

Research Application Summary

Demand for African indigenous vegetables and seed in Uganda

Kansiime, K.M.,¹ Karanja, D. K.¹ & Alokite, C. ¹
¹CAB International, P. O. Box 633-00621, Nairobi, Kenya
*Corresponding author: m.kansiime@cabi.org

Abstract

African Indigenous Vegetables (AIVs) have traditionally been a significant contributor to food security, nutrition and incomes for smallholder farmers in many parts of East Africa. However, farmers' capacity to grow and benefit from AIVs has been limited by lack of good quality seed and technical packages. Efforts aimed at supporting the performance of AIV subsector are limited by a general lack of information about the effective demand for AIVs. This study assessed the demand for AIVs, both vegetables and seed in the context of Uganda. The study covered northern and central regions in Uganda. Study results are based on data from 313 household interviews, 18 focus Group Discussions and 239 key informant interviews. Seventeen different types of AIVs were grown and marketed by farmers in the two study locations. *Solanum aethiopicum* and *Vigna unguiculata* were the most preferred AIVs in central and northern Uganda, respectively. AIVs were grown by smallholder farmers primarily for home consumption. Marketing of AIVs is still fragmented and characterised by traditional handling mechanisms and limited value addition. The estimated aggregate seed demand for the five most common AIVs in central Uganda was 88 tonnes per year, of which 62% was supplied by farmers themselves. Farmers cited the lack of reliable supply of quality and affordable seed as the major reason for using own seed. Demand for seed was significantly ($p < 0.1$) and positively related to output price. This implies the need to holistically address both seed access and market constraints in the promotion of AIV production. Development of farmer seed entrepreneurship, farmer-trader linkages and market access by farmers are recommended strategies for achieving sustainable AIV production.

Key words: Good seed initiative, marketing, seed demand, seed entrepreneurship, seed system.

Résumé

Les légumes indigènes africains (LIAs) ont toujours été un facteur important de la sécurité alimentaire, la nutrition, et les revenus des petits exploitants agricoles dans de nombreuses régions d'Afrique de l'est. Cependant, la capacité des agriculteurs à cultiver et bénéficier des LIAs a été limitée par le manque de semences de bonne qualité et des supports techniques. Les efforts visant à soutenir la performance du sous-secteur LIAs sont limités par un manque général d'informations sur la demande effective des LIAs. Cette étude a évalué la demande des LIAs, que ce soit légumes ou semences, dans le contexte de l'Ouganda. L'étude a porté sur les régions nordiques et centrales en Ouganda. Les résultats des études sont basés sur des données provenant de 313 entretiens avec les

ménages, 18 groupes de discussion et 239 entretiens avec des informateurs clés. Dix-sept types de LIAs différents ont été cultivés et commercialisés par les agriculteurs dans les deux sites d'étude. *Solanum aethiopicum* et *Unguiculata vigna* étaient les LIAs les plus préférées en Ouganda centre et du nord, respectivement. Les LIAs étaient cultivées par de petits exploitants principalement pour la consommation domestique. La commercialisation des LIAs est encore fragmentée et caractérisée par des mécanismes de manutention traditionnels et une valeur ajoutée limitée. La demande totale estimative de semences pour les cinq LIAs les plus courantes dans le centre de l'Ouganda était de 88 tonnes par an, dont 62% ont été fournies par les agriculteurs eux-mêmes. Les agriculteurs ont mentionné le manque d'approvisionnement fiable de semences de qualité et abordables comme la principale raison d'utiliser leurs propres semences. La demande de semences a été significativement ($p < 0,1$) et positivement liée au prix à la production. Cela implique la nécessité d'aborder de manière globale à la fois l'accès aux semences et les contraintes du marché dans la promotion de la production des LIAs. Le développement d'entreprises semencières par des agriculteurs, les liens entre les agriculteurs et commerçants, et l'accès au marché par les agriculteurs sont des stratégies recommandées pour parvenir à une production durable des LIAs.

