

Technical Report
Rapid market assessment: Viable Sweetpotato
Technologies in Africa – Tanzania

Sarah Mayanja, Fredrick Kobina Grant,
 Rogers Kakuhenzire and Haile Selassie Okuku



RESEARCH PROGRAM ON
 Roots, Tubers
 and Bananas



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International Potato Center

P.O. Box 1558, Lima 12, Peru
cip@cgiar.org • www.cipotato.org

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Authors:

Sarah Mayanja, Fredrick Kobina Grant, Rogers Kakuhenzire and Haile Selassie Okuku

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Notes on contributors

Sarah Mayanja, a holder of an MSc in agroecology, is a research associate with CIP. She has experience in agricultural trade development, agricultural marketing, gender-responsive value chain development and postharvest research.

Dr Frederick Kobina Grant, who has a PhD in nutrition and health sciences, is a public health nutrition epidemiologist at CIP and the manager of the VISTA-Tanzania project.

Dr Rogers Kakuhenzire has a PhD in plant pathology. He works as a plant disease epidemiologist and seed systems specialist, focusing on seed production technology and seed health. He is the technical expert for seed systems development and agronomy for the VISTA-Tanzania project.

Haile Selassie Okuku holds an MSc in clinical trials and is a monitoring and evaluation specialist in the VISTA-Tanzania project. He is an experienced monitoring and evaluation specialist with a demonstrated history of working in the research industry. He has skills in clinical, community and social services, statistical data analysis, epidemiology, and large database management.

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Acronyms

IIRR	International Institute of Rural Reconstruction
KIT	Karlsruhe Institute of Technology
OFSP	orange fleshed sweetpotato
RMA	rapid market appraisal
SACCOs	savings and credit cooperative societies
SP	sweetpotato
USAID	United States Agency for International Development
var.	variety
VISTA	Viable Sweetpotato Technologies in Africa
WFSP	white-fleshed sweetpotato
YFSP	yellow-fleshed sweetpotato

Executive summary

The Viable Sweetpotato Technologies in Africa (VISTA) Tanzania project aims to expand the production and utilization of nutritious orange-fleshed sweetpotato (OFSP) in the seven districts in Tanzania in Mbeya, Iringa and Morogoro regions that are part of USAID's Feed the Future zones of influence. VISTA-Tanzania seeks to contribute to improved dietary diversity, food security and incomes in Tanzania, especially among the households with children under five years of age.

A rapid market assessment study to determine the commercial potential of OFSP was conducted in Iringa, Mbozi, Ulanga, Wanging'ombe, Mufindi, Mbozi and Gairo districts in Tanzania, constituting the project intervention area. Two markets were visited in each district and 328 individuals were involved.

The results indicate that sweetpotato produce markets varied in size, structure and nature of operations, and for the study were categorized as large, medium and small. The most common source of fresh sweetpotato roots in the large markets was Songea region. Some 89% of the traders obtained their sweetpotato supplies directly from farmers. Retailers constituted 76% of the traders, traders with dual functions 13% and wholesalers 8%. Women formed 77% of the retail and 63% of the wholesale traders. White-fleshed sweetpotato varieties were the most traded followed by yellow-fleshed varieties and then OFSP. About 46% of the traders had heard about OFSP, most of whom were women. Only 39% of the traders were aware of the nutritional benefits of OFSP.

The most common form of transport for sweetpotato was the bicycle in Iringa and Mbeya and the ox cart in Morogoro. The 20 L bin was the most common unit of measure in sweetpotato trade. The mean volume purchased by traders was 35.6 kg per month in the peak seasons and 25 kg per month in the lean seasons. The traders had informal agreements with their trading partners and had formed social networks, especially in Morogoro and Iringa. At least 33% of the traders had accessed credit to enhance their sweetpotato businesses, mostly from savings and credit cooperatives (SACCOs).

Sweetpotato consumption data indicated that 61% of the consumers were not aware of OFSP, but the general perception was that its demand was on the increase. Over 70% of the consumers bought sweetpotato at least once a week, and the purchase factors that were considered important included root size, skin color and extent of root damage. Flesh color and price also were important.

Though the findings indicate that the volumes of sweetpotato traded by individual traders were low, their cumulative amounts were substantial and a significant contribution to agricultural trade in the regions. Female traders were seen as crucial to the trade despite the small volumes they handled. Their frequent sweetpotato purchases ensured consistent availability of the crop in the market.

Amongst the barriers to sweetpotato trade that new entrants were likely to face were taxes, inadequate knowledge on the trends and varieties on demand, ensuring consistent supply of sweetpotato for clients, and lack of ability to engage in off-season trade in the crop, which was bound to be more lucrative.

OFSP trade is a lucrative option that the new commercial farmers who are being promoted by the project can engage in. They will, however, have to be supported to prepare production and marketing plans, build business partnerships and networks, and engage actively in sweetpotato platforms in their areas of operation.

1. Introduction

Marketing of agricultural commodities in East and Central Africa is largely informal, ad hoc and in many cases disorganized (KIT and IIRR, 2008). Farmers strive to sell their commodities through various channels, often with little benefit. Traders and other value chain actors are equally frustrated, as they have to deal with high transaction costs in their quest to serve as the bridge between producers and consumers. Such costs are a result of poor infrastructure, high bulking and transportation expenses and quality adulteration, among others. Yet markets offer an opportunity for commercializing agriculture and hence improving the livelihood of smallholder farmers and other value chain actors. This is especially the case in Tanzania, where most people depend on agriculture. There is need to address such constraints.

Sweetpotato markets in Tanzania and elsewhere in East Africa are constrained by the bulky and perishable nature of the crop, high transport costs, inadequate storage facilities, limited market intelligence services, and limited processing facilities (Bashaasha et al., 1995). The most common trade channels are characterized by low-volume sales by women in rural markets, though urban trading is growing in significance (Bashaasha et al., 1995). As such, sweetpotato is mainly regarded as a woman's crop and mostly held in poor regard, which further undermines its trade.

Sweetpotato offers a lot of opportunities for farmers, especially those living in marginal areas, given that it is drought resistant and nutritious and it matures earlier than most other root and tuber crops. All sweetpotato varieties are nutritious and are a good source of vitamins C, B2 (riboflavin), B6 and E, as well dietary fiber, potassium, calcium, manganese and iron (Szalay, 2014). Sweetpotato is an important energy food for diabetics, as it helps to stabilize blood sugar levels and lower insulin resistance, in addition to being low in fat and cholesterol.

Orange-fleshed sweetpotato (OFSP) varieties in particular are an important source of beta-carotene, a vitamin A precursor. Just 125 g of OFSP is enough to supply a child aged five years or younger with the daily recommended intake of vitamin A, given as 400–500 mcg of retinol activity equivalents (Ross 2006, 2010; HarvestPlus, 2012). Thus, OFSP can be used to combat vitamin A deficiency, a micronutrient deficiency that is widespread in East and Central Africa and which if not addressed could cause xerophthalmia (an inflammation of the eye that could lead to blindness), reduce immunity and increase child mortality (Low et al., 2007 in Mwanga et al., 2011).

According to Ewell and Mutuura (1994), sweetpotato is an efficient provider of cash income per unit land area and unit time. Even with low external inputs, the profitability of the crop is high when improved technologies are applied (Bashaasha and Mwanga, 1995). Sweetpotato production in Tanzania has been growing steadily and the country was registered as the second largest producer in Africa in 2015 (FAOSTAT, 2014). The crop is increasingly being recognized for its contribution to food and income security in the country. Considering OFSP's benefits, it is important that efforts to improve its production and marketing be stepped up in Tanzania.

This report is a result of a rapid market appraisal conducted for the Viable Sweetpotato Technologies in Africa (VISTA) Tanzania project. It is based on a quantitative study conducted in July 2016 in the seven districts that make up the project intervention area. The report offers insights on 14 sweetpotato markets operating in the project area and focuses on sweetpotato production trends, supply and demand, as well as traders' and consumers' practices and perceptions of the growth of the sweetpotato sub-sector. This will assist in refining the development of sweetpotato marketing strategies in the project intervention districts, especially in regard to supporting commercial OFSP farmers to expand the market for their produce, and in widening the consumption and utilization of the nutritious OFSP. This report provides lessons for interventions with objectives similar to those of VISTA-Tanzania.

1.1 Background

The VISTA-Tanzania project aims to expand the production and utilization of nutritious OFSP in seven districts in Tanzania in Mbeya, Iringa and Morogoro regions, which are part of USAID’s Feed the Future zones of influence. VISTA-Tanzania seeks to contribute to improved dietary diversity, food security and incomes in Tanzania, especially among households with children under five years of age. It seeks to expand the production, consumption, storage, utilization and marketing of OFSP and its products. It also aims to create financially viable sweetpotato seed and root enterprises. Understanding the production, marketing and consumption of such novel commodities is imperative to achieve some of these project objectives.

A rapid market assessment was conducted in line with VISTA-Tanzania project’s objective 3 to address the pertinent questions listed below related to the achievement of the target “that root producers and traders utilize improved storage and marketing of fresh OFSP roots”:

- What is the existing and projected demand of fresh sweetpotato roots in the market?
- How much sweetpotato is supplied to the major district markets and what is the projected future supply?
- What are the sweetpotato consumption trends?
- What is the perception of OFSP amongst traders and consumers?
- What attributes drive the demand for and purchase of sweetpotato?
- What strategies can the project adopt to position the large OFSP farmers in the market?
- What are the existing gender-based issues that have to be taken into consideration to ensure that marketing strategies equitably benefit both men and women value chain actors?

This report addresses these issues with the aim of supporting the project to develop and strengthen sweetpotato marketing strategies as this objective is operationalized and rolled out in the intervention districts.

1.2 Methods and tools

This study adopted the rapid market appraisal (RMA) approach (Bernet et al., 2006), which allows the rapid assessment of a specific market to determine the commercial potential of a new or existing product or service. This approach was considered appropriate for this study because in many areas OFSP was fairly new and had not been fully commercialized, compared with other sweetpotato types or other common agricultural commodities. The study was conducted in Iringa, Mbozi, Ulanga, Wanging’ombe, Mufindi, Mbozi and Gairo districts in Tanzania, constituting the project intervention area. In each district, two markets were visited, and a total of 328 individuals were interviewed, as detailed in Table 1.

Table 1: Study participants in the project districts in Iringa, Mbeya and Morogoro regions in July 2016

Participant category	Men	Women	Total
Traders	35	114	149
Consumers	48	114	162
District agricultural, irrigation and cooperative officers	4	1	5
Market masters	9	2	11
Processors	1	0	1
Total	99	231	328

Two quantitative tools were designed and used to collect data from traders and consumers. A checklist type of a tool with question guides was used for the key informant interviews.

