Promotion of Traditional African Vegetables (TAY) In Cameroon: The Need for a Post-Harvest Loss Reduction Strategy

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Abstract
Traditional African vegetables (TAV) receive little research attention despite their economic potential, their role in ensuring food and nutritional security, and their cultural acceptance. The enhancement of the TAV system requires the characterization of the different actors involved in the sector and their interaction. The objective of the study is to identify and analyze constraints for innovation in the TAV system in Cameroon. Data on TAV value chain actors was collected through focus group discussions held with a mixed group of producers purposively selected in the South and the Southwest regions of Cameroon. Venn diagram was used to identify actors who have a direct or indirect relation with producers. The actors identified as directly active in the TAV value chain were invited to a one-day multi-stakeholder participatory workshop in each of the sites. The study revealed that the TAV value chain is short and still poorly developed. Only five main actors interacting directly were identified: producers, Bayam Sellam (retailers), agro-dealers, consumers and transporters. All the actors identified the ignorance of storage and processing techniques as the main constraint for innovation in the TAV system. One solution to solve the constraint is the value chain based innovation platform which was set up as a result of the research action process. The reduction of TAV post-harvest losses is thus the entry point of this TAV based value chain innovation platform. The general objective of the IP was to reduce post-harvest losses of the members by 20 % within 3 years by specifically increase the income of at least 80 % of IP actors by at least 20 % and enhance TAVs available on the market at all seasons. Being very perishable, TAVs are often sold at a loss during the season of availability, hence the need for appropriate postharvest loss reduction strategy. Keywords: Cameroon, Traditional African vegetables, Innovation platform, Post-harvest losses.

INTRODUCTION
Traditional African vegetables (TAV) complement staple-based diets and their consumption is crucial to improve the health of mothers and reduce child deaths from malnutrition—both global development targets (Afari-Sefa et al., 2012; Keatinge et al., 2015) included in the new United Nations Sustainable Development Goals. Although the demand for traditional African vegetables recently has increased due to increasing awareness of nutritional and health-related benefits of their consumption, there has not been a corresponding rise in their production. In fact, findings suggest that the global supply of fruits and vegetables (F&V) falls 22 % short of the global population's needs and this varies from 58 % to 13 % across low- and upper-middle-income countries (Siegel et al., 2014). Assuming medium fertility and projected growth in agricultural production, the global supply: need ratio for F&V increases slightly to 0.81 by 2025 and to 0.88 by 2050 while if assuming no change from current levels of F&V production, the global supply: need ratio for F&V decreases to 0.66 by 2025 and to 0.57 by 2050 (Siegel et al., 2014). Thus, Siegel et al. (2014) recommend that global nutrition and agricultural communities need to find innovative ways to increase F&V production and
consumption to meet population health needs, particularly in low-income countries. Traditional African vegetables contribute to the daily diet of the population in Cameroon but their nature particularly perishable limited shelf-life once harvested (Kouame et al., 2013). The losses are caused by mechanical, physiological or pathological factors, which may be aggravated by deficient post-harvest technologies. The development of simple handling techniques, the development of transport and storage infrastructures, as well as an efficient marketing system can contribute to minimizing post-harvest losses (Kouame et al., 2013). This needs a value chain intervention to be achieved. The value chain is the full range of activities which are required to bring a product or service from conception through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use (Kaplinsky and Morris (2000).

Future agricultural research needs to shift the focus from predominantly developing new biophysical technologies towards social science research that assesses issues at the value chain, macroeconomic institutions and policies that influence the adoption of technology (Kebede, 2015). A value chain framework, which usually focuses on applied research, expands the specification of the problem and usually integrates technical innovation with institutional innovations in farmer organization and marketing to ensure that results are used throughout the value chain (WB, 2012). The contribution of people and organizations (stakeholders) around the value chain is needed to make innovation success. This study aims at answering the questions of who are actors of the TAV value chain and how do they relate? What can keep TAV value chain functioning? What are the main constraints faced by TAV value actors and how can they overcome these constraints?

**METHODOLOGY**

**Study site**

The study was conducted in Ekona and Ebolowa respectively from the Southwest and South regions of Cameroon. The Southwest and South regions of Cameroon, the focus of the study, cover an area of 72,600 km², representing 15% of the surface area of the country. The South-West region is an area of high vegetable production that supplies several other regions especially the Littoral, while the South region with a high production potential supplies the neighbouring countries such as Gabon and Equatorial Guinea.

