**Mango (***Magnifera indica***) farming as influenced by agronomic and marketing channels in Siaya County, Kenya**

# ABSTRACT

Mango farming by smallholder farmers in Siaya County, Kenya, is a popular economic activity that significantly contributes to food security, employment and income generation. Potential yields have been estimated around 15 – 20 metric tons per hectare, which are rarely achieved by the majority of farmers. The main objective of this research project was to determine the influence of specific agronomic and marketing channels on mango yields in Siaya County. The research was carried out in Siaya County for one year in 2022. Siaya County is located in the Lake Victoria Basin and borders Busia County to the North, Kakamega County to the North-east, Vihiga County to the East, Kisumu County to the South-east, with Lake Victoria to the South and West. Siaya County has six (6) constituencies and 30 electoral wards. Alego Usonga, Gem and Bondo have six wards each while Rarieda has five, Ugenya has four and Ugunja has three wards. The specific factors included 1) impact of fertilization, 2) the influence of pruning, 3) pest management, 4) disease control, 5) marketing channels, 6) impact of factory and farmgate sales. Structured survey questionnaires were used to collect data on mango yields and influencing factors from 400 mango farmers, randomly sampled across the County, during June-July 2022. Additional general information was obtained from County Agricultural Extension Officers. The data was statistically-analysed and mango yields averaged and expressed in Kilograms per tree per year. The statistical differences between various means were determined by Analysis of Variance (ANOVA). The research revealed that, use of commercial agricultural inputs; disease management and pest control were found to be the best practices to increase mango production. Generally, selling mangoes to factories was also found to be significant in mango production as it offers a steady and ready market. The report findings indicated that mango yields in Siaya County can be significantly improved by adopting better agronomic practices including pest management and disease control. Marketing channels revealed that farmers supplying factories and those selling at farm gate markets achieved comparable sales, indicating that both pathways can be viable with proper support.

KEYWORDS: Mango production, Mango Yield, Marketing Channels, Mango Sales, Agronomic Practices.

**INTRODUCTION**

“[Mango production](https://getfarms.in/)  refers to the agricultural practice of cultivating mango trees for the purpose of commercial production of mango fruits. It involves the systematic management of mango orchards or plantations to ensure optimal tree growth, fruit yield and quality” (Getfarms, 2023). Mango *(Mangifera indica*) is a stony tropical fruit in the Anacardiaceae family and one of the most important and widely cultivated fruits of the tropical world (Britannica, 2024). According to Britannica (2024), “the tree is evergreen, often reaching 15-18 metres in height and attaining great age. Mango fruits vary in shape, size, taste, skin colour and the colour of the flesh as per the different varieties” (Kalro, 2021). It gives an attractive shape in the home landscape due to its rounded canopy shape and is therefore, referred to as the “queen fruit” in tropical areas of the world (Zotrax, 2020). Fruit trees however, have a more direct utility to people for nutrition and food security, in that they provide fruits which are rich in vitamins, proteins, essential oils and energy (Begum, 2023). “Ripe fruits are consumed raw as desserts or processed into fruit juices and other products” (Greenlife, 2024). “The ripe fruits besides being used for desert are also utilised for preparing several products like squashes, syrups, nectars, jams and jellies” (Agritech, 2020). “Raw fruits are used for making chutney, pickles and juices” (Greenlife, 2022).

According to Frutic (2021) “the trees in general, have many other functions in a farming system; they contribute directly to food requirements of household communities and livestock through provision of fruits, vegetables, starch and fodder” (Wei *et al*., 2021). “Environmentally, trees contribute to a sustainable and increased food production, particularly for vulnerable ecosystems, by improving the soils and microclimates of the surrounding” (IFAD, 2020). IFAD (2020) reports further that “to farmers and rural communities, mango trees are a source of fuel wood, which in many areas is the only available form of energy, in addition to providing locally available materials for construction. However, mango farming involves the systematic cultivation of mango trees to produce high-quality mango fruits for sale in the local or international markets”(Mitra, 2016).

From a global context, mango production plays a significant role in enhancing food security and driving economic growth. The crop provides good returns to farmers and other actors in the value chain, making it a vital contributor to the economies of many countries and a key source of livelihood for farming communities (Getfarms, 2023). Mangoes are not only a nutritious fruit but also a high-value commodity in both local and international markets. The global demand for mangoes has been steadily increasing, driven by their versatility in fresh consumption, processing and export. This has positioned mango farming as a critical agricultural activity, particularly in developing countries where it supports rural economies and creates employment opportunities along the value chain (UN Women, 2024).