Sweetpotato trader study participants were recruited through the market masters, who assisted in identifying and mapping them. Consumer interviewees were recruited on the spot as they bought sweetpotato products, with the assistance of the traders. All the interviewees, i.e. the traders, consumers and local government officials, were informed that participation in the study was voluntary and that declining to participate would not result in any penalty.

Data were analyzed using Stata version 13.

2. Findings

2.1 Sweetpotato production

Sweetpotato did not feature amongst the key cash crops grown in the study area, which included paddy rice, potatoes and maize. The main cash crops were maize, sunflower, Irish potatoes, paddy rice and timber, while the food crops were maize, Irish potatoes, sweetpotatoes and vegetables.

In Iringa and Mbeya regions sweetpotato was previously not considered as a source of cash income but as a security food crop for drought periods. It was not ranked amongst the three most important crops in any region. It was commonly eaten at breakfast, though it was also popular among Muslim communities as a basic component in 'futr', a food for breaking the fast during the fasting period or Ramadan. Commercialization efforts were just beginning in the project intervention districts. In Ulunga district, for example, people from the Sukuma tribe were producing sweetpotato in large quantities and later preserving it for use the drought period because it was their traditional food. In Iringa district, while other food security crops failed due to the changes in agroecological climatic patterns sweetpotato was resilient hence bridging the hunger gap. In Mufindi district, the major sweetpotato production areas included Sadani, Ikweha, Wintandula and Mbalamaziwa wards. Farmers mostly grew sweetpotato for home consumption but sold the surplus in local markets within their districts. Farmers also sold fresh sweetpotato roots by the roadside alongside other fresh agricultural products. The months of March to May were noted as the peak periods for sweetpotato harvesting in Mufindi.

Most farmers in the project districts indicated that they grew the local variety commonly known as deji. New OFSP varieties had recently been introduced in the districts. In Mufindi district, the district agricultural, irrigation and cooperative officer revealed that the local government was actively promoting OFSP and had established contacts with the tissue culture laboratory in Arusha to supply clean planting materials that were then distributed to farmer groups. Promotion of OFSP was in its early stages in the other districts and farmers and consumers hardly knew about it.

2.2 Sweetpotato business and trade

2.2.1 Sweetpotato market structure

Sweetpotato produce markets varied in size, structure and nature of operations. For the purposes of this study, they were categorized as large, medium and small and accordingly profiled.

The Iringa Municipal market was large, well structured and organized. It handled the highest volume of sweetpotato among the study sample. Each agricultural commodity traded in this market was allocated a specific zone for its offloading, wholesaling and retailing. In addition, the municipality had specific wholesale points for the various commodities where retailers from other markets came to buy from the wholesalers. There were two registered sweetpotato traders, but in the peak season a few more, sometimes up to five, could come and trade in the market area.

The Mahenge Soko la Wakulima in Ulunga district was a medium-size daily market where farmers were allowed to sell their produce directly to consumers, especially in the periods of crop scarcity. Farmers grew sweetpotatoes mostly during the rainy season but also under irrigation during the dry season. The crop from the dry season was said to be the better of the two. The farmers who supplied the market were located 5–10 km away. In the peak season farmers also supplied sweetpotatoes to traders, which they delivered either carrying them on the head, especially women, or on motorcycles, mainly the farmers with large volumes of the crop who were mostly men. The main varieties supplied were kilombero and deji, a local landrace that is disappearing due to pest and disease pressure.

The Kalenge Market in Iringa district was a small daily market in which 55 traders operated, 7 of whom specialized in sweetpotato. Farmers located 20–30 km from the market were the major suppliers of the commodity. In the peak season, farmers delivered fresh sweetpotato roots to the traders, but during the lean period, when the produce was scarce and was considered precious, the traders picked it up from the farm

gate. The terms between the traders and the farmers were agreed upon on the phone before the traders travelled to pick up the sweetpotato.

2.2.2 Sweetpotato traders

Among the 149 traders involved in the study, 39 were from Iringa, 43 from Morogoro and 67 from Mbeya. Retailers constituted the largest proportion of the traders in all the regions, accounting for 76% of the total (Fig. 1). Next were traders with dual functions, at 13%, and wholesalers, at 8%. Women dominated both the retail and wholesale functions, accounting for 77% and 63% of the traders, respectively. This helps explain the perception of sweetpotato as a woman’s crop. For 88% of the traders, primary schooling was the highest level of education attained.

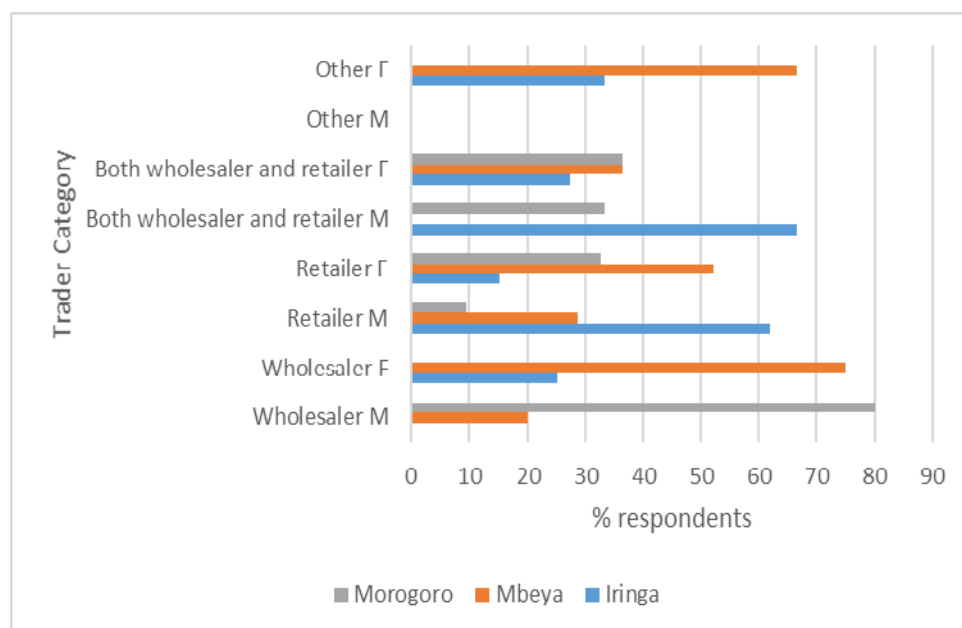


Figure 1: Types of sweetpotato traders operating in the main markets in Iringa, Mbeya and Morogoro regions by sex category in July 2016

Besides sweetpotato, 51% of the traders revealed that they dealt in other commodities including cassava, as the most important, followed by bananas, then beans and then maize.

2.2.3 Sweetpotato supply

The most common source of fresh sweetpotato roots for the large markets was Songea region. For example, sweetpotatoes in Iringa were mainly obtained from Ruvuma region in Songea and were packed in 100-kg bags. Other supply areas included Pawaga and Kilolo in Iringa. According to the market master, when the sweetpotato production season in Songea ended, supplies were obtained from the other areas, but the quantities were smaller. Makambako market sourced its sweetpotatoes from Mufindi district in Nyigu village, Njombe, Songea, Idofu and Wanging’ombe, as well as from its own locality, though these quantities were small. The sweetpotatoes sold in Mufindi mostly came from Njombe or Songea. Some 89% of the traders obtained their sweetpotato supplies directly from farmers, while the rest relied on agents and wholesalers. In Ulanga sweetpotatoes were sourced from within the district, mainly from smallholder farmers. Generally the smaller markets were supplied with sweetpotato by farmers located within a radius of 10–15 km of the market. Considering that the distance between Songea and the main sweetpotato markets in Iringa and Mbeya regions is long, there is unexploited market potential within the project intervention districts that the farmers need to exploit by increasing their sweetpotato production.

2.2.4 Sweetpotato varieties traded

Both OFSP and white-fleshed sweetpotatoes were traded by their local names. The market masters revealed that the varieties in many markets were mixed during village level aggregation and so one could buy a heap with both types. The market masters in Iringa and Ulanga reported that OFSP was the most preferred variety because it was tasty and mealy, especially when roasted. However, nearly all the traders (93%) mostly traded in white-fleshed varieties followed by yellow-fleshed types (68%). OFSP was traded by only 16% of the traders. About 46% of the traders had heard about OFSP, 79% of whom were women. However, only 39% of the traders were aware of the nutritional benefits of OFSP, and mostly they had received that information through the media, but also from fellow traders.

2.2.5 Sweetpotato awareness and trends

Mufindi district had high awareness about sweetpotato, and like in the other areas sweetpotato was consumed there for breakfast and as a popular food during the month of Ramadan. The demand had grown steadily over the previous three years. According to the market chairperson in Mahenge town, Ulanga district, the demand for sweetpotato was on the rise also in that district. In her 16 years of trading in sweetpotato she had seen her clients grow in number. Most of them cooked it for breakfast and mostly preferred OFSP because of its taste and mealiness. In the market OFSP stocks always ran out faster than other types such as kilombero. In her estimate, OFSP commanded about 30% of the total volumes of sweetpotato sold in that market. Even if OFSP supply were to triple traders would still be able to sell it off without a problem because of its high demand.

Consumer tastes and preferences in Iringa Municipality market were reported to be dynamic. Some people preferred yellow-fleshed sweetpotato while others preferred the white-fleshed variety. The current trend was that consumers chose to have sweetpotato other than bread for breakfast, the reason being that sweetpotato provides satiation for a longer time than bread. As in the other locations sweetpotato demand was highest during Ramadan, though generally it seemed to have increased in the other months as well.

Sweetpotato was not popular in Iringa and Kalenga during the late 1990s but this has changed over time and the crop's demand and consumption are on the increase. According to the market master, even if supply were to double in the future the traders would easily sell the sweetpotatoes with minimal impact on their gross margins. However, tripling production would have to be done in a phased manner to ensure consistent supply to the market. For example, farmers would plant a new crop every two months to level out gluts and spikes in supply. In instances of oversupply the sweetpotatoes would be delivered to other markets, and this would not depress the demand in Iringa Municipality market.

2.2.6 Sweetpotato trading periods and volumes

The key informant interviews revealed that slight variations existed in the peak trading periods across the three regions. The peak trading months in Iringa were April to early June, when 50–60 bags were delivered to the market on a daily basis, according to the market master. Retailers bought the sweetpotato roots by the bag and sold them in heaps, obtaining on average about 40 heaps from a bag. Each heap comprised four to five roots and sold for Tsh 1,000. The low supply period stretched from July to March and deliveries were reduced to as low as 10–30 bags a day. Retailers maintained the price of the heaps but reduced the size and number of roots per heap. Generally retailers incurred small losses and hardly threw away any roots.

