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PRODUCTION CHALLENGES, USES AND CONSUMPTION OF PUMPKIN PRODUCTS BY FARMERS IN KISII CENTRAL SUB COUNTY, KISII COUNTY, KENYA

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ABSTRACT

Pumpkin is a native vegetable crop with vast prospective to offer nourishment, food security and revenue to families in Kenya but its production and consumption remains dismal. The vegetable has been accorded insignificant consideration in research and has not been embraced as a lucrative venture. The available literature reveals that production challenges and consumption of pumpkin products by smallholder farmersin Kisii have not been studied neither documented. The study was conducted in Kisii Central Sub- County. The study analyzed production challenges, uses and consumption of pumpkin products by farmers in Kisii Central Sub County, Kisii County. A household survey of 120 pumpkin growing family units was conducted using structured questionnaires. The data was analyzed using inferential statistics (one sample t-test) and descriptive methods such as frequencies, percentages, presented using tables. Pumpkin fruits andleaves were largely used as food while seeds were utilized as planting materials by majority of the households. Pumpkin was considered food for the poor, children and women. There was a statistical significance in socio-cultural pumpkin consumption ($t9 = 4.935$, $p < 0.05$), (Appendix 2, i(b). The main challenges in pumpkin production were pests and diseases. Additionally, there was a statistical significance in pumpkin production challenges ($t14 = 7.004$, $p < 0.05$), (Appendix 2 (b). Policy interventions such as enhancement of farmers' awareness and strategies to promote pumpkin production in Kisii central sub county, western Kenya. The study will enable the researcher highlight the production challenges affectingpumpkin growing and provide a basis for further research. The study results will also inform the Ministry of Agriculture and other stake-holders in-order to highlight the uses and importance of pumpkin growing in Kenya so as to improve pumpkin production and its consumption in Kenya.

KEYWORDS: Pumpkin, Pest, Yields, Native, Household, Kisii.

1.0 INTRODUCTION

Smallholder farming is a vital basis of food, livelihoods and employment for a majority of households in Kenya. Nevertheless, agricultural production in Kenya has dropped in recent past with a low performance of 2.9 percent in

2013.[24] Majority of Kenya's smallholder farmers get involved significantly in agricultural production accounting for 75 percent of total output and 70 percent of the marketed produce.[25] The production of the major food crops has been generally low due to depressed rainfall andunpredictable rainfall patterns.[15]

Pumpkin (*Cucurbita maxima*) has an origin in North America and falls under the family Cucurbitacea whichalso includes gourds, melons, squash, courgettes and cucumber. The crop is rich in nutrients, adapts well to local conditions and grows in a variety of agro-ecological zones.[5] It is low in calories and a rich sourceof vitamin A, vitamin C, potassium and proteins.[27] The pumpkin fruits and leaves are eaten as vegetables and the seeds are utilized when roasted as a snack food. Pumpkin seeds are rich in protein, carbohydrates and oil containing unsaturated fatty acids.[6]

Pumpkin is widely adapted to various agro-ecological zones in Kenya and has huge potential for food production but this has not been adequately appreciated nor fully exploited. Like other traditional crops, pumpkins remain underutilized in national development. Pumpkin production in the country remains low with smallholder farmers producing less than the potential of 20 tons per hectare.[3]

According to[21,23], indigenous foods are superior in health qualities, nutritional values and dietary diversity compared to exotic foods such as wheat and rice but their consumption has greatly reduced. Kenya's policy has been promotion of food self-sufficiency and diversification in the production of agricultural commodities.[24] The focus in Kenya has been on production of a few food commodities such as maize, wheat and rice resulting to neglect of traditional food crops and subsequently food insecurity in the country. In a related study carried out by[22] in Western Kenya found that the majority of farmers grewpumpkins mainly for domestic consumption and only the surplus was used for commercial purposes. The study further established that pumpkins were an important source of food and income for households but were mainly grown by low income farmers. Traditional vegetables offer vital sources of food and are recognized by some communities in Kenya for their nutritional and therapeutic properties.[1] Pumpkin fruits, leaves and flowers are used as vegetables while seeds are roasted to give oil or eaten as a snack.