The mango tree, scientifically known as *Mangifera indica*, is indigenous to southern Asia, with its origins traced to regions such as Myanmar and the Assam state of India. These areas are recognized as the primary centres of mango diversity, where numerous cultivars have been developed over centuries (Yadav & Rao, 2022). The fruit’s cultivation later spread to other parts of Asia, including Indonesia, which is now the second-largest source of mangoes globally. The adaptability of mango trees to various tropical and subtropical climates has facilitated their widespread cultivation, making them a staple crop in many countries. The rich genetic diversity of mangoes has also enabled the development of varieties suited to different agro-ecological conditions, further enhancing their global significance (Yadav & Rao, 2019).

Regionally, the mango tree is native to several countries in tropical West-Central Africa, including the Congo, Gabon, Ghana, Nigeria, Senegal and Cameroon. In these regions, mangoes are not only a source of food but also an integral part of cultural and traditional practices (Ogunbode *et al.*, 2024). The crop’s ability to thrive in diverse environments has made it a key component of agroforestry systems, contributing to environmental sustainability and biodiversity conservation (Wake *et al.*, 2019). Mango production continues to expand, driven by increasing demand for fresh and processed mango products. This growth underscores the importance of addressing challenges such as low productivity, post-harvest losses and inadequate market access to fully harness the potential of mango farming for food security and economic development (Vita, 2017; Ermias, 2021).

Mangoes were introduced to East Africa from tropical Asia. It then spread to East and West Africa and Brazil northwards to the Caribbean and Eastern Mexico. The world production of mangoes in 2020 was 55 million tons, of which India produced 45% of the total. Other major mango-producing countries like Indonesia, China, Pakistan, Mexico, Brazil, Bangladesh, Nigeria and the Philippines, produced the remaining 10%. In Africa, the fruit is mainly grown in South and West Africa whose export of the fruit to the European market has increased by 40% in recent times (CORAF, 2019).

“In Kenya, mango farming is done mostly in the eastern parts of the country and the coastal strip, mango being one of the high potential fruits in Kenya, suitable for different agro-ecological zones ranging from sub-humid to semi-arid. The leading counties in mango production by value are Makueni (30.4%), Machakos (23.2%), Kilifi (15.5%), Kwale (7.9%), Meru (4.5%), Embu (2.8%), Bungoma (2.1%), Tana River (1.8%), Elgeyo Marakwet (1.1%), Muranga (1.1%), Tharaka Nithi (1%), Kitui (1%), Siaya (0.9%) Taita Taveta (0.8%), Busia (0.7%) and others (5%)” (HCD, 2018).

The production in Kenya has increased over some time, for example, the quantities produced between 2005 and 2017 tripled from 254,113 tons to 772,700 tons, making it the third-largest mango producer in Africa. In 2010, mainly in the coastal and eastern parts of Kenya 540,000 tons of mangoes were produced while those exported in the same year was about 0.4%, meaning that most mangoes were consumed fresh within the country. In 2016 the area under mango was estimated to be 49,098 ha and produced 779,147 million tons, valued at KES 11.9 billion in the same period (HCD, 2018) making Kenya’s mango production of great economic importance. Mango is grown at an altitude between 0-1,600 m above sea level (asl) on a variety of soils; the optimum temperature is around 20–26°C and the annual rainfall is 500–1,000 mm per annum. The poly-embryonic (traditional local) varieties can be propagated by seeds, whereas mono-embryonic types (introduced commercial) varieties are propagated vegetatively (HCD, 2018).

“Kenya has a huge potential to further increase mango production but the quality and quantity of fresh and processed mango cannot adequately meet the demand of both domestic and export markets, though there is limited reliable data available on this. Due to the high seasonality of this fruit, the sub-sector faces problems such as oversupply during peak season, resulting in high postharvest losses and insufficient supply during off-peak season” (Wamucii, 2020). According to Muthini, (2015) “the main mango harvesting seasons are from Dec-March in Eastern and Central Kenya and from November to February as well as from May–to Aug in the coastal region. Mango trees grow to 30–40 metres (98–131 feet) tall, with a crown radius of 10–15 m (33–49 ft). The trees are long-lived, as some specimens still produce fruit after 300 years. Almost 60 mango varieties of the three types of local small–fruited; local large–fruited; and improved introduced varieties are maintained in mother blocks in Kenya, but only about seven varieties (Apple, Ngowe, Haden, Kent, Sensation, Tommy Atkins and Van Dyke) are commonly offered in nurseries and widely cultivated on the farms. Many of these varieties are not sufficiently studied and characterized, therefore, farmers are not provided with detailed recommendations on the most characterized but offer a high potential for breeding purposes and as drought–tolerant rootstocks”.