The peak sweetpotato trading months in Mufindi were May to July, with the highest sales occurring in June. In the peak period the Mafinga upper market received about 15 bags of sweetpotatoes a week while the lower market received almost twice that. Each full bag contained 8 tins (20 L plastic bins) of sweetpotatoes and cost Tsh 50,000 at wholesale. Retailers sold by the heap. On average each tin sold for Tsh 8,000, generating a gross profit of Tsh 14,000 per bag.

The low season in Mufindi district stretched from August to April and saw deliveries drop by about 30% in the two markets. During that time the 8-tin bag cost Tsh 75,000 and deliveries went down to as low as 10–30 bags a day. The retail price per tin rose to Tsh 10,000. Retailers could increase the number of heaps per bag by

reducing the heap size, but they left the price per heap unchanged. The gross profit in this case was estimated at Tsh 15,000–20,000 per bag.

In the smaller markets sweetpotatoes were sold in 20 L and 10 L plastic containers. On average, a retailer trader would obtain 20–30 heaps of sweetpotatoes from a 20 L container, but this varied with the season and fresh root availability. Traders purchased a 20 L container of sweetpotatoes for Tsh 8,000 to Tsh 10,000 and sold it for Tsh 15,000 to Tsh 20,000, while heaps went for Tsh 500 to Tsh 1,000. The gross profit per a 20 L container was estimated at Tsh 5,000 to Tsh 10,000.

2.2.7 Terms of sweetpotato trade

Generally, sweetpotato retail traders had some form of informal agreements with their suppliers. This had largely been facilitated by the increased use of mobile phones, which assisted in making trade operations more efficient. The nature and terms of trade varied from region to region.

According to the market masters in Iringa and Morogoro regions, traders had close relationships with suppliers, and they communicated on the phone and agreed on delivery volumes and prices. They did not have formal contracts. Traders in Iringa district had to pay taxes as a prerequisite for trading in the markets. A new trader or supplier would have to do some groundwork to understand how the market operated before being allowed entry, though the barriers to entry were not stiff. Once all the paper work was done, the trader was free to sell sweetpotato to retailers from these or other markets.

In Ulanga district farmers selling sweetpotato to traders were paid on delivery, but some farmers allowed partial credit and some traders advanced payment to farmers before the farmers delivered the roots, especially during Ramadan.

In Mufindi district sweetpotato suppliers maintained contact with aggregators and wholesalers by phone. Suppliers preferred to deliver the same volume of sweetpotatoes each time regardless of the season, so in the low season they made fewer deliveries. This may be attributed to the high transport costs associated with the long distances between sweetpotato farmers and markets. About 75% of the traders revealed that they dealt directly with farmers and consumers. Payment terms were cash on delivery for 80% of the traders, and 43% of them pre-agreed on the price before the produce was delivered by farmers.

2.3 Analysis of sweetpotato supply and demand based on traders' perceptions

2.3.1 Peak months of sweetpotato demand

According to the traders, the months with the highest supplies of sweetpotato were June to August for Iringa region, with the peak being in July; April to June in Mbeya region, peaking in May; and May to July for Morogoro, with the peak in May.

2.3.2 Varieties of sweetpotatoes traded in the peak months

White-fleshed sweetpotatoes were the most commonly traded types across the region followed by mixed varieties, while yellow-fleshed and OFSP varieties were the least traded (Fig. 2). This agrees with the assessment by the market masters (see section 2.2.4). The data show that OFSP was traded by only 5% of the traders in each of Mbeya and Morogoro regions. The trend was similar when the data were categorized by sex, and only women reported to have sold OFSP, and even then only 4% of them did. Women also led in the business of white-fleshed sweetpotatoes (Fig. 3). Men sold more yellow-fleshed sweetpotato than women did, while trade levels in mixed varieties were similar for the two sexes. These results may have a bearing on the choice of promotion strategy that the project will adopt.

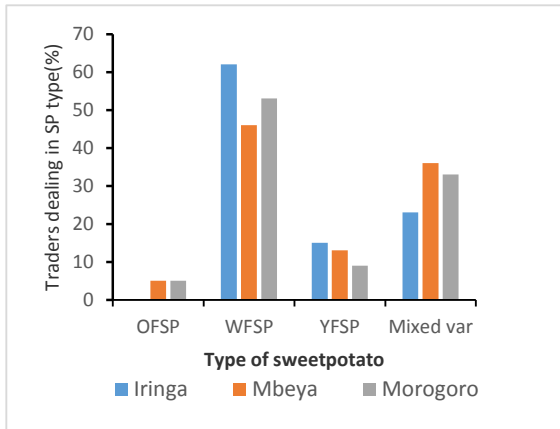


Fig. 2: Traders dealing in sweetpotato type by region

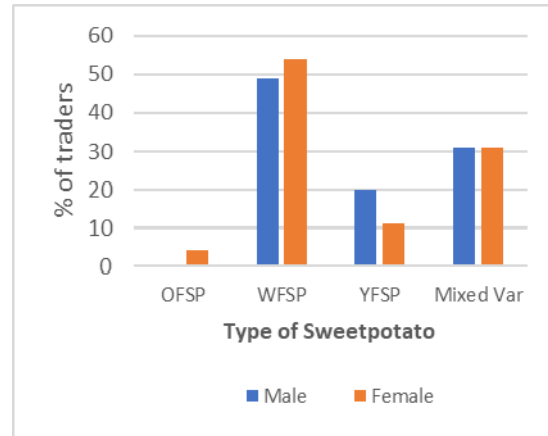


Fig. 3: Male and female traders dealing in sweetpotato

2.3.3 Main sources of sweetpotato in the peak months

The farm gate was the most popular source location for sweetpotato across the regions, accounting for more than 75% of the fresh root obtained for trading (Fig. 4). More men than women regarded the farm gate as the most important source for sweetpotato. Although the difference is not large, it could be attributed to the higher mobility difficulties women faced compared with men and may have had an effect on the volumes and quality of sweetpotato sourced, especially during the periods of scarcity. Women had to resort to open markets and other sources for the roots to counter this challenge (Fig. 5). And they may also have had to pay higher prices for the produce in circumstances where they did not buy directly from the farm gate and had to depend on wholesalers and intermediaries. In such cases, they were likely to have much lower gross margins than men did.

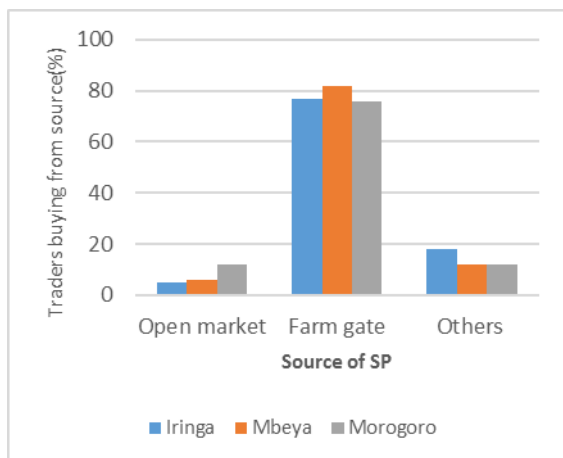


Fig. 4: Major sources of sweetpotato traded by region

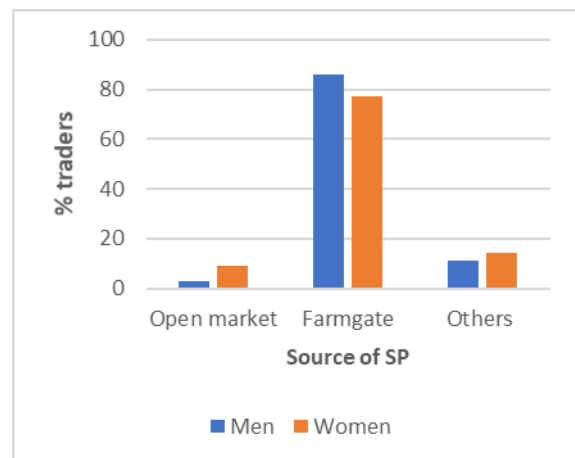


Fig. 5: Major sources of sweetpotato for female and male traders

2.3.4 Means of transporting sweetpotato to the market in the peak months

The most common form of transport for sweetpotato was the bicycle in Iringa and Mbeya and the ox cart in Morogoro (Figs 6 & 7). Morogoro had the most traders using a means of transport falling under the uncategorized group, followed by Mbeya. Transport types falling under that category were the most common means for these two regions.

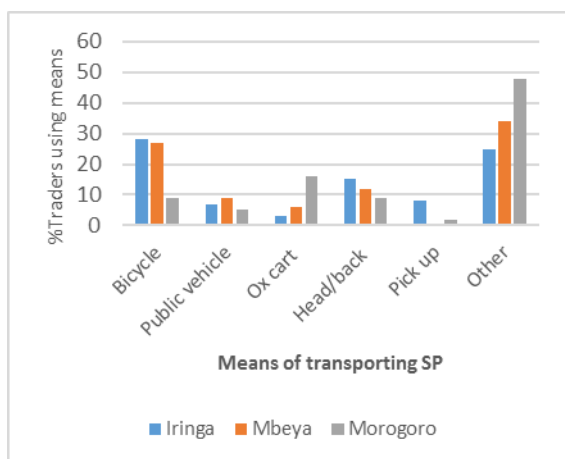


Fig. 6: Means of transporting sweetpotato traded by region

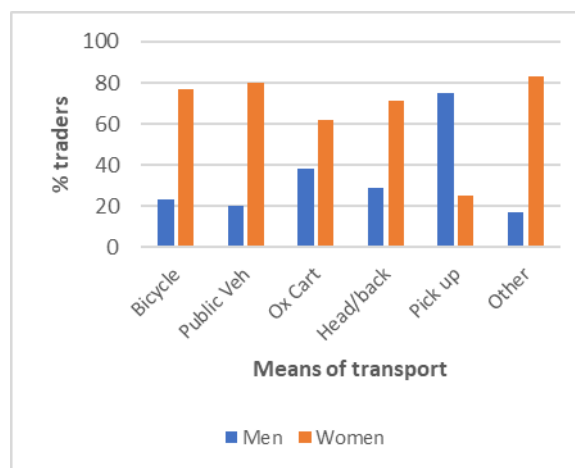


Fig. 7: Means of transporting the sweetpotato traded by male and female traders

The most common method women used for transporting sweetpotatoes were public vehicles and bicycles. But carrying them on the head or back also was common. Many women acknowledged using the forms of transport categorized as ‘other’. Men mostly used pick-up trucks or ox carts. The means of transport clearly has a bearing on the volumes one can purchase and the size of his or her operation, given the bulky nature of sweetpotato roots. Thus, men were more likely to trade in larger volumes of sweetpotato and exploit economies of scale, which women might have found hard to do.