**Data collection and analysis**

The primary data on TAV value chain actors was collected through focus group discussions. Focus group discussions were held with a mixed group of producers purposively selected in the South and the Southwest regions to identify the actors who can have a direct or indirect incidence on their activities using the Venn diagram. Five focus groups discussion were held with a group of actors consisting of five to fifteen people each, the actors' groups were: TAV producers, group of direct actors especially ‘Bayam sellam’ (TAV retailers), consumers, transporters and agro-dealers. The actors identified as directly active in the TAV value chain were invited to a day multi-stakeholder workshop in each of the sites (Ebolowa in the South Ekona in the Southwest). Actors of the TAV value chain were used as the unit of analysis to make a visual presentation of the TAV value chain visualising the main actors and the different types of interactions among them. A participatory workshop methodology facilitates different groups of stakeholders to – individually and homogeneous and heterogeneous groups – identify, categorize and analyze constraints for innovation in the TAV system. To keep the workshops manageable and stimulate interaction, less than 25 participants attended each workshop; consisting of 3-5 representatives of the four different stakeholders directly interacting (Retailers, transporters, processors and consumers) with farmers. The workshop methodology consisted of sessions focusing on: (1) identifying constraints, (2) categorizing constraints, and (3) exploring specific and generic entry points for innovation (Schut et al., 2014) to ultimately create a TAV value chain innovation platform (IP). A SWOT analysis was the tool used to collect information from a different group of actors. Constraints identified by actors group were ranked base on two criteria (1) touch a large number of people and (2) cause a lot of money lost. The ranking
was done at the level of the group of actors, and then later at the level of all groups of actors to identify the constraint touches most of the actors which constitute the entry point of the IP for which the action plan was developed. Data were analysed using qualitative content analysis, which involved reading through the field notes and transcribing them to identify key themes and patterns relevant to the research questions and concepts.

RESULTS
Mapping of TAV value chain actors and interactions
The actors involved in the TAV value chain were identified and mapped out in Figures 5.1, 5.2 and 5.3. The SWOT analysis revealed some common ground in the value chain. TAV production and commercialization are time-consuming, which supply chain actors considered a weakness. In fact, the production is labour intensive while the preparation before cooking is fastidious, the fluctuation of the price and the high perishability of the TAV produce obfuscate the sale. Moreover, while producers see customer demand as an opportunity, retailers perceive this as strength. Growing demand is observed which can be linked to the growing population and the increase in nutritional awareness of the benefit of TAV. This is an opportunity for retailers. The linkage between the increasing nutritional awareness and the rise in demand of TAV was also reported by Chagomoka et al. (2014) in Malawi and Mozambique. This growing demand can lead to an increase in production, representing an opportunity for agro-dealers. Lack of quality seeds and financial constraints are threats to the sustainability of the production. It can disrupt the supply to retailers and consumers and discontinuity in the demand of agro-inputs.
Figure 5.1: TAV value chains mapping according to TAV producers using Venn diagram.
Figure 5.2: TAV value chains mapping according to Buyam sellam (retailers) and Input dealers using Venn diagram
Producers are the first link in the TAV value chain, involved in the fresh production process and supply produce to other players along the chain. TAV value chain mapping according to TAV producers has many actors than others attesting the keys role play by producers in the value chain.

**Analysis of the TAV value chain**

The TAV value chain is not very long. Between producers and consumers, there are mostly wholesalers and retailers and sometime processors. Wholesalers usually buy the produces at the farm gate and cover the transport cost. For urban and peri-urban production, producers sometime sale directly to the consumers. If one element of the chain fails, it will endorse the losses. The added value is not equitably shared along the value chain.