Mot Clés : Bonne initiative de semences, la commercialisation, la demande de semences, l'entrepreneuriat semencier, système de semences

Background

African Indigenous Vegetables (AIVs) have traditionally been a significant contributor to food security, nutrition and incomes for smallholder farmers in many parts of East Africa (Abukutsa, 2010; Mwaura *et al.*, 2014). They have an advantage over staple crops because of their shorter growing cycles, little space requirement, ability to maximize scarce water supplies and soil nutrients, and are considered less risk prone (Weinberger and Lumpkin, 2007). Awareness of nutritional benefits of AIVs is also growing amongst many East African consumers, which has elevated the commercial importance of AIVs (Irungu *et al.*, 2007). However, farmers' capacity to meet a growing demand for these vegetables has been limited by lack of good quality seed (Abukutsa *et al.*, 2005; Onim and Mwaniki, 2008) and technical packages (Abukutsa *et al.*, 2005). The majority of farmers either use seed saved from their crops over many years, or from open air markets, with problems of both purity and germination. The absence of good quality seed leads to significant production losses affecting household incomes and food security. A number of seed companies aiming to satisfy this demand have resorted to imported seed, though they remain constrained by narrow crop choice and affordability (Sperling and McGuire, 2010).

CABI's Good Seed Initiative (GSI), working with partners in East Africa (Kenya, Tanzania, Uganda, Burundi, Rwanda and South Sudan) aims to address this gap by supporting farmers to access quality seed by strengthening seed systems. Empirical evidence from CABI's work has so far shown that an effective seed supply system, that is farmer-led, and an

assured market for seed are critical factors in successfully unleashing the potential of AIVs to improve livelihoods especially for the most vulnerable populations (Karanja *et al.*, 2011). However, there is a general lack of information about the effective demand for AIVs and AIV seed in the focus countries. Without such information, it is difficult to promote commercial seed production for the purpose of sale to farmers. This study therefore aimed to generate information to understand the market demand for AIVs and AIV seed in Uganda. Results are useful in providing guidance on developing strategies for enhancing AIV (both vegetable and seed) production and marketing in order to meet the growing demand for vegetables as well as improve rural household nutrition and incomes.

Research description

Market assessment was conducted in two regions in Uganda – central and northern, using a mixed methods approach involving both a quantitative and qualitative design. Data were collected from a cross section of AIV value chain actors – vegetable and seed producers, traders, agro-dealers, consumers and agricultural extension personnel. In Northern Uganda, the assessment was conducted during January 2015, covering two districts - Lira and Kitgum. A total of 12 focus group discussions, 120 household interviews, and 160 key informant interviews were conducted. In central Uganda, the assessment was conducted during August 2015, covering five districts - Buikwe, Kampala, Masaka, Mpigi and Wakiso. Six FGDs, 193 household interviews, 35 agro-dealer and 44 vegetable trader interviews were conducted. We also observed farmer practices and marketplace conditions to ascertain product quality, quantities sold, participants and product flow.

Data gathered from FGDs were analysed using descriptive and content analysis techniques. Perceptions and opinions of the respondents about AIVs were analysed using rating scale and presented using graphs and tables. To estimate seed demand, we first estimated the seed requirement, as the seed needed to plant the total AIV production area. Seed requirement was obtained by multiplying the seed rate per acre by the number of acres cultivated (1ha = 2.2 acres). Seed demand was then derived as the quantity of AIV seed that seed users wish to secure from the “market”, followed by estimation of seed input function to explain the factors affecting seed demand for AIVs. The estimated empirical form of the demand for seed was stated as in equation 1 (Ogola *et al.*, 2012);

$$\text{Seed}_{ki} = g (p_{ki}, r_{ji}^f, r_{ki}^s) \quad (1)$$

Where, Seed_{ki} = amount of seed j of vegetable k used by farmer i ; p_{ki} is the price of vegetable k grown and marketed by farmer i ; r^f , r^s = are fertilizer and seed prices respectively. The model was estimated using OLS. Data were analysed using STATA 12 statistical package.