2.3.5 Unit of purchase and average volumes traded

In Iringa and Mbeya more than 60% of the sweetpotato traders used the 20 L plastic bin as their most common unit of measure in the peak months. The 50 kg bag and the 100 kg bag were next in importance in Mbeya and Iringa, respectively. In Morogoro the most common unit of purchase was the 100 kg bag, which was used by 53% of the traders. Some 52% of the traders across the three regions considered the 20 L container as the most common unit of purchase. While there was no significant difference in the unit of purchase between the sexes, at 79% the proportion of women reported to be using the 20 L containers was higher than that of men. This was also the case with the 100 kg bag, at 64%, and the 50 kg bag, at 90%.

During the months of sweetpotato scarcity the most common unit of measure remained the 20 L plastic bin, but it was used by only 48% of the traders across the three regions. More women than men used the most preferred units of measure: the 20 L bin, the 100 kg bag and the 50 kg bag.

The mean volume of sweetpotato purchased in the peak seasons by traders in all the regions was 35.6 kg per month. This went down to 25 kg per month in the low seasons. The mean volumes purchased by season and sex are given in Table 2.

A t-test revealed that male traders on average traded significantly higher volumes of sweetpotato than the female traders in both the peak and low seasons (Table 2). In addition, the number of women trading in the low season was reduced by 7%, which could be attributed to the female traders’ lower mobility levels, which limited their ability to travel in search of produce, as well as their low capital base.

Table 2: Average sweetpotato volumes purchased by traders by season and sex

Season	Variable	Observations	Mean (kg)	Std. error	t-value
High season	Male traders	33	76.0	20.8	0.0001
	Female traders	107	23.2	3.0	
	Combined	140	35.6	5.7	
Low season	Male traders	33	51.8	16.2	0.0012
	Female traders	99	15.9	3.3	
	Combined	132	24.9	4.9	

2.3.6 Average prices paid

Some 41% of the traders indicated that during the peak months they purchased the 20 L plastic bin of sweetpotatoes for an average of Tsh 5,000. For 49% of the traders the cost of the 100 kg bag in the peak season ranged between Tsh 35,000 and Tsh 50,000, while for 36% of the traders the price for the 50 kg was Tsh 10,000. Like with other agricultural produce, sweetpotato prices fluctuate across seasons with wide variability between rainy and dry seasons, especially if the dry season is longer. In some markets the traders noted that for non-standardized units of measure such as the 20 L plastic bin the price of the sweetpotatoes was kept constant but their quantity was varied.

2.3.7 Sweetpotato clients

In both the peak and low seasons the most frequent clients for traders across the three regions were the final users, constituting over 80% of the customers (Fig. 8). There was a significant ($p = 0.1$) difference between the number of female and male traders selling to a particular type of client (Fig. 9).

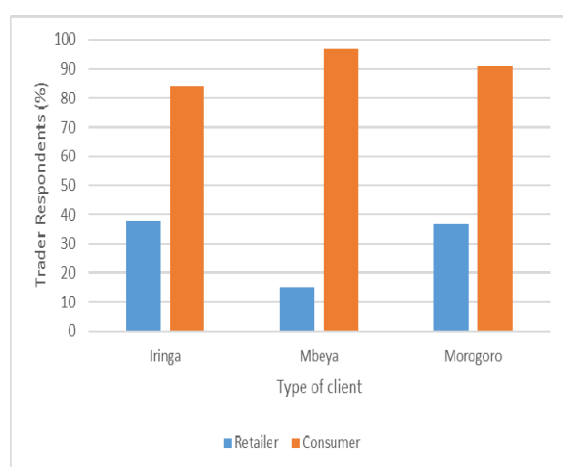


Fig. 8: Type of sweetpotato customers by region

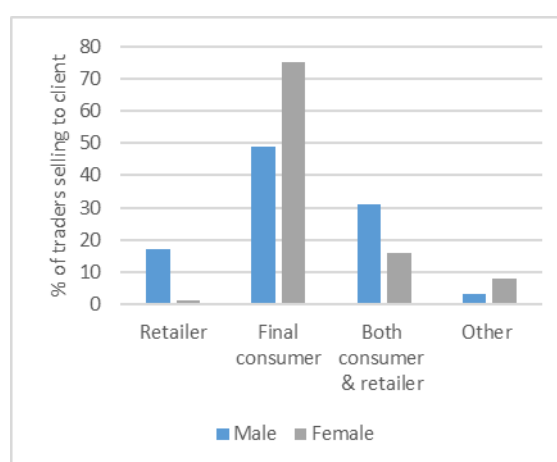


Fig. 9: Type of sweetpotato customers by sex

While male traders were able to sell sweetpotato to retailers, and probably in high volumes and for good profit margins, female traders were largely confined to the consumer market, especially in the peak periods. They moved to even less profitable markets in the low production periods, and 8% of them reported selling sweetpotato to a myriad of low income buyers and sometimes not selling any at all.

2.3.8 Price per sweetpotato unit and volumes sold

The most frequently used unit of sale across the three regions was by the heap, which 73% of the traders mentioned using. Iringa and Mbeya regions had the highest proportions of traders selling sweetpotato by the heap, at 83%, which were significantly higher ($p = 0.001$) than for Morogoro. However, Morogoro was the only region where sweetpotato was sold in 100 kg bags, which indicates that it had high value buyers (Fig. 10).

There was a significant difference ($p = 0.001$) between the type of unit of sale that the male and female traders used. This could have a bearing on the type of clients traded with. Male traders were able to sell sweetpotato to clients demanding it in high volumes such as 100 kg bags, which no female traders could. More than twice as many male traders than female traders sold sweetpotato by the 20 L container (Fig. 11). Female traders mainly sold sweetpotato by the heap, which was the least volume and which had the least value.

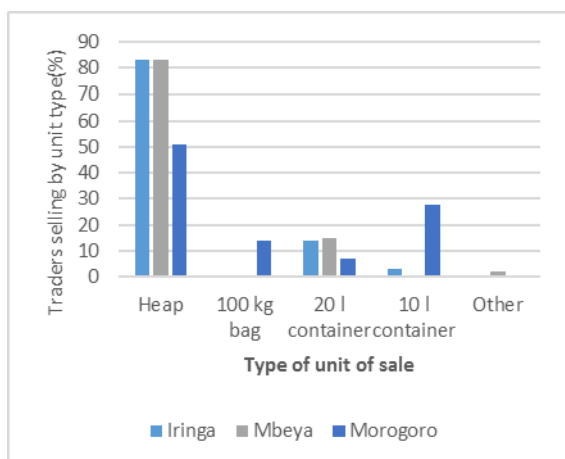


Fig. 10: Type of unit of sale in the regions

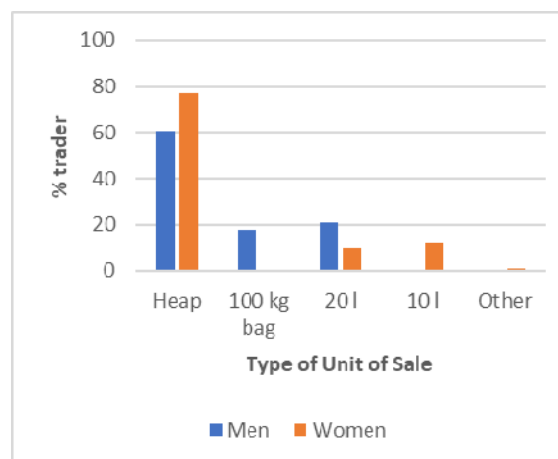


Fig. 11: Type of unit of sale used by male and female traders

The volume of sweetpotato sold per month across all the three regions in the low season averaged 161 kg. Table 3 shows the volumes sold in the lean sweetpotato harvesting season differentiated by the sex of the trader.

Table 3: Average sweetpotato sold monthly in the lean harvesting season in July 2016

Variable	Observations	Mean (kg)	Std. error	t-value
Male traders	32	180.3	39.3	0.46
Female traders	99	154.6	15.3	
Combined	131	160.9	15.0	

Though male traders were able to sell more sweetpotatoes than were female traders, the difference was not significant ($p = 0.46$). However, this dataset may need to be investigated further since it does not tally with the data on sweetpotato purchases by traders (see Table 2).

2.3.9 Sweetpotato marketing costs

For sweetpotato traders, transportation, packaging and storage, as well as market fees and promotion constituted the common marketing costs in the course of the sweetpotato business.

The study asked the traders to rate sweetpotato trade costs as high, moderate or low, and 49% of the 143 traders interviewed considered the packaging cost to be high, while about 55% of 110 traders considered market dues as high. Transport costs were seen as high by 43%, while loading and offloading costs were perceived to be high by 57% of the 131 traders who incurred those costs. Among the 117 traders interviewed on this question, 81.8% regularly incurred storage costs while 108 (75.5%) had spent money on sweetpotato promotion activities. There were no significant ($p = 0.10$) differences between the costs incurred by female and male traders, although there were more female traders across all the cost categories. This fact may be attributed to women's greater participation in sweetpotato marketing, particularly in retail trade.

2.3.10 Trends in and frequency of sweetpotato trade

The majority of the traders, and mostly female traders (Fig. 12), purchased sweetpotato for sale two to three times a week, particularly in Mbeya (Fig. 13). Male traders represented the highest proportion (31%) of those who bought sweetpotatoes once a week.

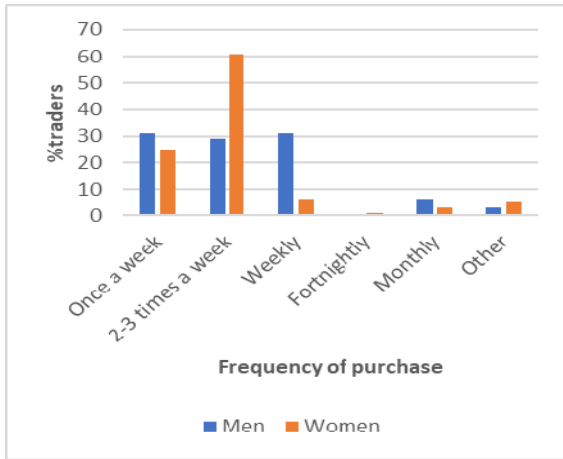


Fig. 12: Frequency of sweetpotato purchase by female and male traders

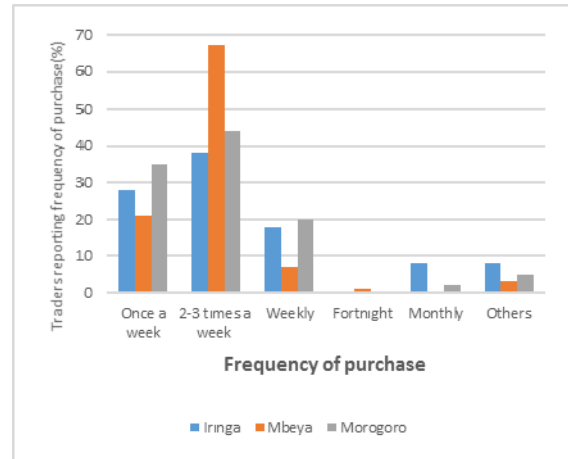


Fig. 13: Frequency of sweetpotato purchase in the regions

Female traders purchased sweetpotato more frequently than male traders did ($p = 0.001$). This could be attributed to the nature of the trade, where women were mostly retailers, as well as the scale of operation. Women bought smaller volumes but were likely to have higher turnover than men. Over 60% of the traders indicated that they did not purchase OFSP at all.

