

Research Application Summary

The university role on capacity building, value addition and utilization of orange fleshed sweet potatoes among small scale farmers in Kakamega county, Kenya

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Abstract

Capacity building in agriculture is done using informal methods which in most cases depend on the community. A participatory study was initiated by Masinde Muliro University of Science and Technology to train farmers on value addition and utilization of orange fleshed sweet potatoes among small scale farmers. This was an outreach initiative to bring the farming community closer to the University. The teaching and training was to empower the community and most specially the vulnerable groups; i.e., children less than five years, expectant mothers, the elderly and the HIV/AIDS infected and affected. Five sub-locations in Lurambi division of Kakamega County were selected for the study. The objective of the study was to harness common foods available in the study area. The local leaders were identified and trained on production, harvesting, storage, processing and value addition of the Orange Fleshed Sweet potatoes, Fish and the Local green Leafy Indigenous Vegetables. The local leaders in turn mobilized their respective community members for the practical demonstrations on value addition. The study sampled one hundred (100) small scale farmers and administered questionnaires through interviewed schedule to assess their understanding of the foods in the study. The results from the study showed that (53%) of the sampled farmers had farm sizes below 0.5 ha. of which (64%) planted other types of sweet potatoes but not necessary the orange fleshed sweet potatoes. About (72%) lacked information on orange fleshed sweet potatoes. The study also showed that 85% of the farmers did not consume fish. The farmer's level of education was of concern in that (60%) were of primary level. The success of this project was judged by the University's ability to influence and benefit the communities living in surrounding environment by using its inherent wealth of scholars, research outputs, and outreach extension services which is offered through well coordinated programmes.

Key words: Kakamega, Kenya, orange fleshed sweet potatoes, value addition

Résumé

Le renforcement des capacités en agriculture est fait à l'aide de méthodes informelles qui, pour la plupart des cas, dépendent de la communauté. Une étude participative a été initiée par l'Université des sciences et technologies Masinde Muliro pour former les agriculteurs à la valeur ajoutée et à l'utilisation des patates douces à chair d'orange. Il s'agissait d'une initiative de sensibilisation visant à rapprocher la communauté agricole de l'Université. L'enseignement et la formation devaient autonomiser la communauté et plus particulièrement les groupes vulnérables; c'est-à-dire les enfants de moins de cinq ans, les femmes enceintes, les personnes âgées et les personnes infectées et affectées par le VIH / SIDA. Cinq subdivisions de Lurambi dans le comté de Kakamega ont été sélectionnées pour l'étude. L'objectif de l'étude était d'exploiter les aliments courants disponibles dans la zone d'étude. Les dirigeants locaux ont été identifiés et formés à la production, à la récolte, au stockage, à la transformation et à l'ajout de la valeur à la patate douce à chair d'orange, du poisson

et des légumes verts indigènes à feuilles vertes locales. Les dirigeants locaux ont à leur tour mobilisé les membres de leurs communautés respectives pour les démonstrations pratiques sur l'ajout de la valeur. L'étude a échantillonné cent (100) petits agriculteurs et administré des questionnaires par le biais d'une interview programmée pour évaluer leur compréhension des aliments. Les résultats de l'étude ont montré que (53%) des agriculteurs échantillonnés avaient une taille de ferme inférieure à 0,5 ha, dont (64%) ont planté d'autres types de patates douces mais pas nécessairement celles à chair orange. Environ (72%) manquaient d'informations sur les patates douces à chair orange. L'étude a également montré que 85% des agriculteurs ne consommaient pas de poisson. Le niveau d'instruction des agriculteurs était préoccupant dans la mesure où (60%) étaient du niveau primaire. Le succès de ce projet a été jugé par la capacité de l'Université à influencer et à faire bénéficier les communautés vivant dans l'environnement environnant en utilisant sa richesse inhérente de chercheurs, de résultats de recherche et de services de vulgarisation, offerts par le biais de programmes bien coordonnés.

Mots clés: Kakamega, Kenya, patates douces à chair orange, valeur ajoutée

Introduction

Kakamega is one of the 47 Counties in Kenya with a heavy disease burden and deepening poverty, with an estimated 50% of household below the poverty line of \$1 per person per day. The Province is heavily affected by preventable diseases such as malaria, malnutrition and HIV/AIDS, and relatively high HIV infection rates estimated at 15% but ranging from 5.1% in highland Districts to 30% in lakeshore Districts and islands such as Sigulu Island in the former larger Busia district (KDHS, 2008). The School of Agriculture, Veterinary Science and Technology (SAVET) of Masinde Muliro University of Science and Technology (MMUST) undertook an outreach project sponsored by JICA / AICAD to benefit communities in five sub-locations of Kakamega County. The study focused on bringing on board common foods available and cherished by people in the larger Western province of Kenya. Lack of technology in value addition has reduced consumption of common foods in adequate quantities thus causing loss of interest to appreciate the value of the local foods in diet. The foods involved in the activity were but not limited to, orange fleshed sweet potato, fish and green leafy indigenous vegetables.