Producers of TAV are mostly smallholders. TAV Farmers are not organised into groups for technical services, input purchase or marketing of produce. There are some producer organizations with low-level member
commitment and lack of resources which make them disorganised. They mostly sell to individual buying agents and do not know the value chain. Wholesalers sometime buy leafy TAV on the plots, organise the picking, sorting and packaging, and then hire a truck to deliver the produce to “Bayam sallam” (marketers) in urban areas. A big issue in the delivering of the produce is the poor means of transport (plate 4) which increases the post-harvest losses. Transporters’ challenges are especially the poor status of the roads which causes the products to reach the market already with some losses. Bayam sellam (retailers) resell the produce to regular buyers who are usually the consumers (households, restaurants, etc.). Retailers are mostly stallholders in major markets, to roadside stands or small market stalls. In the absence of a convenient packing house and proper stand for TAV in the market, TAVs are usually poorly stored. Input dealers provide fertilisers and pesticides to producers but not TAV seed as they do for standard vegetables. They are also supposed to provide advice on their application. But, given the safety issue currently face with TAV produces, it’s assumed that either input dealers failed to provide advice to farmers, or farmers do not apply the recommendations. Finance facility for TAV is weak and almost inexistent. Finance services are not willing to give credit for TAV production; TAVs are neglected crops and have not yet gained trust for their potential. Processors are weakly represented in the TAV value chain; this represents a huge gap that needs to be filled. TAV, once harvested, begin to lose their nutritional and sensory quality, hence the need to develop appropriate methods of conservation /processing. There are many causes of post-harvest losses (Parkouda et al., 2016). The main causes affecting food directly may be biological (insects, rodents, birds, etc.), microbiological (fungi, bacteria, etc.) and human pathogens, chemical (heavy metals in the environment, pesticide residues, etc.), biochemical (enzyme reactions), physical (injury, temperature, humidity, etc.), physiological (breathing), psychological (disgust or refusal by the consumer). To these causes are added the poor harvesting practices, packaging and handling, the non-compliance with normative requirements The time spent to prepare and cook TAV is an obstacle to their consumption; processed TAV could have been a solution to this but consumers have no confidence in those products. They think these products have been mixed with some other herbs before processing. The government has to come in with certification of the products so they can gain consumers’ trust. The Ministry of Agriculture and Rural Development (MINADER) offers advice to farmers, but their capacity is limited. It also disseminates market information on prices at different markets and packaging requirements. The actors of the value chain are usually aware of the price fluctuations which help them fine-tune their marketing strategy. Although the market information system is not well developed, it is reliable because of the good communication network and can be very useful. Regulators intervene indirectly in the TAV value chain. These include different government bodies such as Local councils develop by-laws that help establish and maintain infrastructure (markets, roads); Ministry of health which conducts a sanitary inspection in restaurants (once a year); Ministry of Urban development and housing which has to ensure that the space for urban horticulture is not converted into dwellings as its currently observed. The organisation of the TAV value chain The ranking of the actor’s constraints identified the “Ignorance of storage technique” as the main constraint relevant to all the actors which can lead to high post-harvest losses. Traditional African leafy vegetables, once harvested, start to lose their nutritional and sensory quality. Being very perishable, they are often sold at a loss during the season of availability, hence the need for appropriate postharvest loss reduction strategy. The development and dissemination of suitable methods of conservation/processing of TAV is an important but
neglected research area. The conservation is essentially done via drying under the sun, sometime with solar dryers which can affect the quality of the nutritional produce if not well done. Moreover, some cautions such as careful harvest of TAV at full maturity stage, avoid wounding leaves during harvest, put vegetables in clean containers for transport to avoid any contamination, sort leaves to eliminate diseased and wounded ones, wash vegetables with clean water to remove adhering soil and other debris without allowing leaves to stay long into the water, put the leaves in plastic crates carefully and cover with damp sack can considerably reduce losses and add more value along the chain.

It was agreed to organise actors within a TAV innovation-based value as a potential solution to the constraint. In fact, it takes more than a good harvest to make markets work. Understanding how best practices and market information circulate among farmers, traders, consumers and policymakers is essential for establishing vegetable value chains to benefit all (Issaka et al., 2016). The organization of the stakeholders in a TAV based value chain innovation platform can help to overcome the identified constraints. By bringing the various actors in a value chain together, innovation platforms set the stage for collaboration among the various actors of a value chain towards addressing value chain specific challenges’.

A TAV innovation platform based value chain was set and launched. The action plan of the TAV value chain based platform was developed around the entry point identified as the “Reduction of post-harvest losses by developing and practising TAV storage techniques”. The general objective of the IP was set as follows: At least 80% of IP actors reduce their post-harvest losses by 20% within 3 years. Two specific objectives were set: (1) the income of at least 80% of IP actors increase by at least 20%, (2) TAVs are available on the market at all seasons. Five keys activities were anticipated (1) Contribute to less politicisation of the administration. (2) Definition and application of a motivation policy for communication agents, (3) Inscription of TAV on the road map of research, (4) Sensitisation of decision-makers on the nutritional and economic importance of TAV through the setting up of a framework for consultation between politics and technology and lobbying on the value of TAV and (5) organisation of advocacy on TAV.

CONCLUSION

The TAV value chain is still underdeveloped. Traditional African vegetables, once harvested, start to lose their nutritional and sensory quality. Being very perishable, they are often sold at a loss during the season of availability, hence the need for appropriate postharvest loss reduction strategy. The losses caused by mechanical, physiological or pathological factors may be aggravated by unsuitable post-harvest technologies. A TAV based value chain innovation platform (IP) was anticipated as a possible solution to the post-harvest losses constraint identify intending to reduce post-harvest losses by 20% for at least 80% of IP members.

REFERENCES