With regard to the perceptions of the general trend of sweetpotato trade in the previous three years, 63% of the traders across the three regions saw it as growing, but 32% of the traders in Morogoro were of the view that it was declining (Fig. 14). Overall, 71% of the male traders perceived the sweetpotato business to have grown, compared with 62% of the female traders. On the other hand, 23% of the male traders considered the trade as declining compared with 19% of their female counterparts (Fig. 15).

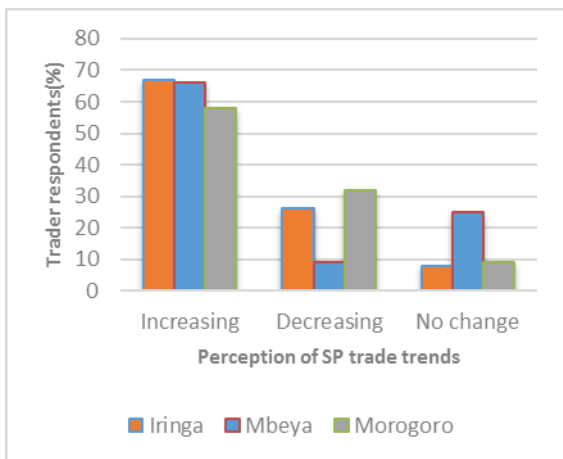


Fig. 14: Perception of sweetpotato trade trends in the past three years by region

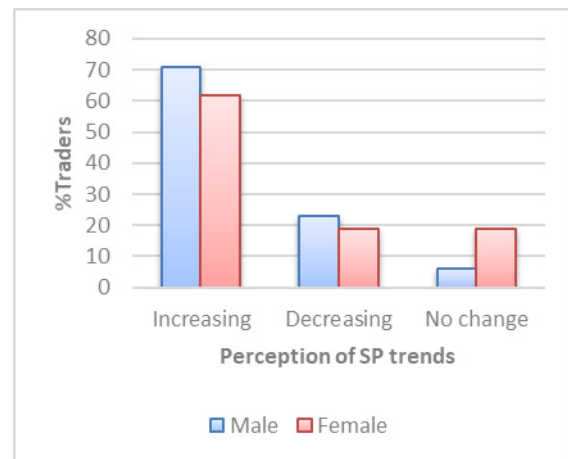


Fig. 15: Perception of sweetpotato trade trends in past three years by male and female traders

The difference in perceptions could be attributed to the increased participation of male traders in the sweetpotato trade, which had hitherto largely been dominated by women. Men were more dominant in the sweetpotato wholesale business. Data showed that 88% of all the traders regarded the demand for OFSP as growing. Those who had the opposite view mainly cited the lack of information about OFSP as the main driver for its low demand (61%) followed by its general absence in the market (Fig. 16). These reasons provide an impetus for actively promoting OFSP in the markets in the project intervention districts. Promotional messages targeting traders and addressing the lack of information on OFSP and its poor availability in the market would be imperative to improve its market and utilization.

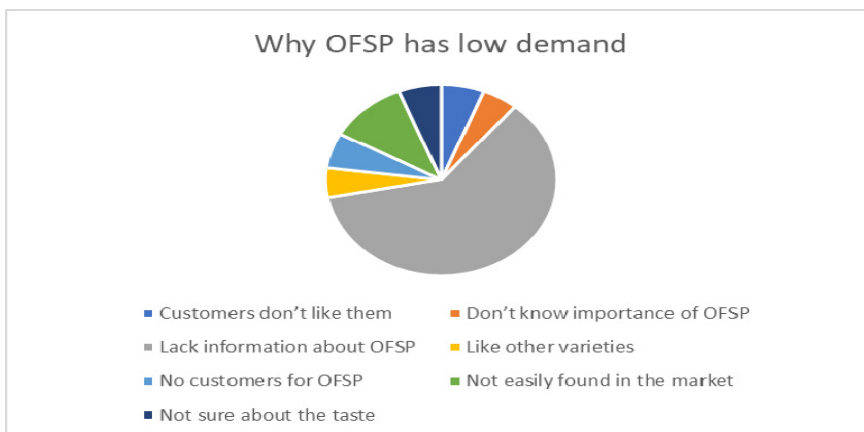


Fig. 16: Reasons cited for the low demand of OFSP by consumers

2.3.11 Social networks and business development

Purchase and sales contracts

Data showed that 65% of the sweetpotato traders had made contractual arrangements with suppliers in advance of the produce delivery. For 62% of these traders the contracts focused on the quantity of roots to be supplied while for 59% of them the frequency of delivery also was included in the contract. However, by nature the contracts were not formal but more of a gentleman's agreements and were not legally binding. More male traders (74%) than female traders (62%) entered into such agreements.

Sweetpotato business promotion

Only 25% of the traders across the three regions promoted their products/sweetpotato business. However, 40% of the traders used means such as providing good customer care, repeat sales and word of mouth to attract customers.

Group membership among sweetpotato traders

Traders in Iringa and Morogoro had the highest membership in groups or associations, at 49% and 43%, respectively (Fig. 17). The most common types of groups were savings and credit associations (93%) followed by trade advisory groups (16%).

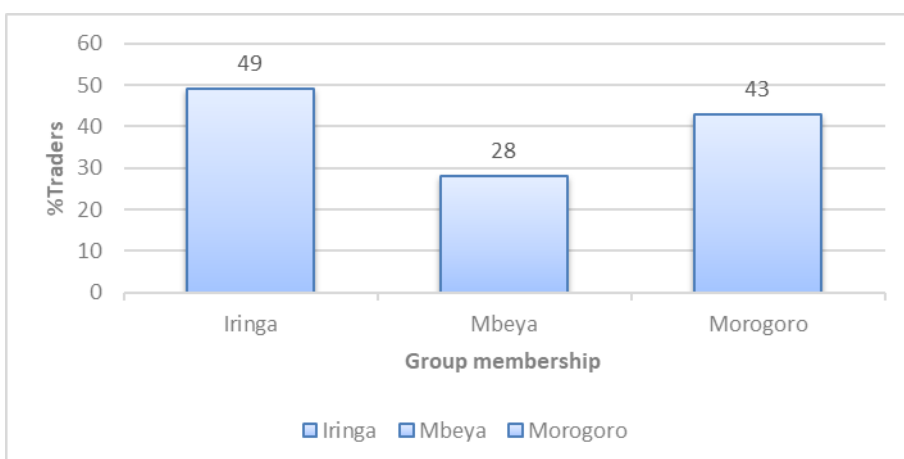


Fig. 17: Group membership among sweetpotato traders

Groups or associations ease service delivery and negotiation of business terms. In the project regions groups are likely to create a quicker avenue for entry of the commercial OFSP farmers into the trade.

Access to credit

Only 33% of the traders had received credit for their sweetpotato business in the previous year, 51% of whom were from Morogoro region. Among these traders, 88% obtained credit from SACCOs and 10% from microfinance institutions and banks (Fig. 18). Of note is that 79% of the traders who received credit obtained it from group SACCOs and were female. This implies that SACCOs are a very important source of credit for female traders, who may lack collateral, which is required to access larger credit institutions such as microfinance institutions and banks.

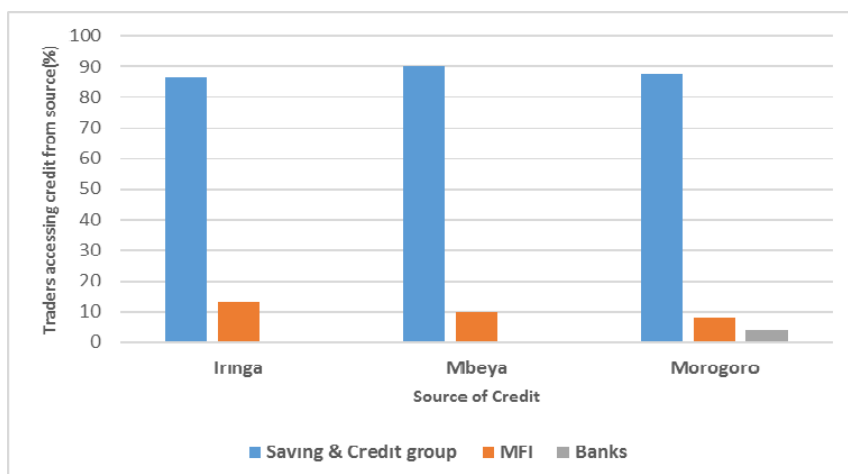


Fig. 18: Sources of credit by region

2.4 Analysis of sweetpotato demand and consumer characteristics

The assessment of sweetpotato consumption involved 162 participants, where 48 were male and 114 were female (Fig. 19).

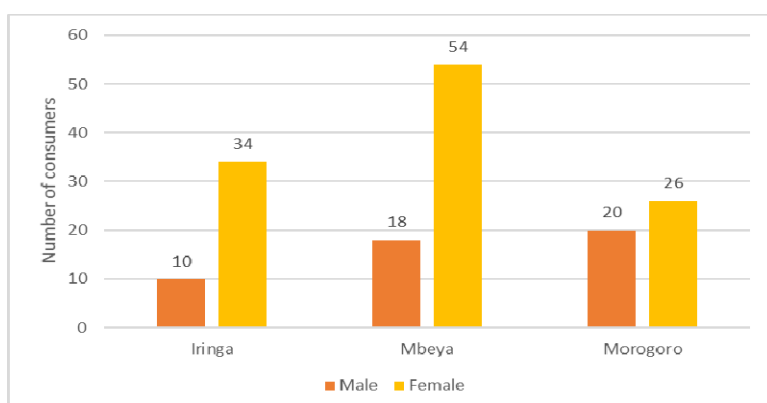


Fig. 19: Distribution of consumer respondents by region and sex

Among the sweetpotato consumers in the survey 61% had attained primary school education, 27% secondary school education and 8% tertiary education. In terms of occupation, 47% were in retail business while 34% were farmers. The sweetpotato products most consumers purchased across the three regions were fresh roots, which 99% of them bought.

