

Prioritizing Wild Medicinal and Food Plants with Potential for Commercialization and Value Chain Improvement for Livelihood Enhancement and Poverty Reduction in Uganda

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Abstract: Uganda is endowed with a diversity of wild and cultivated plant species that can be commercialized for livelihood enhancement and poverty reduction. These wild plants are increasingly becoming a valuable source of livelihoods for many people through household use and trading as medicine, food or craft materials. However existing literature on commercialization of wild food and medicinal plants in Uganda is largely anecdotal and disjointed. The objectives of this study were to (i) to identify wild food and medicinal plants sold in capital markets in Kampala (ii) To rank wild food and medicinal plants with potential for commercialization (iii) To identify challenges affecting wild medicinal and food plants trade in Uganda. A market survey was conducted in the markets of Kampala Capital City to identify wild and semi wild food and medicinal plants on the market. A total of 48 wild and semi wild food and medicinal plant species were recorded on the market. Using commercialization index, the wild plants were ranked according to their commercialization potential. It is evident from this study that wild plants with commercialization potential do exist on the Ugandan markets. It is recommended that in-depth value chain analysis of potential plants be conducted and business capacity of traders be developed.

Keywords: Commercialization, food plants, prioritization, uganda, wild medicinal

INTRODUCTION

Uganda like many other tropical countries is endowed with a wide diversity of wild food and medicinal plants species. A great number of these wild plants have potential to generate income and support people's livelihoods (Agea *et al.*, 2008). Once identified, marketed and the value chain developed, the wild plants have enormous potential to contribute to poverty reduction in developing economies through commercialization. This has been observed to work in South Africa and many West African economies (Shackleton *et al.*, 2002; De Caluwe, 2011).

Some of the wild plants sold in Uganda have been documented (Agea *et al.*, 2008; Buyinza and Muyanja, 2008; Agea, 2010). Earlier studies however focused on plants known and used in the home (Naluswa, 1993; Tabuti *et al.*, 2004; Tabuti, 2007; Agea *et al.*, 2011) and did not investigate which plants are sold in markets. Many others species remain undocumented even though they may have potential for commercialization.

Successful commercialization of wild plants requires robust information, a good policy and institutional

environment to be able to boost investor confidence in the sector (Ingram and Bongers, 2009). Once commercialized, wild plants provide many economic benefits generally to the national economy but particularly to the people involved in trade (Schippmann *et al.*, 2002).

Furthermore, commercialization and the increase in value of the wild plants can generate positive attitude towards the need to conserve them to guarantee benefits (Marshall *et al.*, 2006).

In Uganda, wild plants are used by many people because of their low costs and effectiveness against a background of poor infrastructure, cultural and religious preferences and inadequate provision of basic services such as medicine, food and synthetic craft alternatives (Shanley and Luz, 2003).

Some of the wild plants sold in Uganda include *Mondia whitei*, *Prunus africana*, *Solanum nigrum*, *Rubus pinnatus*, *Munodota junodoii*, *Physalis peruviana*, *Cyphomandra betacea*, *Luffa cylindrica* and *afromomum angustifolium*, among others.

While many wild plant species are sold on local markets in Uganda, there is no information on their commercialization potential and level of importance.

Information regarding how many species are on the market and which products are derived from these is largely not documented in Uganda (Tabuti, 2007). Research on wild plants in Uganda has concentrated on documenting indigenous knowledge with less effort on commercialization resulting in limited market information (Agea *et al.*, 2008).

The overall aim of this study was therefore to document and characterize the wild plants with potential for commercialization in Uganda. For purpose of this study, the term wild plants includes plants cultivated under agroforestry. Specific objectives of the study were:

- To identify wild food and medicinal plants on sale in capital markets in the Capital Kampala.
- To rank wild food and medicinal plants with potential for commercialization.
- To identify challenges affecting wild medicinal and food plants trade in Uganda.