Most households in Uganda mainly use pumpkin leaves as vegetables while seeds are used as a sauce and snack.[17] In a study in Zimbabwe,[10] found that pumpkin was one of the most preferred traditional leafyvegetable.[18] Established that in Zimbabwe, pumpkin leaves were consumed three to four times per weekduring the rainy season. Around Lake Victoria regions,[22] found that pumpkins were used as relaxatives, antiflatulents, anti-diarrhoea, de-wormers and in the treatment of heartburns and ulcers. Traditional foods consumption was generally low mainly due to the negative perception given to these foods.[2,26]

Negative beliefs act as barriers but health, nutrition, tradition and culture are main drivers for native and customary foods consumption by rural communities.[11] Around Lake Victoria neighborhood, cooked pumpkin fruits were mainly consumed by women and children while men considered them as food for children.[22]

Additionally, food security is influenced by household structure, income, savings behavior, socio-cultural orientation and nutrition awareness.[19] Smallholder farmers' agricultural patterns appear expanded with formidable linkages between crops, livestock and off-farm practices.[4] More than half of Kenya's farming households in rural areas are involved in off-farm income generating activities and about 36 percent have at least one salary earner living away from the farm.[24] Farm produce sales and off-farm activities are major sources of income for smallholder farmers in Western

Kenya.[29] Nonetheless, access to and control over financial, physical, social and human resources for agricultural production depends on factors such asage, position and gender of rural household members.[10]

The land ownership system in Kenya is mainly individual ownership with or without title deeds. Land is an essential resource for many people in rural areas and the land tenure system influences crop production.[7] Social capital contributes to income generation for households belonging to farmer organizations or associations.[7] A study in Western Kenya established that social capital affects performance and increasesthe level of commercialization of rural producer organizations.[29] Members of producer groups have better access to technical advice on crop management which helps them increase their yields.[9]

3.0 MATERIALS AND METHODS

3.1 Description of the study area

Kisii Central Sub County is one the nine Sub Counties of Kisii County, Western Kenya. It comprises of six locations with seventeen sub-locations (Source: County commissioner office, Kisii County, 2019). Temperature ranges from 10ºC to 30ºC. The Sub County (formerly Kisii Central district) had a population of 588,000. However, with a population growth rate of 3.6% the population is now over 700,000 (19% of whom live in urban areas).[8] It is one of the most highly populated Sub Counties in Kenya and covers anarea of 317.4Km^2. Due to the high population pressure, considerable portion of the land is for agricultural activities. The available land is partitioned among families; farm size is small with an average farm being 15,000 m² (MoA, 2016). With an average of a quarter of an acre allocated for arable farming, almost all farmers engage largely in home-based agricultural production and minimal production for sale. The area allocated for cash crop farming is approximately 3,800ha while for food crop production is about 12,500ha.[14] Livestock farming is predominated by dairy and local poultry keeping. Agriculture offers employmentfor an estimated 80% of the inhabitants either directly or indirectly and the estimated rural poverty is 30% with some areas with 61% based on the Kisii county profile.[15]

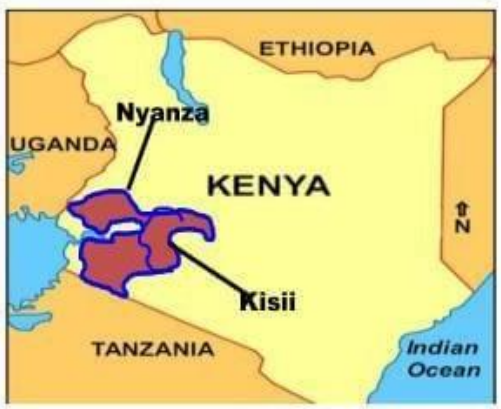

Figure 1: Kisii County, Nyanza Province of Kenya, where the research was undertaken.

Source: Kisii County profile plan (10/6/2023)

Figure 2: Kisii Sub-County Regions in Kisii County where the research was done.

Source: Kisii County profile plan (10/6/2023)

N

3.2 Sample Size

Twelve sub locations were randomly selected. Eighty hundred and seven administrative households were found to be under pumpkin production as shown in Table 1. The sampling unit was individual pumpkin growing households. From each of the sampled sub-locations, 10 households were sampled to make a sample size of 120 households for the study.

Table 1: Sub locations with their total number of households and households growing pumpkins.