2.4.1 Sweetpotato purchase and consumption patterns

Some 45% of the consumers from across the three regions purchased sweetpotato 2–3 times a week, and 31% bought it once a week. This implies that at least 76% of the consumers purchased sweetpotato once a week (Fig. 20). The proportion of female consumers purchasing sweetpotato 2–3 times a week was significantly higher than that of the male consumers ($p = 0.1$), although more men purchased the roots once a week (Fig. 21).

Among the sweetpotato consumers, the commonest and most popular unit of purchase was a heap, and 90% of the respondents mentioned using it. Additionally, the number of women buying sweetpotato by the heap was significantly higher than that of men, which could be an indication of sex differences in consumer purchasing power.

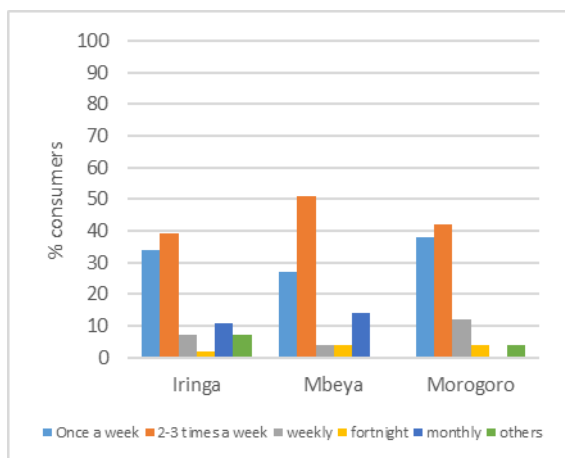


Fig. 20: Frequency of sweetpotato purchase by region

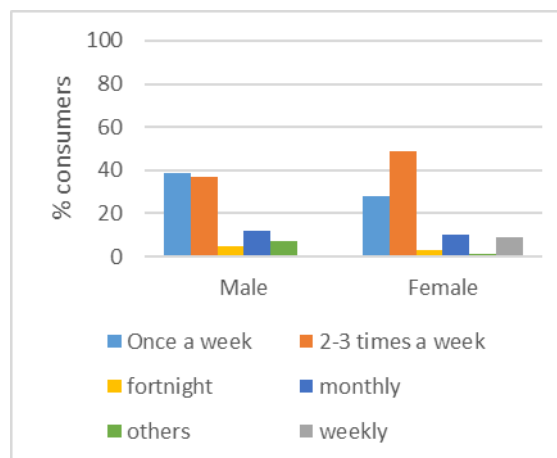


Fig. 21: Frequency of sweetpotato purchase by male and female consumers

Across the three regions, 81% of the consumers indicated that they preferred to pay medium prices for sweetpotato as opposed to low or high prices. Some 89% of the consumers bought the fresh roots from the open market while 9% bought their sweetpotato from the farm gate.

2.4.2 Purchase and consumption of OFSP

About 33% of the consumers had bought OFSP in the past, with most of them coming from Mbeya and Morogoro regions (Fig. 22). More women than men had bought OFSP, but more men, at 42%, than women, at 32%, had consumed OFSP in the past (Fig. 23).

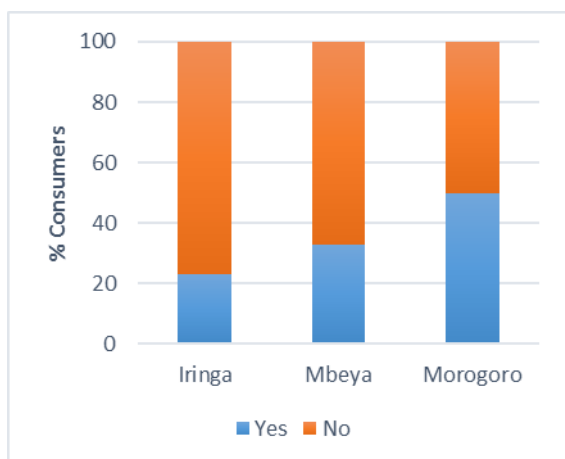


Fig. 22: Sweetpotato consumers who had ever eaten OFSP by region

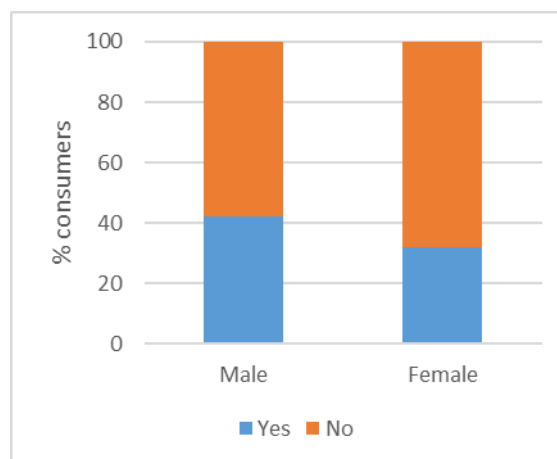


Fig. 23: Sweetpotato male and female consumers who had ever eaten OFSP

All the respondents who had ever eaten OFSP indicated that they had consumed it in its root form and had never tasted processed OFSP products.

2.4.3 Traders' and consumers' perception of attributes that influence sweetpotato purchase decisions

Root size

The majority of traders (77%) across the three regions perceived root size as a very important attribute for customer decision on whether to buy fresh sweetpotato roots. This was true for both male and female traders, as well as for consumers across the three regions, 80% of whom preferred large roots. The variation in sweetpotato root size preferences between traders and consumers was most pronounced in Mbeya region, where large roots were favored by 70% of the traders against 92% of the consumers (Figs 23 & 24).

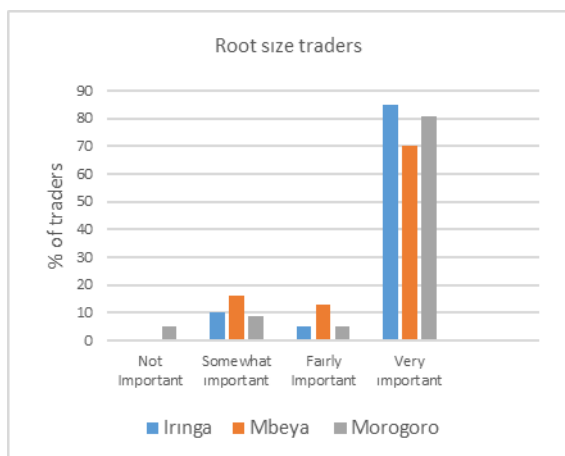


Fig. 24: Traders' perception of the importance of root size by region

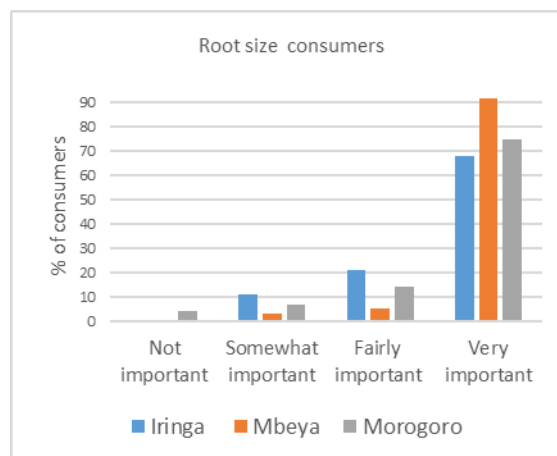


Fig. 25: Consumer perception of the importance of root size by region

Harmonizing traders' and consumer's preferences on sweetpotato root size may call for interventions to improve postharvest handling, specifically grading and sorting, to ensure that clients' needs are met. This would imply that producers would also have to take these practices as long-term measures to improve sweetpotato gross margins at each node of the value chain.

Skin color

Sweetpotato skin color was considered a very important quality attribute by 73% of the traders across the three regions and as the attribute most cherished by customers, especially female traders. It was also a very important purchase factor for 81% of the consumers in the three regions. In Mbeya and Iringa, root skin color was more important for consumers than for traders (Figs 26 & 27). This difference was not present in Morogoro. The most preferred root skin color was red/pink, which was favored by 75% of the consumers, followed by white.

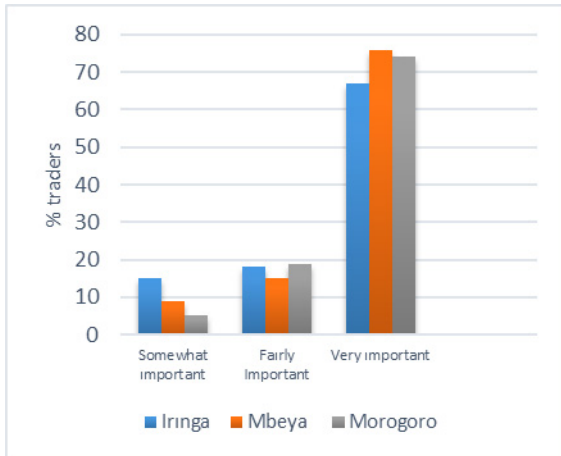


Fig. 26: Trader perception of the importance of sweetpotato skin color by region

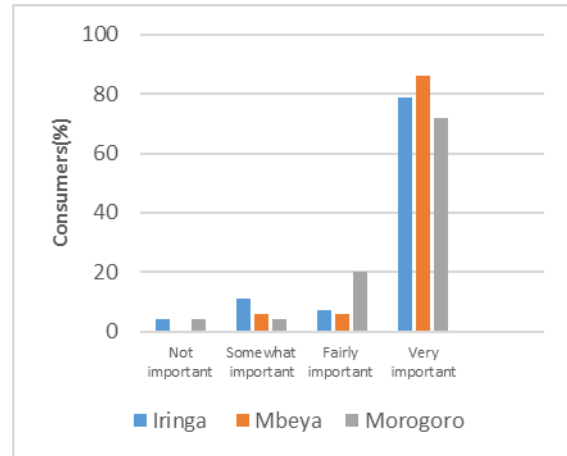


Fig. 27: Consumer perception of the importance of sweetpotato skin color by region

Flesh color

For 72% of the sweetpotato traders across the three regions, flesh color was an important attribute that customers considered before purchasing fresh sweetpotato roots (Figs 28 & 29). Data show that 76% of the consumers preferred yellow-fleshed roots, while 51% of the consumers preferred white-fleshed varieties. Of the 16% of the traders who preferred orange-fleshed roots most were female.

Only 46 consumers considered root flesh color as important, representing 28% of the total sample size. Amongst this group 83% deemed it a very important purchase factor especially in Iringa (Fig. 29). For 89% of the consumers in the sample, the yellow-fleshed sweetpotato was the most desirable. Next were white varieties followed by orange types. Clearly, OFSP was not a favored type among the consumers.