According to USAID-KAVES, (2015), the consumption and demand of mangoes were projected to increase from 564,000 metric tons to 746,000 metric tons in 2017 and from 952,000 metric tons in 2022. Since 2010, Kenya has been producing an average of 650,000 metric tons of mangoes annually, which generates an average of USD 84.4 million in gross production value (HCD, 2018). Recent statistics show that production has increased rapidly since the mid-2000s, growing at a rate of 9.2% per annum, correlating with the increases in mango exports (Onyango *et al.*, 2023). In 2016 the area under mango was estimated to be 49,098 ha and produced 779,147 million tons, valued at KES 11.9 billion in the same period making Kenya’s mango production of great economic importance (Swaroop, 2018). On average, prices per kilogram of mangoes in African markets range from $0.50 to $2.00 (SME, 2024). Mango farming is an income earner for many smallholder farming households; it contributes 40 per cent of the household income (Karanja, 2018).

Mango productivity has a direct market for both fruits and seedlings since there is a high demand (Wamucii, 2020). However, the quality and quantity of fresh and processed mangoes cannot adequately meet the demand of both domestic and export markets (Frutic, 2024). For instance, there is a high demand for mangoes in Kenya for both local and export markets, with numerous buyers and relatively stable prices. According to the Food and Agriculture Organization (FAO), African countries collectively earned over $500 million from mango exports in recent years, As of 2023 Kenya’s mango production stood impressively at approximately 924,000 metric tonnes per year, making it one of the leading mango-producing countries in Africa (Dokota, 2021). In the 2022/2023 financial year, the export value of Kenyan mangoes was estimated to be around $57 million, contributing significantly to the overall value of fruits produced in the country (Farmers Trend 2024).

According to the strategic Integrated value chain action plan 2017-2022, the value chain actors in Siaya County had 39 value chain organizations across all the segments and in all the sub-counties with a membership of 1308 (ASDSP, 2020). They include the Directorate of Pest Control, Kenya Bureau of Standard, Kephis, HCD, Kilimo biashara and the Siaya integrated development program. Others are the Siaya County value chain platform and Siaya fruit cooperatives, those that support the business are the Kenya Chamber of Commerce and Industries and the Siaya dealers’ development association (ASDSP, 2020).

Siaya County produces about 8433 tons of mangoes per year giving an income estimated at Kshs. 88.2million. However, the prices of mangoes at farm-gate are low at about 5/-per fruit for a small-fruited local variety and 20/= for a large-fruited local or an improved variety. Consumers in urban areas pay about 10/= per fruit for small-fruited local varieties and 50/= for large-fruited local or improved varieties.

Siaya County is endowed with a warm tropical monsoon climate where mango varieties such as Tommy Atkins, Sabine, Ngowe, Apple, Kent and Vandyke are best preferred for cultivation. The potential yields are about 15–20 t/ha, which is often not achieved by many farmers due to poor tree management practices, poor harvesting techniques and poor marketing systems, which result in large post-harvest losses with low income (Wanjira, 2019). Mango production is still low, yet this is a value chain with the potential to create employment opportunities in production, input supply, processing and marketing (Onyango *et al*., 2023).  Determining the yield gap between mango and production constraints and marketing can potentially promote the sustainable development of the mango industry (Zhang & Wang, 2019). However, it is noted that farmers have limited knowledge on fruit tree cultivation, particularly how to plant fruit trees. Majority of these farmers lack basic skills on fruit tree planting including; proper timing, technical aspects and management techniques (IFAD, 2020).

The study introduces the approaches that can enhance better management practices and marketing of mangoes that can be adapted to improve mango yields, income to alleviate poverty, improve good health and food security in Siaya County. Together with these, the agronomic drivers of marketing and production will address the challenges to assist any stakeholder who wants to support the growth of mangoes in Siaya County.Despite the strong growth in the mango subsector in Kenya, there is scant documentation of the dynamics of the industry or the financial performance of actors along the value chain. Furthermore, up to 50% of mangoes go to waste as a result of a lack of ready market and poor post-harvest and storage methods (Haslet, 2020). The study is, therefore, necessary to find out the agronomic and marketing channels of mango production in Siaya County.