Findings

Importance of AIVs

The study identified 17 different types of indigenous vegetables grown and marketed in the study locations (Table 1). AIVs were mostly grown by rural households twice a year with farmers allocating relatively small proportions of their land (about 0.3 acres) to vegetable production per season. A small proportion (about 5%) of farmers with adequate capital base to hire labour and purchase inputs, allocated 1-2 acres for AIV production, and produced vegetables at least 3-4 times a year. The short growth duration (3 weeks –3 months) of AIVs facilitated sequential cropping where the same or different vegetable crops were planted sequentially on the same piece of land within the season. Differences in preference of AIVs across the two study regions existed, attributed to cultural attachments, environmental conditions and perceived palatability of AIVs with key staples. *Solanum aethiopicum* and *Vigna unguiculata* were the most preferred AIVs in central and northern Uganda, respectively. These vegetables were also the most popularly grown and marketed in the two regions. Other preferred AIVs by proportion of both producers and traders were *Amaranthus lividus*, *Solanum aethiopicum (gilo)* and *Gynandropsis (Cleome) gynandra*.

Table 1: Common AIVs grown and marketed in central and northern Uganda

No.	Scientific Name	Common English name	Traditional name (Luganda) *	Traditional name (Acholi / Langi) *
1	<i>Amaranthus dubius</i>	Amaranthus	Doodo	Dodo
2	<i>Amaranthus lividus</i>	Amaranthus	Bugga	Abuga
3	<i>Brassica oleracea</i>	Kale	Sukuma wiki	Sukuma wiki
4	<i>Cajanus Cajan</i>	Pigeon peas	Nkolimbo	Lapena
5	<i>Cassia obtusifolia</i>	Sicklepod	-	Oyado
6	<i>Corchorus species</i>	Jute mallow	Mlende	Otigo dii
7	<i>Crotalaria ochroleuca</i>	Slender leaf	-	Lala / Alayu
8	<i>Cucurbita maxima</i>	Pumpkin leaves	Sunsa	Chwicha
9	<i>Gynandropsis (Cleome) gynandra</i>	Spider flower	Jjobyo	Akeyo/Akeo
10	<i>Hibiscus esculentus</i>	Okra	Mlende	Otigo lwoka
11	<i>Hibiscus sabdariffa</i>	Hibiscus	-	Malakwang
12	<i>Manihot esculentum</i>	Cassava leaves	-	Pot mogo
13	<i>Solanum aethiopicum</i>	Scarlet eggplant	Nakati	-
14	<i>Solanum aethiopicum (gilo)</i>	African eggplant	Ntula	Ntula
15	<i>Solanum indicum</i>	Bitter berries	Katunkuma	Oli / Uli
16	<i>Solanum nigrum</i>	African night shade	Nsuga	Obugacuga
17	<i>Vigna unguiculata</i>	Cow peas	Gobe	Boo / Boyo

*We obtained local names for only those AIVs observed in the study regions at the time of the survey, both at farm and market.

AIV marketing was characterized by traditional handling and storage mechanisms, with no cold storage at all levels. Limited processing and value addition was done especially in northern Uganda where leafy vegetables were dried and stored. This meant that quantities and prices for AIVs had to adjust daily to clear stocks in the markets. Both AIV producers

and traders indicated that there is a growing demand for AIVs, particularly for city dwellers. However, a number of constraints exist that affect the sub-sector’s ability to meet this growing demand. Pests and diseases, prolonged dry spells and high cost of production inputs were the key production constraints, while low market, low output price and price fluctuations were the key marketing constraints (Fig 1).