	Sub location	Total Number of households	Households growing pumpkins
1	Nyanchwa	430	77
2	Nyaura	348	80
3	Masongo	502	45
4	Matunwa	346	67
5	Nyaguta	534	35
6	Boronyi	347	44
7	Kegati	444	50
8	Nyanguru	389	44
9	Nyamware	447	36
10	Bomwagi	390	26
11	Kirwa	467	30
12	Kabosi	545	41
13	Chirochiro	458	37
14	Nyamagwa	399	46
15	Kerera	445	51
16	Birongo	568	60
17	Taracha	489	38
TOTAL			**807**

Twelve sub locations were randomly sampled for the study. In each of the sub locations, pumpkin growinghouseholds were surveyed and recorded as shown in Table 2.

Table 2: Sampled locations with their total number of households and households growing pumpkins.

	Sub location	Total Number of households	Households growing pumpkins
1	Nyanchwa	430	77
2	Nyaura	348	80
3	Masongo	502	45
4	Matunwa	346	67
5	Nyaguta	534	35
6	Kegati	444	50
7	Nyamware	447	36
8	Bomwagi	390	26
9	Kabosi	545	41
10	Nyamagwa	399	46
11	Birongo	568	60
12	Taracha	489	38
TOTAL			**601**

3.3 Sampling and data collection procedures

From the seventeen sub locations under pumpkin production, 12 of them were randomly sampled for the study with the assistance of the Ministry of Agriculture extension officers. The sampling unit was individual pumpkin growing households. From each of the sampled sub-locations, 10 households were sampled to make a sample size of 120 households for the study. The households were assigned numbers using lists obtained from the Ministry of Agriculture field extension officers. The starting point of sampling the households was determined by randomly picking wrapped papers numbered from 001 to 120 from a container. Administration of questionnaires was done on households to

collect data. Data collected at household level included socio-cultural issues on the uses and consumption of pumpkin products.

3.4 Research instruments

Primary and secondary data were used in the study. Primary data on demographic and socio-economic characteristics of pumpkin production challenges, uses and consumption of pumpkin products were collected using a structured questionnaire (Appendix 1). The questionnaires were pre-tested in one site each in Marani Sub County. This was done to establish a precise understanding of questions and correct responses by the respondents. The enumerators who assisted in data collection were trained on administering the questionnaires and creating good rapport with the respondents. Secondary information on the study area was obtained from the Ministry of Agriculture.

3.5 Data Analysis

The data collected was subjected to descriptive analysis (frequencies and percentages) and inferential statistics (one sample t-test) aided by SPSS software (version 21).

4.0 RESULTS

4.1 Pumpkin consumption

The study sought to assess the uses of pumpkin products and results recorded.

4.1.1 Uses of pumpkin products

Pumpkin fruits and leaves were mainly used as food by 20% and 16.7% respectively of the sampled households in this study. Only 10% of the households used fruits as medicine, 8.3 % of them used leaves for medicinal purposes, 10 % as spices while 9.2 % as animal feeds. The households utilized seeds primarilyfor planting (14.2%) with a few using them as medicine (6.7%) and food (5%). The results of this researchshowed that pumpkin products especially fruits and leaves were mainly used as food by majority of the households in Kisii central sub county, Kenya in order to meet their nutritional requirements as indicated in Table 4.1.

Table 4.1: Percentage distribution on uses of pumpkin products.

Pumpkin product	Use	No. of individuals	Percentage (%)
Fruit	Medicine	12	10
	Food	24	20
	Spice	12	10
	Feed for animals	11	9.2
Leaves	Food	20	16.7
	Medicine	10	8.3
Seeds	Planting	17	14.2
	Medicine	8	6.7
	Food	6	5
TOTALS		**120**	**100**

4.1.2 Socio-cultural issues in pumpkin consumption

The results showed that majority of the sampled households in Kisii central sub county, Kenya consideredpumpkins as food for the poor (23.3%), children (15%) and rural residents (8.3%). Additionally, other socio-cultural perceptions on pumpkin consumption by the households comprised of dislike by most people (6.7%), control roundworms (7.5%), farmers were not aware of the nutritional values (8.5%), pumpkins are medicinal (7.5%) and shift from traditional to modern foods (10%). Other perceptions by the sampled households included negative associations towards the crop

(1.7%), personal taste (5%), detachment of most people from pumpkins (4.2%) and embarrassing to serve pumpkin meal to visitors (2.5%) as illustrated in Table 4.2. There was a statistical significance in in socio-economic issues in pumpkin consumption ($t9$ =4.935, $p < 0.05$), [Appendix 2, i(b)].