The purpose of the project was to improve dietary quality through the promotion of diet diversification and modified food habits, particularly young child feeding practices (U5), in Kakamega County. Emphasis was placed on addressing two major nutritional problems: Vitamin A deficiency and inadequate caloric intake. To achieve this, the project introduced and evaluated pro-vitamin A (beta-carotene) rich varieties of sweet potato (identified by their orange flesh), utilizing these new cultivars as a low-cost, effective entry point for improving the kinds of weaning foods given to young children and increasing the frequency of intake of essential micronutrients and calories use of fish and green leafy vegetables. The members of the project visited collaborators officers for team formation and the project initiation with the Ministry of Agriculture, the Centre Director for KALRO Kakamega, fisheries and ministry of public health. Currently the crop of choice in Lurambi division is sugarcane with 22,000 ha of land under sugarcane, 8,700 ha under maize and sweet potatoes occupying only 8 ha although the target was 120 ha. The first observation showed that land use on sugarcane is given great emphasis while food crops were grown along the road side. Sweet potatoes grown were of different varieties identified by farmers. The team observed local vegetables particularly cowpeas, mrenda, beans, amaranthus, mostly grown along the roadsides. In Shibuli there were a fish pond which was established under the Economic Stimulus Package.

Materials and methods

The study started with a reconnaissance survey which was done in Lurambi sub-county. This was followed by stakeholder meetings of leaders in the community for informal teaching and training. Subsequently, interviews were held with one hundred farmers (100) sampled from five sub-locations. The farmers were also identified for training on value addition of various products including orange fleshed sweet potatoes.

Results and discussion

In session paper No. 2 of 1994 of National Feed Policy, Kenya Government reaffirmed the very high priority attached to achieving food security at national and household levels. Food is the primary concern of man in his physical environment throughout history. The destiny of man is greatly influenced by availability or lack of food. Domestic supply through production of sweet potatoes indicates that sweet potato is 3rd besides cassava in calorie output in Kenya. Per capita consumption of fresh sweet potato roots in Kenya by 1990 – 1992 was 21 kg/cap/year. KARI in collaboration with the International Potato Centre (CIP) have developed a range of sweet potato cultivars with considerable dry matter and some orange fleshed with high beta carotene. The colour intensity of the sweet potato root flesh differs from one cultivar to another and varies from white to deep orange. The intensity of the colour is attributed to carotene. Orange fleshed sweet potato (OFSP) has high beta carotene content a precursor of Vitamin A. Vitamin A is required by the body for vision, iron metabolism, skeletal and epithelial surface stability. Studies at Nairobi University on carotene content in flesh dried and processed sweet potato showed that increased consumption of OFSP in either fresh or processed form can contribute in alleviating dietary deficiency of vitamin A.

Table1. Nutritive value of OFSP vs other foods/100g edible portion

Food Item	Energy cal	Protein gm	Calcium gm	Iron mg	Vit A ug	Thiamine mg	Rib mg	Niacin mg	Vit C mg
Sweet-potato	109	1.6	33	2.0	300	0.09	0.04	1.7	37
Soya	407	34.0	185	6.1	9	0.71	0.25	0	0
Sorghum	337	9.5	28	10.0	3	0.28	0.09	3.4	0
Banana	82	1.5	9	1.4	20	0.03	0.03	0.06	9
Cassava	318	1.6	66	3.6	0	0.06	0.05	0.9	4
Cowpeas	45	4.7	255	5.7	450	0.20	0.37	2.1	56
Maize	341	9.3	174.2	4.3	0.30	0.081	1.8	3	
Beef	234	18.0	11	3.6	25	0.26	0.15	4.0	0
Finger Millet	318	5.6	35	54.0	4	0.22	0.10	0.8	0

The orange fleshed sweet potatoes have more vitamin A compared to white or cream fleshed varieties. One would consume less quantities 40 – 90 grams of OFSP compared to 3600-9000 grams of white fleshed to meet daily requirements. The sweet potato can be processed by washing and grating, sun drying the grated product and milling into flour. The sweet potato can also be washed, boiled, mashed and mixed with other ingredients for baking or frying. The sweet potato leaves can be processed as vegetable.