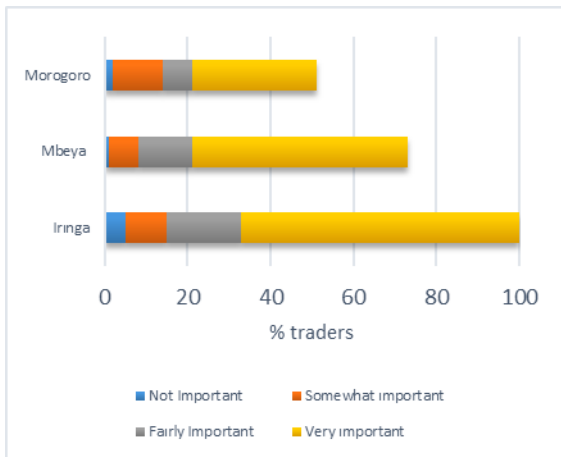


Fig. 28: Trader perception of the importance of flesh color by region

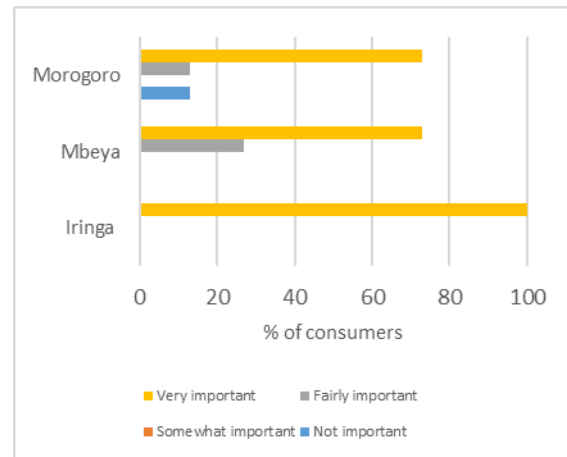


Fig. 29: Consumer perception of the importance of flesh color by region

Shelf life

A half of the traders interviewed considered the shelf life of fresh sweetpotato roots to be a very important attribute. There was no significant difference between male and female traders' perception of sweetpotato shelf life. Among sweetpotato consumers, 64% considered shelf life as a very important factor. There was a marked difference between the number of traders and consumers who considered this attribute to be very important (Figs 30 & 31). The plausible explanation as to why consumers did not consider shelf life important may be related to the frequency and quantity of their sweetpotato purchases in a week. If they made frequent purchases of small quantities of sweetpotatoes their need for roots with a long shelf life would be limited.

Taste

About 80% of the traders across the three regions perceived taste to be an important attribute for their clients, more so in Iringa and Mbeya regions. Within the sex categories, female traders valued this attribute significantly more than their male counterparts did ($p = 0.1$). Men had higher scores for sweet taste (74%) than women had, while women scored higher for high dry matter content (83%).

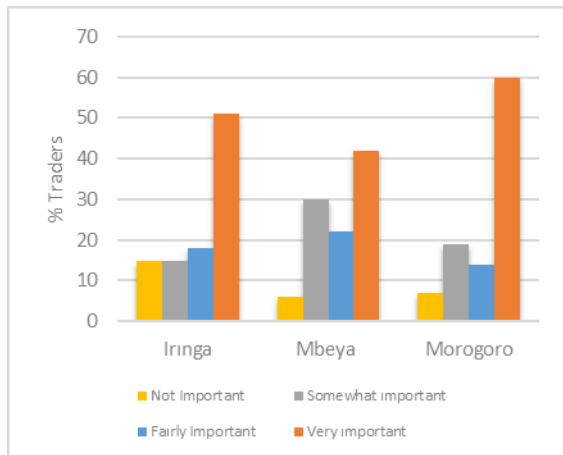


Fig. 30: Trader perception of the importance of sweetpotato shelf life by region

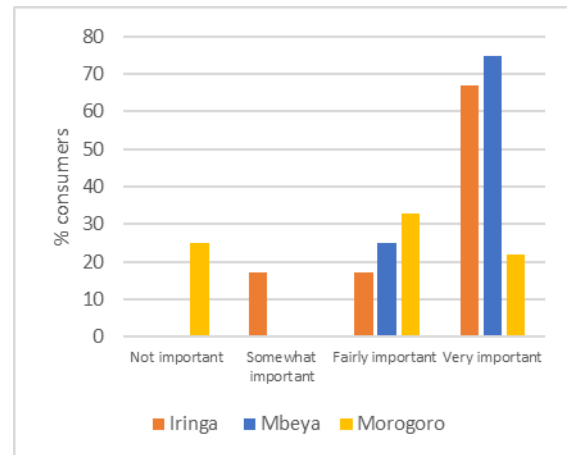


Fig. 31: Consumer perception of the importance of sweetpotato shelf life by region

Some 56% of the consumers considered taste as an important attribute that influenced their sweetpotato buying decision. High dry matter content was more favored (72%) than 'sweet' taste (67%). Only Morogoro had differences between traders' and consumers' perceptions of the importance of taste (Figs 32 & 33).

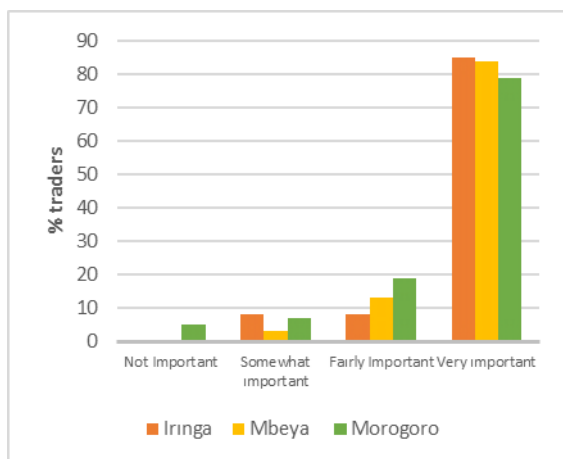


Fig. 32: Trader perception of the importance of taste by region

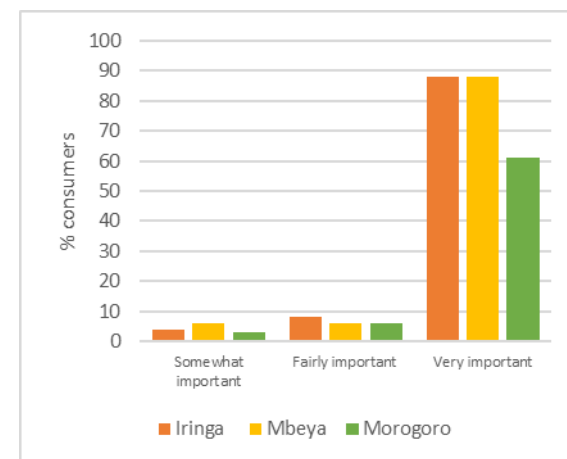


Fig. 33: Consumer perception of the importance of taste by region

Price

Price was considered to be an important purchase factor. About 54% of the traders across the three regions considered it a very important attribute. Of these, 84% believed that a medium price was a better driver of purchase than a low price, unlike 11% of the traders.

Only 27% of the consumers responded to the question on price as a factor in buying sweetpotato, and 76% of them considered price to be very important. Some 93% of the respondents favored a medium price, which is what the traders also preferred. The proportion of consumers who considered price to be a very important attribute in sweetpotato purchase was higher than that of traders (Fig. 34 & 35).

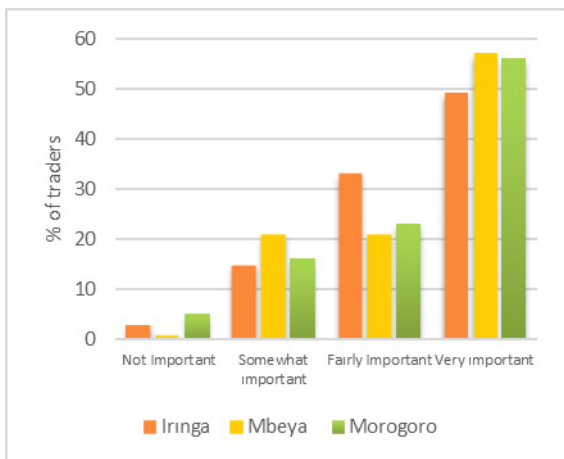


Fig. 34: Trader perception of the importance of sweetpotato price in its purchase by region

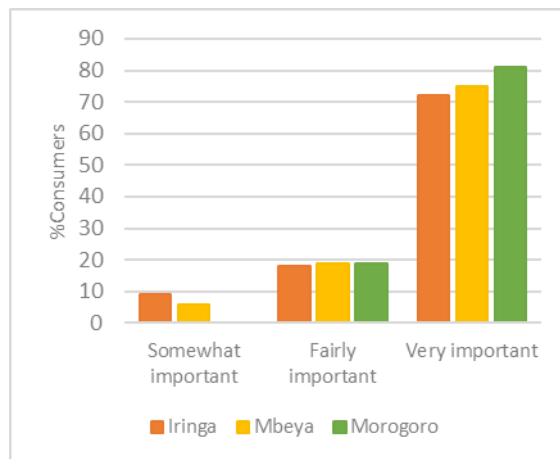


Fig. 35: Consumer perception of the importance of sweetpotato price in its purchase by region

Nutritive value

The nutritive value of sweetpotato was the attribute least perceived by the traders to be a driver in sweetpotato sales, and only 36% of them across the three regions and two sexes considered it as important (Fig. 36). This shows that sweetpotato is not traded for its nutritive attributes by either male or female traders but is treated as any other food. Awareness raising, including initiatives such as ‘Mama lishe’ (a woman who makes and sells nutritious snacks such as fried OFSP chips in the market), which has worked quite well in the Lake region, could be important strategies to include in OFSP market promotion plans.

Consumer perception of the sweetpotato nutritive value as a factor in its purchase was high (Fig. 37). Nonetheless, more efforts are needed to include behavior-change messages in the OFSP promotion campaigns as the project sets out to support commercial OFSP farmers.