MATERIALS AND METHODS

Study area: The study was conducted in all the administrative division markets of the Ugandan Capital Kampala. The study markets were composed of Owino and Nakasero in Central Division, Nakawa in Nakawa Division, Natete in Rubaga Division, Kalerwe in Kawempe Division and Ndeeba in Rubaga Division.

Kampala city is situated in Central Uganda covering a surface area of 195 km² (UDI, 2005). It lies between latitude 0°19'N and longitude 32°35'E (Agea *et al.*, 2008). It has a bi-modal rainfall regime with peaks being March to May and September to November. The mean annual rainfall ranges between 1750 to 2000 mm, respectively.

The temperature is moderately high with a minimum of about 17°C and a maximum of about 28°C. The major economic activity in city is trade. According to Uganda Bureau of Statistics (2005), Kampala city has a population of 1.2 million people but the city has a daily transient population of about 2.3 million people. The city population growth rate is at 3.9% (average density: 51 in/ha). About 39% of the population in the city lives in absolute poverty and 43% of the population are unemployed (Uganda Bureau of Statistics, 2005).

Methods: The study commenced with a desk review of the literature followed by a reconnaissance market survey in June 2011 to confirm which wild food and medicinal plants species are sold in the capital city markets and to test the research instrument. The reconnaissance covered all the five administrative divisions of the capital city.

Data was collected between July and December 2011 through a market survey in which face to face interview

of wild plants traders were conducted with the help of two research assistants who were before the reconnaissance introduced to the study and trained to administer the study's research instrument.

Sampling was done using snowball's sampling method as described in Giuliani and Padulosi (2005) and De Caluwe (2011). In this sampling method, the researcher identifies all respondents by reference from other previous respondents until the sample becomes saturated. This non parametric sampling method was useful in reaching a population that is not known, hard to find and to capture information across a deal of variation in sites, species and groups (Giuliani and Padulosi, 2005).

A total of 181 traders were interviewed from Nakasero, Owino, Nakawa, Natete, Ndeeba and Kalerwe markets. In addition to the Markets, petty traders met hawking the plants were also interviewed.

Identification of wild plants on the market was done by physical observation of the plants by the researcher with the help of the traders who would reveal the local name and then the name would be confirmed with the descriptions listed in Katende *et al.* (1999). Samples of the Plants which were not covered by Katende *et al.* (1999) were collected and taken to Makerere University Herbarium for identification.

The traders were asked the local names of the plants they were selling, which plant parts were useful, range of products from the plant, how and where they obtained their stock, how they perceived importance of the plants they sell, seasonality of supply, weekly profit margin from the plants on sale, challenges affecting their trade and what assistance they expected to overcome the said challenges.

Data analysis: The Data collected were coded and analyzed using Statistical Package for Social Sciences (SPSS) and Microsoft Excel worksheets. The plants were ranked according to their commercialization potential by use of set criteria involving frequency of occurrence on the market for a given plant, number of nodes in a given plant value chain, perceived supply and demand sustainability rankings and overall perceived economic importance. Commercialization index was then computed for each plant species recorded on market using the equation below:

$$CI = 1/5\{F+N+S+D+E\}$$

where, CI is the Commercialisation index, F is frequency of plant species on the market, N is the number of nodes in the value chain, S is the perceived supply sustainability rating on a scale of 1-5, D is the perceived demand sustainability rating on a scale of 1-5 and E is the

perceived overall economic importance on a scale of 1-5 where 5 is the most important and 1 is the least value.

Weekly profit margins were excluded from the computation of the ranking due to the fact that reliability of the figures could not be established. This was mainly because the respondents did not keep proper business records to be able to ascertain the profit margins.

RESULTS

Demography of respondents: Majority of respondents (78%, N = 181) interviewed were females. Many (55%) of the respondents were married and the religious denomination of most (30%) of the respondents was Catholic. A big number of the respondents (34%) were aged between 31 and 40 years and the highest level of education for the majority (44%) of the respondents was primary level (Table 1).