**METHODOLOGY**

**Study Area**

The research was carried out in the year of 2022 in Siaya County. Siaya County is located in the Lake Victoria Basin and borders Busia County to the North, Kakamega County to the North-east, Vihiga County to the East, Kisumu County to the South-east, with Lake Victoria to the South and West. Siaya County has six (6) constituencies and 30 electoral wards. Alego Usonga, Gem and Bondo have six wards each while Rarieda has five, Ugenya has four and Ugunja has three wards. The County covers an area of 2529.8 km2 and lies between latitude 00 26’ to 0018’ north and longitude 330 58’east and 34033’ west. The altitude of the County is 1318m above sea level. The climate is tropical with significant rainfall throughout the year, the annual rainfall is 2155mm with an average temperature of 21.40C. This area receives a bimodal rainfall pattern with long rains (LRs) starting from March to June with a peak in April/May and short rains (SRs) from September to November with a peak in October. The predominant soil type is ferrosols and its fertility ranges from moderate to low with most soils being unable to produce without the use of either organic, inorganic or in most cases both types of fertilizers. Most of the areas have underlying murram with poor moisture retention ability.

**Experimental Design**

The sampling technique employed in the study was random sampling, which ensured that every mango farmer in the target population had an equal chance of being selected. This approach minimized bias and enhanced the representativeness of the sample. The list of mango farmers was obtained from the Siaya County Agriculture Office and a random selection process was used to identify the 400 participants. Additionally, ward agricultural officers from the four sub-counties were included in the study to provide insights into extension services and institutional support. Their inclusion was based on their role in supporting mango farmers and they were selected purposively to ensure their perspectives were captured.

**Data Collection**

Data for this study was collected using structured questionnaires, with one set administered to individual mango farmers and another to ward agricultural officers. The questionnaires were designed to capture quantitative data on agronomic practices, yields, marketing channels and income in mango production. Data collection involved face-to-face methods conducted over a two-month period (June and July 2022). Trained enumerators were engaged to ensure consistency and accuracy in data gathering. Farmers were selected randomly from the target population, while ward agricultural officers were purposively included based on their expertise and role in mango farming. Ethical considerations were strictly adhered to throughout the data collection process. Participants were informed about the study’s purpose, their right to voluntary participation and the confidentiality of their responses. Written consent was obtained from all participants before administering the questionnaires. Additionally, the study ensured that no personal identifiers were collected and data was stored securely to protect participants’ privacy. These ethical measures were implemented to uphold the integrity of the research and ensure compliance with established ethical standards.

**RESULTS**

**Agronomic Practices Effects**

Table (1) presents the data on the effect of agronomic practices on the yield of mangoes. Fertilization, weeding, pruning and pest control frequencies did not show any influence on the mango yields among their application frequencies. The application frequencies were not statistically significant (P≤0.05). However, the frequency of control comparison among pests and disease control indicated that occasional control gave results that were statistically different from that of seasonal control but which did not differ from that of regular control (P≤0.05). This could be explained by the fact that mature trees may produce low mango yields mainly from diseases and pests but hardly from other agronomic practices.

**Table 1: Agronomic Practices Effects**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Fertilization frequency | Weeding | Pruning | Pest management | Disease control |
| Occasion | 3693.23a | 3660.7a | 3833.88a | 3484.83a | 5168.65a |
| Regular | 3641.57a | 3654.7a | 3681.10a | 3270.05a | 2710.11ab |
| Seasonal | 3231.33a | 3250.73a | 3051.14a | 3811.24a | 2687.36b |

Values followed by the same letter are not significantly different (P≤0.05)

**Influence of Marketing Channels on Mango Farming Productivity**

The four marketing channels, for example, factory, contract and distant markets, are ready and established markets as opposed to broker and farm gate marketing (Table 2). The broker is a bridge between the market and the farmer and involves the broker fee, which limits what the farmer receives and is not very popular with the farmer. On the other hand, the farm gate simply waits for whoever may come to buy. So the probability of customers coming to buy may be limited. For the existing and ready and steady markets (factory, distant and contract), the farmers put more effort into boosting their mango yields and this explains the difference in yields.

