which the application of indigenous knowledge practices by farmers and agricultural officers would have promoted and improved farming activities. While indigenous knowledge practices in agriculture have many advantages, some factors can limit their widespread use, as shown in the table below.

Table 6: Limitations of indigenous practices (Multiple Response)

Indigenous farming practices	Frequency	Percentage
Lack of documentation	69	97.2
Obsolete and outdated	62	87.3
Unsupportive authors	39	55
One man knowledge	67	94.4
Time demanding	66	93.0
Poor recognition	52	73.2
Lack of resources	41	57.8
Lack of trust	36	50.7
Socio-economic status	23	32.4

Table 4 shows that a total of 97.2 % indicated a lack of documentation, while 87.3 % indicated obsolete. Also, 55.0% indicated unsupportive authors, while 94.4 % indicated one-man knowledge. A total of 93.0 % indicated time demand, 73.2 % indicated poor recognition, 57.8 % indicated lack of resources, and 50.7 % indicated lack of trust, while 32.4% indicated socio-economic status. This implies that these factors hinder the use and effectiveness of indigenous knowledge in agriculture and food security.

According to the Agricultural Officer 1:

*“The rapid pace of youth migration to urban centers threatens the physical, sociological, and economic setup of indigenous communities. Before it is too late, we urgently need to capture valuable, fast-vanishing knowledge for the larger good of society and nature.”*

According to the Agricultural Officer 2:

*“Younger generations are not aware of indigenous food systems, diet patterns, and farming methods their grandparents used to practice, under some challenging conditions with no technology or essential tools.”*

The work of Lwoga et al. (2011) indicated that the lack of a cohesive approach to managing knowledge suppresses the efforts of people with low incomes to take advantage of their innovations and skills to improve their farming activities. Indigenous knowledge is mainly preserved in the memories of elders whose knowledge disappears when they die of old age, and thus, indigenous knowledge has been lost at a high rate. At the same time, there is still a low rate of adoption of external technology despite the fact that it receives most of the attention (Nnadi et al., 2013) due to weak linkage between research extension and farmers. Hence, farmers neither adapt to new technologies nor manage their knowledge systems for improved farming operations.

## 6 Conclusion

Based on the findings of this study, indigenous knowledge emerges as a valuable resource, not only for providing effective alternatives to Western practices but also for expanding the options available to local farmers in their agricultural operations. Instead of solely relying on

Western technologies, farmers can choose to draw from indigenous knowledge or integrate it with Western approaches. Given the significance of sustainable agriculture and food security for human survival, it is crucial to prioritise their implementation. Additionally, indigenous knowledge has made substantial contributions to sustainable agriculture and food security.

Consequently, the study concludes that rural communities in Kesses Sub-County have developed complex management practices over the years, encompassing indigenous techniques such as mulching, organic manure utilisation, sun drying, and various food preservation methods. These practices include early harvesting by hand, the use of sacks, the mixture of red pepper, the application of wood ash, and placing food under fire for preservation.

## 7 Recommendations

In light of these findings, the following recommendations are proposed:

- The government should provide access to information and communication technologies (ICTs), such as computers, the Internet, digital cameras, and camcorders, to enable libraries to facilitate the accessibility of indigenous knowledge in the agricultural sector, end hunger, achieve food security and improved nutrition, and promote sustainable agriculture as per Sustainable Development Goal number 2, zero hunger.
- Seminars, workshops, and extension education campaigns should be initiated to promote the utilisation of indigenous knowledge and practices in agriculture in rural communities.
- Government institutions, private organisations and local communities should collaborate to address the issues surrounding indigenous knowledge practices and farming activities in rural areas.

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