Most of the interviewed people (66%) were family heads and the highest (73%) number of the interviewees were Baganda by tribe. The average number of years spent in wild plants trade by the respondents was $5 \pm SD5$ years, the shortest time being 4 months while the longest being 20 years.

Wild plants on the capital markets: A total of 48 species of wild and semi wild food and medicinal plants were identified in the markets surveyed during the study period. Of these, 34 were predominantly food plants while 14 were predominantly medicinal plants (Table 2).

The study reveals that on average, trade in a wild or semi wild food or medicinal plant generates Ushs 26,775 per week as profit (Table 2). The highest profit being Ushs 140,000 from *Luffa cylindrica* sales while the lowest being Ushs 200 from sale of *Capsicum frutescens*. The trade in a wild or semi wild food or medicinal plant was providing an average contribution of 36% to the household incomes of the traders, the highest contribution being as high as 80% for *Luffa cylindrica* while lowest being 2% for *Solanum nigrum* (Table 2).

The value chain nodes of the plants on market were found to be short, the longest chain having three nodes while the shortest having two nodes. The longest node was Collection-Whole sale-Retail chain while the shortest was retail by collection-retail chain. There was little value addition along the value chains identified.

Aggregate ranking of the commercialization potential indicate that the most ten commercially viable wild and semi wild food and medicinal plants according to their level of commercialization potential were *Luffa cylindrical*, *Cyphomandra betacea*, *Physalis peruviana*, *Solanum aethiopicum*, *Mangifera indica*, *Amaranthus lividus*, *Cinnamon zeylanicum*, *Amaranthus dubius*, *Canarium schweinfurthii* and *Citrus limon*.

Table 1: Characteristics of respondents

Variable	Response (%)
Sex	
Male	22
Female	78
Age (years)	
Below 20	9
21-30	32
31-40	34
41-50	15
Above 50	10
Marital status	
Married	55
Divorced	19
Never married	26
Religion	
Muslim	24
Catholic	21
Protestant	30
Pentecostal	25
Education	
No formal education	29
Primary (PLE)	44
Uganda Certificate of Education (UCE)	16
Uganda Advanced Certificate of Education (UACE)	5
University degree	5
Vocational qualification	1
Tribe	
Baganda	73
Bakiga	8
Luo	1
Bagisu	1
Banyankole	6
Banyarwanda	4
Banyoro	3
Batoro	3
Basoga	1

Challenges facing the trade in wild plants: The respondents reported that major problems affecting the trade include seasonality of supplies and demand (80%, N = 181), inadequate capital (30%), perishability due to low shelf life of some plants (90%), difficulty in obtaining credit hence lack of adequate capital since the business is largely informal (70%) and lack of adequate market space to expand trade (45%).

DISCUSSION

Demography: Majority of the traders encountered in the study were women. This confirms the long established fact in West Africa (De Caluwe, 2011) and East Africa, particularly Uganda (Agea *et al.*, 2011), that trade in wild food and medicinal plants are generally traded by women. The trade in Uganda is embraced by people from all major religious denominations existing in Uganda at present. There is therefore no major influence of this trade by belief.

The wild medicinal and food plants' trade is embraced by people of all age groups ranging from the youth to the elderly. This makes the commercialization of