**Table 2: Influence of Marketing Channels on Mango Yields**

|  |  |
| --- | --- |
| **Marketing Channels** | **Yields in Kg/tree/year** |
| Factory | 3925.0a |
| Contract | 3000.0a |
| Distant Markets | 2500.2a |
| Farmgate | 1035.4b |
| Broker | 1001.4b |

Values followed by the same letter are not significantly different (P≤0.05)

**Influence of Marketing Channels on Mango Sales**

The study found that the sales from the marketing channels (Farm gate Kshs76375.33 and factory Kshs 51440.59) were not significantly different (P≤0.05 Table 3)). Farm gate and factory sales were not significantly different; one can either sell at the farm gate or take to the factory. Factory offers prices that would give the highest profit and reduce what the farmer would get from the open market and that would explain the difference between what the farmer would receive from the factory and the open-air market (Table 4.10).

**Table 3: Influence of Marketing Channels on Mango Sales**

|  |  |  |
| --- | --- | --- |
| Channel | Sales per year (Kshs.) | HO: LSMean1=LSMean2 |
| Pr > [t] |
| Factory | 51440.59a | 0.4127 |
| Farm gate | 76375.33a |  |

Values followed by the same letter are not significantly different (P≤0.05); HO=null hypothesis, no significant difference LS=Least Squares

**DISCUSSIONS**

**Impact of Agronomic Practices on Mango Farming Productivity**

During the study, the data indicated that the effect of good agronomic practices impacted the yield of mangoes. Musyoka, (2020) confirmed this finding and reported that the application of good management practices in mango farming increases the quantity produced, which in turn will reflect in increased market supply. This was also confirmed by the study conducted by Dong and Chong (2019) on fertilization management, including fertilizer N, P205 and K2O application rates and planting density were the main limiting factors of mango yield. In addition, tree age influenced mango yield in the Northern Mountains (11.1%) and Central Valley (11.7%) regions.

Njunguna, (2017) contradicted this finding and reported that higher fertilizer levels possibly produced some barrier to the nutrition of mango plants or prevalence of other constraints in soil and hence reduced the yield. However, Isaboke, (2022) argued that there was a significant difference between treated trees and non-treated ones and that the trees where integrated crop management practices were used yielded up to 4 times higher. Possible challenges like increased pests and diseases, shifts in rainfall patterns, or drought stress that affect yields (Ogunbode, *et al*., 2024).

Pest control frequencies did not show any influence on mango yields during this study. There was an observation that fruit flies and other pests are on the rise in Kenya due to climate change and can destroy a large part of the harvest (Kirema, 2017). However, the study noted that pest control gave good yield results and the levels of pest control were not statistically different (P≤0.05). For instance, [Keitt Exporters Limited](https://www.keitt.co.ke/) through a partnership that includes the [Micro Enterprises Support Programme Trust](https://mespt.org/) (MESPT) helps tackle a range of challenges to mango farming such as how to tackle the threat posed by fruit flies (Kirema, 2017). Furthermore, pruning whether done occasionally, regularly, or seasonally did not show a significant difference. Similarly, pruning of the mango trees did not benefit from the natural conditions of sun and wind movement. This reduces relative humidity within the canopy while also creating a less conducive environment for disease development (Khasakeli, 2020).

However, a comparison among disease control frequencies indicated that occasional control gave results that were statistically different from that of seasonal control but which did not differ from that of regular control. Mohsin *et al.,* (2014) were in agreement and indicated that mango is subject to several diseases at all stages of its development. Some of these diseases cause heavy losses and are limiting factors in mango cultivation in some regions. For instance, powdery mildew and anthracnose are some of the most serious diseases of mango affecting almost all the varieties. The disease causes a fruit drop of 10-70% and a yield loss of 10-85% (Khaskheli, 2020).

**Influence of Marketing Channels on Mango Farming Productivity**

The study found no significant differences in mango yields across most marketing channels, including factory, contract and distant markets. This finding aligns with research by Karanja (2017), who emphasized that market access and value addition, rather than the choice of marketing channel alone, play a critical role in influencing productivity. However, yields were significantly lower for farmers relying on farmgate and broker channels. This disparity may reflect limited access to better markets or inefficiencies in these channels, as noted by Muthini *et al*., (2017) in their analysis of small-scale farmers’ market choices in Kenya.

The broker is a bridge between the market and the farmer here it involves the broker fee which limits what the farmer receives and is not very popular with the farmer. The findings of Muthini, (2015) supported the results of the study and indicated that the majority of the farmers (58%) sold to brokers, 30% to export, while the rest sold to the direct market. On the contrary, Muthini, (2015) on the price analysis results reported that farmers selling to direct channels earned the highest average prices, while brokers offered the lowest prices. On the other hand, Muthini *et al.,* (2017) supported the fact that the majority of farmers sell to brokers followed by export channels. According to Thakur *et al.,* (2021), farmers who sold to consumers had higher marketing performance than those who sold through market intermediaries such as local traders, commission agents and wholesalers. Further, the results indicated that farm income, farm experience, distance to the market and market information were significant determinants of farmers’ choice of marketing channels.