Figure 1. Preparation of OFSP

Sweet potato utilization. Many households are familiar with what has been passed to them from their ancestors as concerns food utilization. The sweet potato is mainly consumed fresh, boiled or roasted. Some communities boil and mix with beans then mash and thus is consumed with sour milk or groundnut sauce. Sweet potato which is milled into flour is mixed with wheat flour and used to make myriad of products ranging from cakes, chapatti, mandazi and even flour composites for ugali and porridge. The sweet potato leaves are also very delicious when made into relish. The addition of milk, groundnuts, roycy or soya flour enhances palatability of the relish. The orange fleshed sweet potatoes are gaining high recognition and use due to their vitamin A component. Industrial use of dry orange fleshed sweet potato chips and flour is already in progress. Some groups already process composite flours incorporating the sweet potato, sorghum, millet, soya and fermented milk into weaning flour. Sweet potato chips and crisps are also now acceptable and are made from potatoes with high dry matter. Sweet potato crackles and chin have shelf life of six months and can be used as a snack.



a) Nutritious Porridge



b) Sweet Potato Chapati



c) Sweet Potato Mandazi



d) Orange fleshed Sweet potato crisps



e) Sweet Potato Juice

Figure 2. Sweet potato recipes for income generation

African indigenous vegetables (AIV). High poverty levels of over 60% have been reported in rural communities and the urban poor in Kenya. These levels are normally manifested in poor health and malnutrition. There is high household food and nutrition insecurity and in most rural areas the situation is made worse by the prevalence of HIV/AIDS. Many parts of Kenya particularly Coastal areas and Western Kenya are endowed with agricultural biodiversity like Africa Indigenous vegetables (AIVs). These are vegetables whose natural home is believed to be Africa.

Harvesting and preparing local vegetables. Harvest is done during the coolest part of the day: early morning or late afternoon. Either the whole or a part of vegetative growth can be harvested by hands only or sharp knives. Wash carefully vegetables to remove impurities, Keep in cool place and well ventilated place. Do not stack/over pack vegetables as this creates heat build-up or cause vegetables beneath to crush from weight. Vegetables are washed before any preparation for cooking or preservation. Drying is one of the oldest methods of food preservation. Drying preserves foods by removing enough moisture from food to prevent decay and spoilage. The longer the drying time the less flavorful and the less tender the product. The drying time can be hastened by drying small uniformly cut pieces. Vegetables should be dried until they are brittle at which point only about 10% moisture remains and no micro organisms can grow. Only young leaves are used for preparation. Wash and trim very thoroughly and this is applicable to all AIVS. Blanching time is 1 ½ minutes. Handle vegetables tenderly so that they are not damaged by handle them with care to avoid breaking them.



Figure 3. Preparation, cleaning and cooking of local vegetablesng of local vegetables

Packaging and storing. Dried foods are susceptible to insect contamination and moisture reabsorbing and must be properly packed and stored immediately. Pack dried vegetables in small amounts in heavy plastic bags or glass jars and seal well. Label the packages with name of the product, date and method of preparation, dry and store in a cool dry place. Properly stored dried vegetables keep well for six to twelve months. Discard all foods that develop off smells flavors or show signs of mould.

Socio-economic characteristics. Farmers from higher economic status have higher access to resources and institutions controlling resources necessary for effective adoption of technology (World Bank, 1993). In most cases adopters of information are largely opinion leaders who tend to occupy higher socio-economic status, which in this study was positively related to utilization of nutritious food for better life and this is in agreement with (Adams, 1994 and World Bank 1993). Participation in social groups provides the opportunity and sharing of ideas and experiences through interpersonal and inter-farm visits. Social participation is important in social studies because they indicate the extent of contact which farmers have with organised groups and other public services and mass media (Black burn, 1982). They reflect the degree of contact beyond the farmer's primary reference groups and the potential for outside channels of direct influence. Farmer's involvement in various social group activities integrates them into the social fabric of the community. This is achieved through farmers religious, social, and political or self-help groups.