Table 2: Ranked food and medicinal plants

Plant									
	Scientific name	Local name (Luganda)	Dominant use	S	D	E	F	N	CI
1	<i>Luffa cylindrica</i>	Kyaangwe	sponge/food	3.0	5.0	4	30	2	9
2	<i>Cyphomandra betacea</i>	Binyaanya	food	4.0	4.0	5	14	3	6
3	<i>Physalis peruviana</i>	Ntuntunu	food	4.0	4.0	5	10	3	5
4	<i>Solanum aethiopicum</i>	Nakati	food	5.0	5.0	5	8	3	5
5	<i>Mangifera indica</i>	Muyembe	food	3.0	4.0	5	9	3	5
6	<i>Amaranthus lividus</i>	Bbugga	food	4.0	5.0	4	8	3	5
7	<i>Cinnamon zeylanicum</i>	Budalasiini	food	3.0	3.0	4	8	3	4
8	<i>Amaranthus dubius</i>	Doodo	food	3.0	5.0	3	6	3	4
9	<i>Canarium schweinfurthii</i>	Mpafu	food	5.0	5.0	5	1	3	4
10	<i>Citrus limon</i>	Niimu	food	5.0	5.0	3	3	3	4
11	<i>Cleome gynandra</i>	Jobyo	food	3.0	5.0	5	4	2	4
12	<i>Persa americana</i>	Ovacado	food	2.0	4.0	3	7	3	4
13	<i>Passiflora edulis</i>	Obutunda	food	3.0	4.0	5	4	3	4
14	<i>Albizia coriaria</i>	Omugavu	medicine	4.0	5.0	4	2	3	4
15	<i>Balanitis wilsoniana</i>	Nnalgwalimu	medicine	5.0	5.0	4	1	3	4
16	<i>Affromomum angustifolium</i>	Matungulu	food	3.0	4.0	4	4	3	4
17	<i>Capsicum frutescens</i>	Kaamulali	food	4.0	2.0	2	6	3	3
18	<i>Hymenocardia acida Tul.</i>	Mbaluka	medicine	3.0	4.0	4	3	3	3
19	<i>Prunus africana</i>	Ntasesa	medicine	3.0	5.0	4	2	3	3
20	<i>Dioscorea praeensis</i>	Bukupu	food	3.0	5.0	3	3	3	3
21	<i>Citrus reticulata</i>	Mangada	food	1.0	5.0	4	5	2	3
22	<i>Solanum anguivii</i>	Katunkuma	food	3.0	3.0	3	5	2	3
23	<i>Warbugia ugandensis</i>	basi	medicine	2.0	4.0	3	4	3	3
24	<i>Warbugia ugandensis</i>	Mukuzanume	medicine	4.0	5.0	3	1	3	3
25	<i>Cocos nucifera</i>	Coco nut	food	5.0	5.0	2	1	3	3
26	<i>Artocarpus heterophyllus</i>	Fene	food	4.0	4.0	4	1	2	3
27	<i>Morella kandiana</i>	Nkikimbo	medicinal	2.0	4.0	4	2	3	3
28	<i>Toddalia asiatica</i>	Kawule	medicine	2.0	5.0	5	1	2	3
29	<i>Mondia whitei</i>	Mulondo	medicine	3.0	3.0	4	2	3	3
30	<i>Citris sinensis</i>	Micungwa	food	5.0	2.0	2	4	2	3
31	<i>ecuridaca longipeduculta</i>	Mukondwe	medicine	4.0	3.0	4	1	2	3
32	<i>Psorospermum febrifugum</i>	Kanzironziro	medicine	2.0	5.0	3	1	3	3
33		Musongola	medicine	4.0	3.0	3	1	3	3
34	<i>Vigna unguiculata</i>	Gobe	food	4.0	2.0	3	2	3	3
35	<i>Citrus limon</i>	Niimu	medicine	4.0	3.0	2	1	3	3
36	<i>Solanum nigrum</i>	Nsuga	food	2.0	2.0	5	2	2	3
37	<i>Annona reticulata</i>	Bitafeeri	food	4.0	2.0	2	1	3	2
38	<i>Psidium guajava</i>	Mapeera	food	5.0	2.0	1	2	2	2
39	<i>Colocasia esculenta</i>	Mayuni	food	1.5	3.0	3	1	3	2
40	<i>Carica papaya</i>	Pawpaws	food	3.0	2.0	3	2	2	2
41	<i>Syzygium jambos</i>	Mizabibu	food	2.0	2.0	2	1	3	2
42	<i>Dioscorea cirrhosa</i>	Balugu	food	2.0	2.0	2	1	3	2
43	<i>Syzygium cumini</i>	Jambura	food	2.0	2.0	2	1	2	2
44	<i>Dioscorea cayenensis</i>	Kyetutumula	food	1.5	1.5	2	1	3	2
45	<i>Vangueria apiculata</i>	Matugunda	food	2.0	2.0	1	1	2	2
46	<i>Sechium edule</i>	Nsuusuuti	medicine	2.0	1.0	1	1	3	2
47	<i>Rubus pinnatus</i>	Nkenene	food	1.0	1.0	2	1	2	1
48	<i>Brassica sp.</i>	Saaga	medicine	2.0	1.0	1	1	2	1

this trade more acceptable and easy to entrench in society in a bid to promote employment creation for Ugandans.