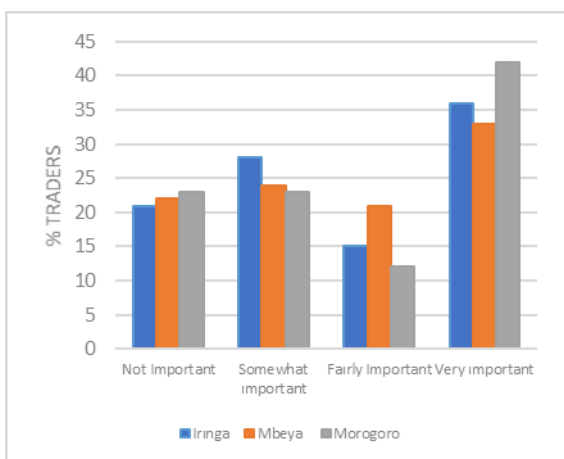


Fig.36: Trader perception of the importance of sweetpotato nutritive value

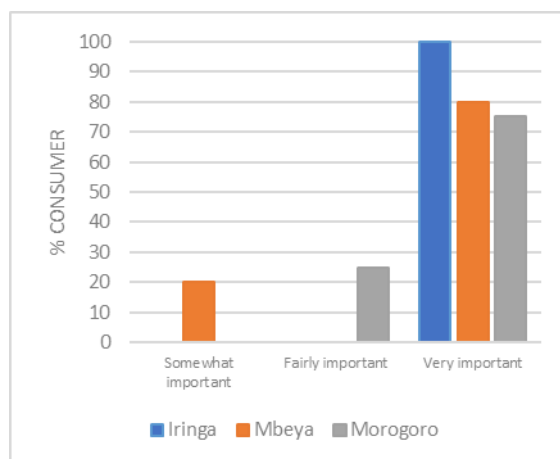


Fig. 37: Consumer perception of the importance of sweetpotato nutritive value

Extent of root damage

The extent of root damage was considered to be a fairly important quality attribute by traders, with 64% of them across the three regions rating it as very important (Fig. 38). For 85% of the consumers across the three regions, the extent of root damage was a very important purchase decision factor (Fig. 39).

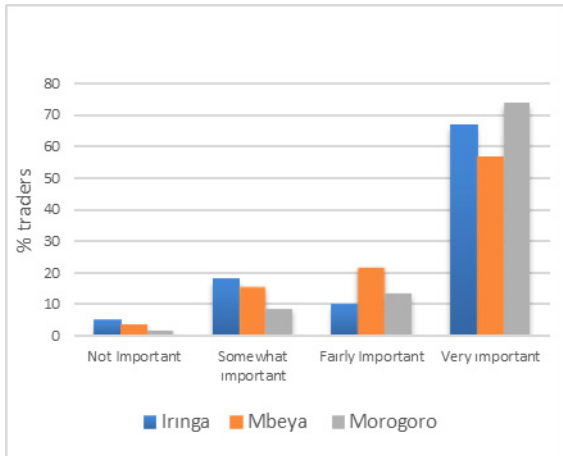


Fig. 38: Trader perception of the importance of sweetpotato root damage by region

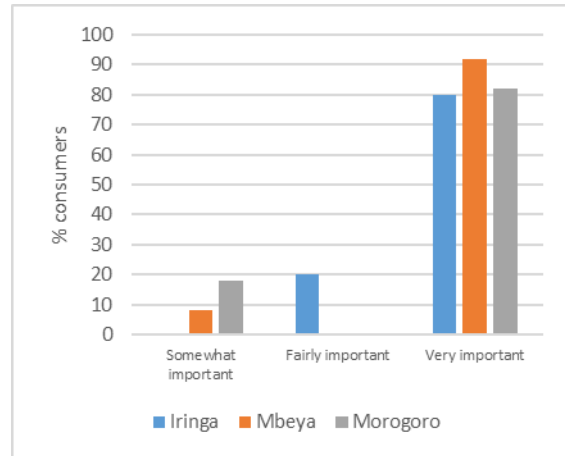


Fig. 39: Consumer perception of the importance of sweetpotato root damage by region

3. Implications of the study findings on the strategies for commercializing OFSP root trade

3.1 Positioning sweetpotato commercial farmers as potential suppliers to large markets

This study revealed that sweetpotato as an agro-enterprise is growing in significance as a potential income earner and for food security. Though the sweetpotato volumes traded by individual traders appear to be low, when considered together they constitute substantial volumes of fresh sweetpotato that get into the local markets annually. The project should take into consideration the estimates made by the key informants as well. Going by the information from the market master from Iringa Municipal market, weekly deliveries to the market in the peak season range between 25 t and 30 t. The wholesale market in Makambako also offers high opportunities for commercial farmers, more so because Songea region, the main source of fresh sweetpotato roots, is a long distance from the markets in Makambako and Iringa. Furthermore, the market masters in most of the markets indicated that the markets would be able to absorb twice the current supply of fresh sweetpotato roots. This shows that there is an opportunity for OFSP commercial farmers in the project intervention area to fill this gap. However, there are markets currently with low sweetpotato demand, but these too could present an opportunity to the commercial farmers to introduce OFSP and should not be ignored. The following factors will be the drivers for market development:

- **Target clients** – The potential commercial sweetpotato farmers may need to segment their target market, more so based on their areas of operation. Most of them are targeting to produce at least one acre of sweetpotato root crop, and they will be able to serve both wholesalers, who would take sweetpotato to distant markets, and local retailers at the community or village level. In the case of commercial farmers located near large markets, it would be advisable to make contacts with large traders and agree on a schedule of delivery at the farm gate. Another option would be the wholesale markets in Iringa, Makambako and Mufindi, where traders from Songea currently deliver and sell fresh sweetpotato roots. Small deliveries could be tried first before larger shipments are made to be sure that this marketing strategy would be appropriate. Commercial farmers in Ulanga may benefit most from staggered planting, given the small size of the markets and the nature of the access roads to the larger markets, because the district seems to be spatially isolated from the large trading towns and principalities.
- **Targeting women traders** – Women traders are crucial in sweetpotato trade. Although they buy the produce in small volumes, they are many and they buy the fresh roots more frequently than do male traders. Cumulatively these add up to large sweetpotato volumes being traded. Small purchases are useful to the commercial sweetpotato farmers; they ensure the continuous flow of both fresh roots to the market and cash to farmers, especially where staggered planting is practiced. However, women traders could be encouraged to make collective purchases to reduce the harvesting, bulking and delivery costs.
- **Root size** – Under normal circumstances, OFSP roots grow rather large and are usually more prone to weevil damage than other sweetpotato varieties given that they are sweeter (Mwanga et al., 2009). To ensure that roots of medium size are delivered to the markets, commercial farmers will have to work with the project agronomist for optimal spacing so as to obtain appropriate root sizes.
- **Sweetpotato nutritive value and taste** – Commercial farmers need to identify a Mama lishe in their market of choice and work closely with her to prepare OFSP products for tasting and promotion. After the initial promotion, the Mama lishe may sell both fresh and cooked OFSP roots. This strategy worked very well in the Lake zone, especially in Mwanza and Bukoba markets (CIP, 2014).

3.2 Barriers to sweetpotato business entry

Amongst the barriers to sweetpotato business entry revealed by the market masters were taxes and non-monetary barriers such as the need to have a clear understanding of the type or variety of sweetpotatoes desired by consumers and the volumes required in a particular season. This would require new market players to study, understand and respond to the changing dynamics of consumer tastes and preferences, and demand and supply in the selected markets. As noted by the market masters, off-season sweetpotato sales are likely to be more profitable but would necessitate higher investment in irrigation, among other considerations. The study showed that the demand for yellow-fleshed sweetpotato was high in the market, and future initiatives could consider promoting these varieties in order to improve the product portfolio of the commercial OFSP farmers.

3.3 Sweetpotato production and marketing plans

Production and marketing plans are important tools, and every commercial OFSP farmer should have them and keep them updated every season. Production plans would contain details on the frequency of sweetpotato planting, for example if staggered or one time, and the area to plant so as to satisfy the target markets. Production plans would help address irregularities in the supply of fresh roots of good quality and adequate quantities and also address issues relating to the purchase and consumption patterns of sweetpotato detailed in sections 2.3.5, 2.4.1. and 2.4.2. The need to have marketing plans cannot be overemphasized, whether as stand-alone documents or as parts of business plans. Planning by commercial sweetpotato farmers on when, where and how much sweetpotato to deliver will support their market development initiatives. In the case of farmers who elect to include yellow-fleshed sweetpotato in their agribusiness portfolio, mapping the OFSP value chain onto the value chain of that variety in the beginning may be advantageous, as OFSP will be piggybacked on a variety that is already popular with traders and consumers in the market.

3.4 Cultivating trusted business partnerships and networks

Trust is a key ingredient in any business partnership. As a new product in the food market, OFSP needs to be carefully tested in the market, and garnering support through building trusted partnerships and networks will be key to achieve market penetration. A simple way to start would be through setting up regional or district trade platforms comprising the value chain actors and facilitators such as the district agricultural, irrigation and cooperative officers and district commissioners who command respect and authority and can be engaged in OFSP advocacy as part of education and awareness creation on good nutrition. Meetings focused on sweetpotato business development and trade visits could be some of the activities to be supported to create a forum for business linkages, business learning and networking. Sharing experiences on how business deals are developed and executed to completion would be helpful, as RAVinvest (<http://www.ravinvest.biz/index.php>), a private company that supports business-to-business development in East Africa, has demonstrated.

3.5 OFSP marketing concept development

It is clear from this study that a lot of work still has to be done to promote OFSP amongst traders and consumers. This would benefit from a simple activity aimed at developing a marketing concept for OFSP, revolving around the six Ps of product, price, packaging, promotion, people and policy. The findings on the purchase and quality factors will be useful in market concept development. If well articulated, such a concept will guide the market promotion and market deepening strategies for the commercial farmers. Benet et al. (2006) have developed guidelines that could be used in drawing up such a concept.

3.6 The future: exploring new markets

Agroprocessing and value addition initiatives for sweetpotato are growing by the day in Tanzania and elsewhere in East Africa. In this study, a short interaction was made with processors (TOSTI) but was not conclusive. However, the message was clear that the processor was open to including OFSP as a key ingredient in products. Although a market for processed OFSP products may take time to develop, it is good to aim for that goal, particularly with the commercial sweetpotato farmers who would have this as an integral

component of their business plans. In the medium term such opportunities could be explored, and in the long-term links with OFSP processors elsewhere, for example the one in Dodoma, could be made. Needless to say, this project is introducing OFSP in most of the intervention districts where it is unlikely that mass production of its roots for home consumption and processing will happen in the current phase. Most farmers were getting exposed to OFSP for the first time. There would be need for an incubation period to build up large quantities of seed that would be needed to produce enough roots to consistently support OFSP processing and product development businesses in Tanzania.

4. Conclusions

This study has shown that though OFSP is currently not traded in appreciable volumes in markets in the VISTA-Tanzania project intervention area, the potential exists to produce large volumes of fresh roots that can be traded locally. Potential commercial farmers have been recruited, trained and facilitated to drive mass seed and root production efforts. They need to be supported further to draft production and marketing plans to guide their market penetration. Business plans with well-articulated marketing strategies will facilitate market development and penetration.

All markets are dynamic and even more so those of agricultural products. It is recommended that the capacity of commercial farmers be enhanced to enable them to carry out continual rapid market assessments, since this is likely to be a routine activity if they are to succeed as sweetpotato agribusiness entrepreneurs. This will assist them to review their marketing and business plans to ensure that they are always well informed of the market trends and changing consumer needs and preferences.

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