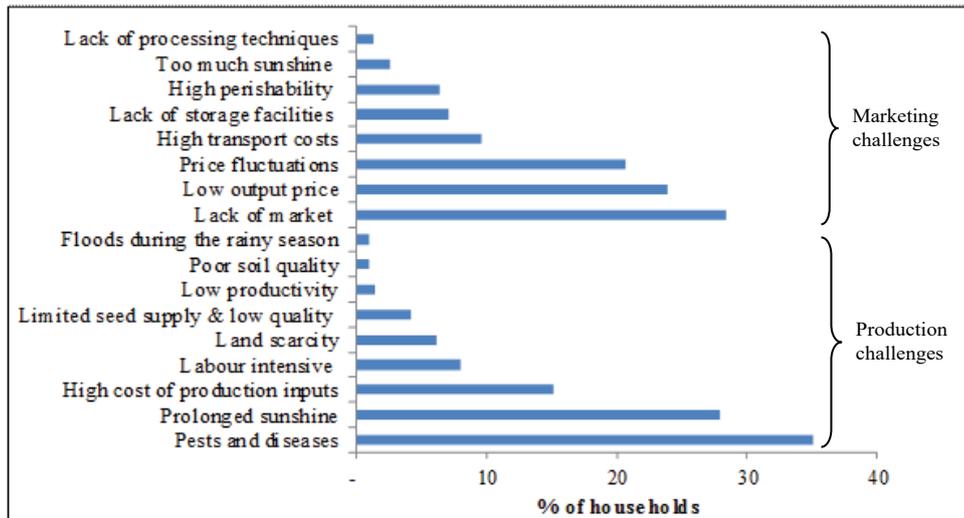


Figure 1: Production and marketing challenges for leafy vegetables

AIV seed systems and seed demand

AIV producers obtained seed from three co-existing seed systems. The largest proportion of farmer seed was obtained from farm saved seed (41%) followed by seed from neighbours and local market (Figure 2). Agro-dealers and seed producing groups contributed 12% and 5% of farmer seed, respectively. According to 60% of the farmers, the key reason for using own seed was the lack of reliable supply of quality seed, yet, they considered their own saved seed to be of good enough quality and always available at the time of planting.

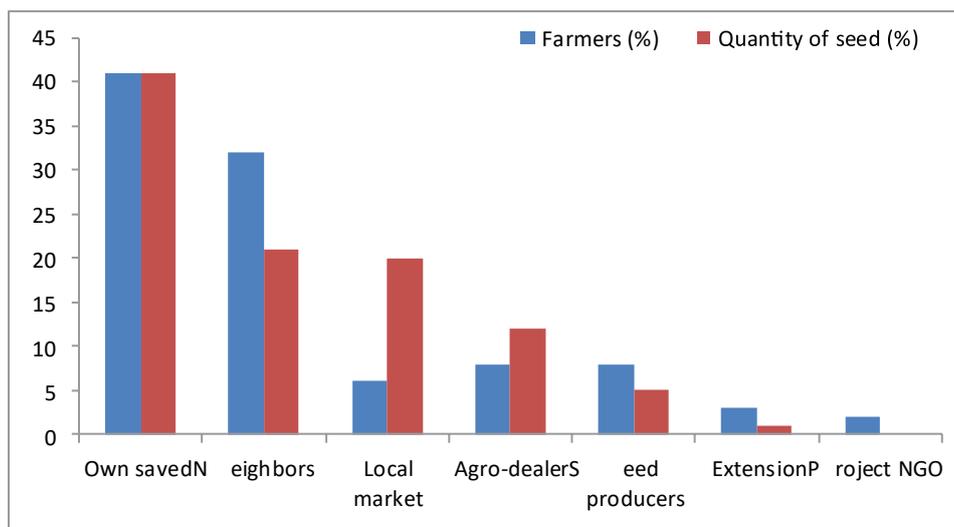


Figure 2: AIV seed sources by proportion of farmers and quantity of seed used.

The estimated aggregate seed demand per year for the most popular AIVs in central Uganda (*Amaranthus lividus*, *Amaranthus dubius*, *Gynandropsis gynandra*, *Solanum aethiopicum* and *Solanum gilo*) was 88 tonnes per year, of which at least 62% was supplied by farmers themselves (farmer seed systems). This implied that farmers utilized seed from market sources, averaging approximately 32 tonnes per year. In comparison, aggregate AIV seed sale for the entire sample was approximately 4.4 tonnes of seed per season. This indicated a gap in meeting the potential seed demand by farmers. This was further confirmed by agro-dealers who indicated that they were not able to satisfy the markets, most of them estimating that they needed to more than triple their current sales if they were to meet the customer requirements. *Amaranthus lividus*, *Solanum gilo* and *Solanum aethiopicum* accounted for 31%, 25% and 23% of total seed demand, respectively. Demand for seed was significantly ($p < 0.1$) and positively related to output price (Table 2). This implied that if farmers anticipated better output prices, they would respond positively by using and/or demanding more seed for AIVs.