Table 4.2: Socio-cultural issues in pumpkin consumption by smallholder farmers.

Socio-Cultural Perception	No. of individuals	Percentage (%)
Considered as food for the poor	28	23.3
Food for children	18	15
Foodstuff for rural residents	10	8.3
Most people do not like pumpkins	8	6.7
Pumpkins control roundworms	9	7.5
Most farmers are not aware of nutritional values	10	8.3
Pumpkins are medicinal	9	7.5
Major shift from traditional to modern foods	12	10
Negative associations towards pumpkins	2	1.7
Personal taste	6	5.0
Most people are detached from pumpkins	5	4.2
Embarrassing to serve pumpkin meal to visitors	3	2.5
TOTALS	**120**	**100**

4.2 Pumpkin production challenges

The sampled households attributed the low productivity to several constraints as presented in Table 4.3. Ten (8.3%) of the households identified pests and diseases as the main challenge in pumpkin production. Other challenges included farmers' preference for maize and beans (15%), pumpkin not a major crop (5%) and negative associations (5.8%). Pumpkins take a lot of space by 10%, inadequate land and damage by moles were indicated as challenges each by 5% while pumpkin as a traditional crop, has poor yields, flower abortion, traditional beliefs, modern civilization, inadequate utilization knowledge and pumpkin seeds' unavailability had 11.7%, 3.3%, 1.7%, 8.3%, 6.7%, 6.7% an 0.8% respectively as indicated in Table 4.3. There was a statistical significance in pumpkin production challenges ($t14 = 7.004$, $p < 0.05$), [Appendix 2 ii(b).]

Table 4.3: Percentage distribution of pumpkin production challenges.

Challenges	No. of individuals	Percentage (%)
Pests and diseases	10	8.3
Insufficient rainfall	8	6.7
Farmers preference for maize and beans	18	15
Pumpkin not a major crop	6	5
Negative associations towards pumpkins	7	5.8
Pumpkins take a lot of space	12	10
Inadequate land	6	5
Damage by moles	6	5
Pumpkin was a traditional food crop	14	11.7
Poor yields	4	3.3
Flower abortion	2	1.7
Traditional beliefs	10	8.3
Modern civilization	8	6.7
Inadequate utilization knowledge	8	6.7
Seed unavailability	1	0.8
TOTALS	**120**	**100**

5.0 DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section discusses the pumpkin products uses, consumption and socio-economic factors that influence pumpkin production. It also contains the challenges in pumpkin production in Kisii Central sub county, Kenya.

5.2 Pumpkin consumption

5.2.1 Uses of pumpkin products

The study findings revealed that pumpkin fruits and leaves were majorly utilized as food while seeds were used as planting materials by majority of the households. These results are in tandem with studies carried out by[22] who found that pumpkins were eaten by majority for their nutritive value as the fruits, leaves and flowers utilized as vegetables. Equally, results obtained by[22] revealed that majority of the households utilized pumpkin leaves primarily as vegetables and pumpkin seeds as a sauce and snack.

In a related study conducted by[10] on the role of traditional vegetables in household food security in Zimbabwe found out that traditional vegetables were utilized as food and medicine while pumpkin was one of the most favorite customary green vegetable. Additionally, a study carried out by[18] revealed that pumpkin leaves were consumed as food three to four times per week.

These study findings showed that pumpkins like other indigenous vegetables exhibit an ability to offer food security to the households. These findings agrees with those of[16] who observed that majority rural communities in many African farming systems relied on indigenous plants as sources of food. The results of this study infers that pumpkins which are abundant in nutrients such proteins, vitamins and minerals have a significant role in the diet and food security of the households in Kisii Central sub county, Kenya.

5.3.2 Socio-cultural practices in pumpkin consumption

Food security is the most important aim for households since food is among the most significant basic requirements to humans. The study findings observed that pumpkins were not regarded important in food production and consumption in Kisii Central sub County. A high number of the households considered pumpkins as food for the poor, children, rural inhabitants and women. These results are in agreement with those obtained by[22] who observed that baked pumpkins were eaten by females while males regarded it as food for the children. This study also observed that the households were affected by some socio-cultural connotations related to production and medicinal values of pumpkins. These study results are in agreement with those of[2] who noted that consumption of traditional foods was generally low due to the negative opinion given to them.