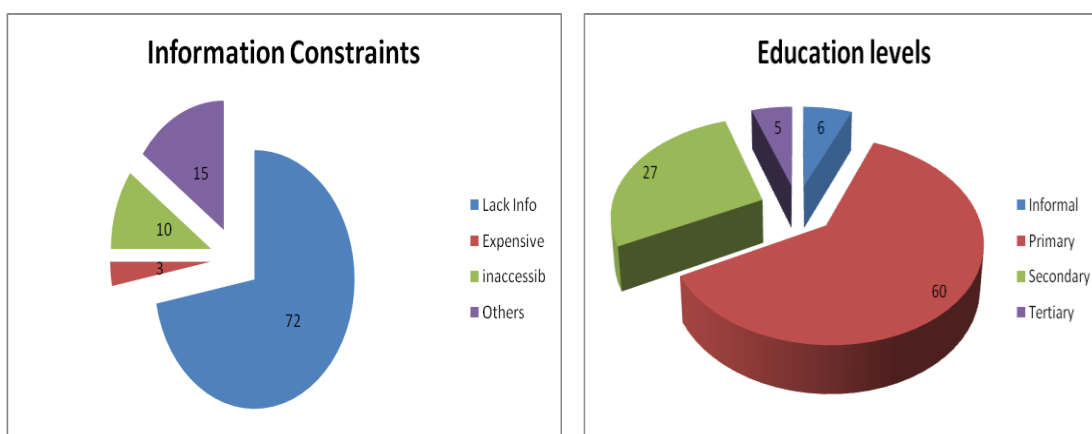


Figure 4. The representation of the information and education levels

Farmers Level of Education. The study established that farmers (72%) lacked information on orange fleshed sweet potatoes and this is closely linked education levels of the farmers in the study area. Literacy plays an important role of enabling farmers to get access to written material, thereby facilitating their awareness of information (Weir and Knight, 2004). Farmers whose ability to read and write is low tend to be disadvantaged in utilizing information. Education increases managerial competence and, therefore, enhances ability to diagnose, assess, comprehend and respond to financial and production problems (Molnar, 1985). It also enables them to choose wisely from a stock of available technologies and how to efficiently manage once the technology has been adopted. In addition, knowledgeable farmers assist researchers in guiding their focus. About 60% of the farms were of primary education and only 5% were of tertiary level.

There is a strong positive relationship between farmers level of education and adoption behaviour (Chitere, 1985). This is consistent with other studies on maize (Misiko, 1976; Amudavi, 1993). This showed that among farmers, who had adopted the use of high yielding varieties, 25% were illiterate, 65% had primary level of education and 11% had secondary school education. Sing and Santiago (1997) found that the farmer’s educational attainment influenced farm earnings in Mexico. In Africa, several studies have shown a positive relationship between farmer’s education and farm productivity (DSE, 1992; Kahn, 1991; Knight and Shabot, 1990; Maliyamkono *et al.*, 1982). Farms of different sizes may present different context of adoption. Large-scale farms are a base for expansion and a source of materials, which can be spread over a greater number of output units. A survey in Kenya has isolated land size as the most important variable affecting farmer innovativeness (Wubeneh and Sanders, 2006; Roling, 1990). The study in Lurambi revealed that (53%) of the farmers had less than 0.1-0.5 ha of land. This is because farmers with large farms can experiment with innovations to see their results before adopting on large scale.

Age of the farmer. Studies relating to farmer’s age to his/her adoption behaviour reveal conflicting results with some showing positive relationships while others reflect strong negative relationship. Rogers, (1995) argues that younger and more educated farmers are more inclined to adopt new practises. Adoption may vary as a function of stage in life cycle of a farmer and family. In this study majority of the farmers 54% were of the active age group of 26-45 years old. This is the most active age and innovative in new ideas.

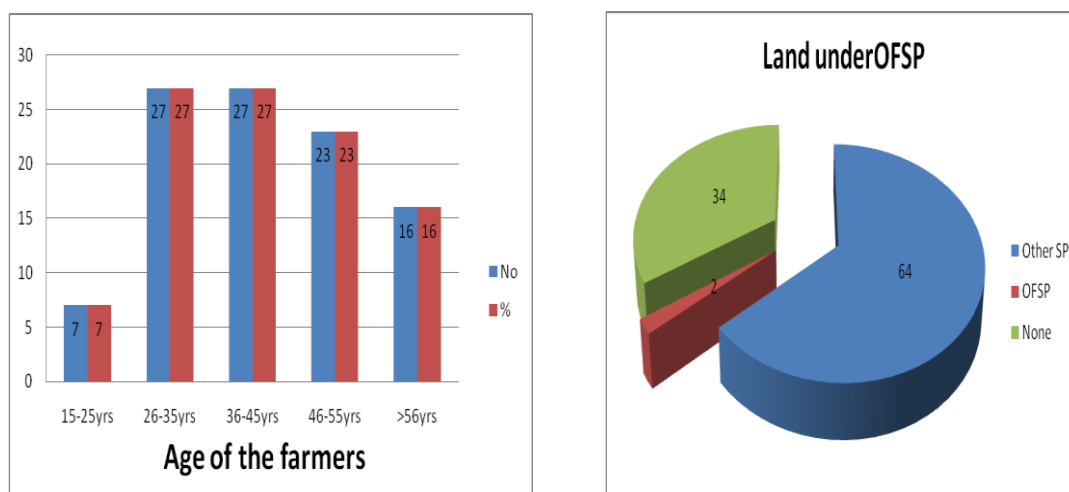


Figure 4. Age and land distribution for farmers

Land under sweet potatoes. The number of farmers cultivating OFSP (2%) while (64%) cultivate other varieties of sweet potatoes. Land in Lurambi as in most parts of western Kenya is under sugar cane with only 2% under orange fleshed sweet potatoes and 64% under othe activities especially sugar cane.

Conclusion

Lack of knowledge (72%) was too high in the region of study. However the project successful demonstrated the use of different method to improve utilization and value addition to generate income and establish a strong outreach extension services which will be done through well-coordinated programmes.

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