Table 2: Factors affecting AIV seed demand in central Uganda

Seed demand	Coefficients	Standard Error	t Stat	P-value
Intercept	0.717**	0.288	2.488	0.014
Seed price per kg	-1.476e-06	0.0006	-0.245	0.807
Output price per kg	0.001*	0.0006	0.946	0.071
Fertilizer price per kg	-2.934e-05	0.0007	-0.372	0.345
N	193			
R2	0.061			
F-value	0.384			

Statistical significance at the 0.01 (***), 0.05 (**), 0.1 (*) level of probability

Recommendations

The results highlight the need to promote access to quality AIV seed, first to bridge the gap between seed demand and supply, but also promote AIV production which has potential to improve income and nutrition of smallholder farmers. Promotion of local level seed entrepreneurs and expansion of agro-dealer networks to reach local levels, are some of the ways for reaching out to smallholder farmers. This should be coupled with strengthening farmer capacity in better production practices, in particular, the ability to meet proper fertiliser and disease management regimes for the most preferred AIVs. Given the positive relationship between seed demand and output price, promotion of output markets is key in the promotion of quality seed. Supporting farmers and traders to ensure proper post-harvest handling, storage and processing could help alleviate the challenge of price variability thereby improving returns by farmers and traders in the AIV value chain.

Acknowledgements

This survey was conducted as part of the project entitled, “Good Seed Initiative” financed by Irish Aid. CABI is the project Lead Institute and the project partners include: The World Vegetable Center– Eastern and Southern Africa (AVRDC-ESA); Horticultural Research and Training Institute Tengeru (HORTI Tengeru) and: INADES Formation Tanzania (IFTz) in Tanzania and: National Crops Resources Research Institute (NaCRRI) and; Mukono Agricultural Research and Development Institute (MuZARDI) in Uganda. The financial contribution of ISSD Uganda towards market assessment in northern Uganda is acknowledged. The authors are grateful to the farmers who participated in this study and to the field enumerators who helped in collecting the data. This paper is a contribution to the 2016 Fifth African Higher Education Week and RUFORUM Biennial Conference.

References

- Abukutsa, M.O.O. 2010. African Indigenous Vegetables in Kenya: Strategic repositioning in the Horticulture Sector. Second Inaugural Lecture of the Jomo Kenyatta University of Agriculture and Technology, April 2010. ISBN 9966 - 923 - 31 - 4. 63 pp.
- Abukutsa-Onyango, M.O., Mwai, G.N. and Onyango, J.C. 2005. Studies on horticultural practices of some African Indigenous Vegetables at Maseno University. In: Abukutsa-Onyango, M.O., Muriithi, A. N., Anjichi, V.E., Ngamau, K., Agong, S.G., Fricke, A., Hau, B. and Stützel, H. (Eds.) proceedings of the third workshop on Sustainable Horticultural Production in the Tropics, 26th to 29th November 2003, Maseno University (MSU). 13-18 pp.
- Irungu, C., Mburu, J., Maundu, P., Grum, M. and Hoesle-Zeledon, I. 2007. Analysis of Markets for African leafy vegetables within Nairobi and its environs and implications for on-farm conservation of biodiversity. A consultancy report for Global Facilitation Unit for Underutilised Species, Rome, Italy.
- Karanja, K.D., Okoko, N., Kiptarus, E., Okongo, P., Samali, S., Katunzi, A., Mtwenzi, H., Mwakitwange, F., Afari-Sefa, V., Musebe, R., Kimani, M. and Kimenye, L. 2011. Promoting farmer-led seed enterprises of African indigenous vegetables to boost household incomes and nutrition in Kenya and Tanzania. ASARECA.
- Mwaura, S.N., Muluvi, A.S. and Mathenge, M.K. 2015. African leafy vegetables and household wellbeing in Kenya: A disaggregation by gender. *Current Research Journal of Social Sciences* 6 (4): 82-94.
- Ogola, J. B.O., Orawo, A.O. and Ayieko, M.W. 2012. Assessment of factors affecting the farmer demand for seed potato in Nakuru District, Kenya. *African Journal of Agricultural Research* 7 (23): 4151-4157.
- Onim, M. and Mwaniki, P. 2008. Cataloguing and evaluation of available community/farmers - based seed enterprises on African indigenous vegetables (AIVs) in four East and Central Africa countries. ASARECA report, Entebbe Uganda. 95pp.
- Weinberger, K. and Lumpkin, T. A. 2007. Diversification into horticulture and poverty reduction: A research agenda. *World Development* 35: 1464–1480.