The higher yields associated with factory and contract marketing channels suggest that these channels may provide farmers with better access to resources, such as technical support and quality inputs, which can enhance productivity. This finding is consistent with studies such as JICA (2023), which highlighted the importance of structured market linkages in improving farm outcomes. In contrast, the lower yields for farmgate and broker channels may indicate challenges such as price exploitation, lack of market information, or limited bargaining power, as highlighted by Akrong *et al*., (2021) in their study on high-value mango markets.

These findings underscore the importance of strengthening market access and support systems for smallholder farmers. Studies such as KALRO (2021) have demonstrated that providing training, market linkages and infrastructure can empower farmers to access higher-value markets and improve productivity. Siaya County farmers can increase mango farming’s sustainability and profitability by tackling the issues with farm gate and broker channels.

**Influence of Marketing Channels on Mango Sales**

The study found no significant difference in sales between mango farmers supplying factories and those selling at farmgate markets, as indicated by the null hypothesis (Pr > [t] = 0.4127). This finding aligns with research by Karanja (2017), who emphasized that the sale of mango depends not only on the choice of marketing channel but also on factors such as value addition, market access and post-harvest management. The similar sales figures for both channels suggest that farmers can achieve comparable profitability through different market pathways, provided they have access to supportive infrastructure and resources, as noted by JICA (2023). According to Oyugi (2024), as a result of past experience post-harvest losses have reduced from 60 per cent to 20% as a result of value addition of the mango fruit. At the same time, the fruit has enabled farmers to have diversified revenue streams of the product range including mango powder, juices, fortified flours and mango flakes acquired from the mango processing”. The mango products are derived from appropriate food processing and value-addition technologies that transform fresh mango into shelf-stable products with ideal organoleptic, nutritional and other quality attributes (Owino & Ambuko, 2021). The emphasis is that some of the common processed products from mango fruit include pulp (puree), juice concentrate, ready-to-drink juice, nectar, wine, jams, jellies, pickles, smoothies, chutney, canned slices, chips, leathers and powder (Karauri, 2021). However, minimum processing of mango fruit as a fresh-cut product has gained importance among health-conscious consumers (Wamucii, 2020). Furthermore, the primary products from mango fruit, mango pulp or powder can be used to enrich or flavour secondary products such as yoghurt, ice cream, beverages and soft drinks while the by-products of mango processing, such as the peel and kernel, are rich in bioactive compounds including carotenoids, polyphenols and dietary fibres (Siafunda, 2019).

The mango sales channel further supported these findings, showing that the model’s explanatory power was limited (F Value = 0.67, Pr > F = 0.4127). This suggests that other factors, such as agronomic practices, access to inputs and extension services, may play a more significant role in determining mango productivity and profitability. This aligns with studies such as Muthini *et al*. (2017), who found that integrated support systems are critical for enhancing smallholder farmers’ outcomes in the mango value chain. These findings highlight the importance of a holistic approach to improving mango production and market access. Studies such as KALRO (2021) have demonstrated that combining value chain interventions with capacity-building and resource provision can significantly enhance productivity and sustainability. Further research indicates that there is immense scope for value addition when mangoes are marketed through factories as it strengthens the marketing system when establishing processing industries and mobilizes resources to increase the bargaining power of mango growers(Shrestha & Pandey, 2021).

**CONCLUSION**

Marketing channels and mango sales revealed that farmers supplying factories and those selling at farmgate markets achieved comparable sales, indicating that both pathways can be viable with proper support. However, challenges such as limited market access and inefficiencies in farmgate and broker channels need to be addressed.These findings emphasize the importance of strengthening market linkages and value addition to improve profitability. Overall, the study provides valuable insights into the agronomic and market factors influencing mango productivity. Stakeholders can encourage sustainable and successful mango cultivation in Siaya County by addressing these variables through focused interventions, such as expanding market access, strengthening agronomic practices and improving mango sales. These results support the larger objective of improving the region’s food security and standard of living.

Consent

As per international standards or university standards, Participants’ written consent has been collected and preserved by the author(s).

**COMPETING INTERESTS DISCLAIMER:**

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

**Disclaimer (Artificial intelligence)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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