Similarly, in a related study conducted by[11] found out that negative beliefs were the hindrances although health, nutrition, tradition and culture were the major motivating factors for the consumption of indigenous and traditional foods by rural communities. The study findings also found out that pumpkins were considered as a minor and inferior crop compared to maize and beans. Therefore, farmers' primary aim is to meet their household food requirements and therefore opt to prioritize staple crops in their farming.

5.3.3 Pumpkin production challenges

The study results revealed that pests and diseases were the major challenges in pumpkin production in the study area. These findings are in agreement with those of[1] who found out that production of indigenous vegetables was challenged

by poor seed quality, pests and diseases. These findings are also supported by astudy conducted by[28] who revealed that poor weather conditions, low soil fertility and lack of seed systems restricted the availability of traditional leafy vegetables.

Similarly,[2] linked low production of traditional food crops to lack of agronomic information, lack of high yielding cultivars and undeveloped seed systems. Additionally, in a related study carried out by[11], their findings revealed that production and consumption of indigenous and traditional foods was fading as a result of socio-economic changes and preference for modern foods.

6. CONCLUSION

Pumpkin products especially fruits and leaves were majorly utilized as food by majority of the households with a few embracing it for medicinal values. Pumpkin seeds were considered as planting materials with limited uses as medicine and food too. Nevertheless, pumpkins were not accorded significance in food production and consumption in Kisii Central sub County, Kenya due to socio-cultural opinions and negativeattitudes on the crop. Majority of the respondents considered pumpkins as food for the poor, children, ruralinhabitants and women.

Few households consumed pumpkins due to their medicinal values such as control of roundworms. Pumpkins were not a prioritized for majority of households compared to food crops such as maize and beans. Pumpkin production in the study area experienced a variety of challenges such as pests and diseases. Additional pumpkin production challenges comprised of farmers' inclination to maize and beans production; pumpkin was not a major crop and takes a lot of space, negative attitude, lack of adequate landand damage by moles. A few of the households considered pumpkin as a traditional food crop, poor yields, flower abortion, traditional beliefs, modern civilization, inadequate knowledge on utilization and seed unavailability as production challenges.

RECOMMENDATIONS

The Ministry of Agriculture at County level should embark on sensitization of farmers to equip them with knowledge and skills to enhance pumpkin production and promote the crop as a lucrative venture.

Sensitization of farmers in order to change their consumption habits and negative discernments on pumpkin and its products. Stake holders and policy makers all levels of governments should advance approaches andoffer resources for elevation of pumpkin production among subsistence farmers.

CONFLICT OF INTEREST

"The author(s) declare(s) that there is no conflict of interest."

There was no role of the funding sponsors in the design of the study; in the collection, analyses orinterpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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APPENDICES

Appendix 1: Questionnaire for household survey

The aim of this questionnaire is to gather household data on pumpkin consumption, uses and productionchallenges. The data to be obtained shall be kept confidential. However, it shall be used to make recommendations on research and policy interventions.

1. Household Description

Name of household head.....

Sex of respondent.....

2. Pumpkin parts and utilization

Pumpkin part and their uses (code)		
Fruit	Leaves	Seeds
1=Food, 2=Medicine, 3=Herb/spice, 4=Processed products5=Others(specify)		

3. Social-cultural issues

Mention any social-cultural concerns associated with pumpkin production, uses and consumption

i. .....ii.....iii.....iv.....

4. Major pumpkin production challenges

Rank the major challenges in pumpkin production

Production challenges
1.
2.
3.
4.
5.
6.

Thanks for your cooperation

Appendix 2: Analysis output

i) Socio-cultural issues(a)

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Issues	10	11.2000	7.17712	2.26961

(b)

One-Sample Test

	Test Value = 0					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Issues	4.935	9	.001	11.20000	6.0658	16.3342

ii) Production challenges

(a)

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Issues	15	8.0000	4.42396	1.14226

(b)

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Issues	7.004	14	.001	8.00000	5.5501	10.4499