The trade is characterized by low levels of education making it hard for market information access, proper book keeping and formalization of this trade. This situation is also reported by Agea *et al.* (2011) in Uganda and De Caluwe (2011) in Mali and Benin. Implication of this finding is that this trade is still informal and unattractive to professional business people. Appropriate basic business skills would impliedly be lacking in such groups

of people presenting a challenge to full commercialization of this enterprise (De Caluwe, 2011).

Prioritizing wild plants for commercialization: Trade in wild plants in Uganda has existed for a long time. This can be deduced from the number of years traders interviewed under this study, have been in this enterprise. It is however apparent that this trade has not grown exponentially to full commercial production save for a few plants like *Ruffa cylindrica* which is increasingly

becoming a commercial product for many small scale traders.

This study confirms the fact that wild plants have the potential to contribute to household incomes. While the recorded profit margin per week may have some inaccuracies resulting from lack of proper books of accounts by the respondents, the mere fact that the traders appreciate this financial contribution is significant enough to affirm this importance. This economic importance has long been documented by ethno botanists and economists globally (De Merode *et al.*, 2004; Akankwasah *et al.*, 2012).

Value chains of most wild plants on trade in Kampala are too short and unelaborated. Save for a few wild plant species, the value chains begin with collectors and directly reach the end point of retailers or petty traders. There is no systematically developed value chains thereby leading to loss of jobs, income and higher quality of products in trade. This scenario is reported in West African Countries of Benin and Mali (De Caluwe, 2011), Uganda (Agea *et al.*, 2011) and Congo (De Merode *et al.*, 2004).

This study generally ranks the wild and semi wild medicinal and food plants identified on the market giving respective commercialization potential and perceived levels of impotence. However, owing to limited scope of this study, time and financial constraint, a detailed value chain analysis of individual plants was not done.

The weekly profit margins could not be included in the computation of the commercialization index due to the fact that the respondents did not keep proper business records to allow ascertaining of the profit margin figures. There need to devise alternative methods for computing the profit margins as the figures given by the respondents should always be ascertained.

There even could be more plants that were not captured by the study especially those that could be offseason. Nevertheless, given the fact that even those offseason could have been mentioned as per the questionnaire design, it can be concluded that the number recorded is significant enough to provide a basis for the ranking given.

CONCLUSION AND RECOMMENDATIONS

It is evident from this study that wild plants with commercialization potential do exist on the Ugandan markets. The top wild food and medicinal plants with potential for commercialization in Uganda are *Luffa cylindrical*, *cyphomandra betacea* and *Physalis peruviana*.

A more detailed study of value chains for the highly rated commercialization individual candidate plants

should be conducted with a view of developing the value chains of these plants so that they can be commercialized to exploit their economic as well as their conservation potential.

The wild and semi plants traders should form organized groups so that they can easily advocate for recognition by Government and extension of training and advisory services.

Government should provide training of the traders in basic business management skills, quality assurance and value addition training in order for them to be able to formalize this enterprise and meaningfully contribute to poverty reduction and livelihood enhancement.

Government should provide soft loans to boost the capital of the traders. This will enable the traders deal with seasonality and low shelf life associated with majority of wild medicinal and food plants.

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REFERENCES

- Agea, G.J., 2010. Use and Potential of Wild and Semi-Wild Food Plants in Alleviating Household Poverty and Food Insecurity: A Case Study of Bunyoro-Kitara Kingdom, Uganda. Ph.D. Thesis, School of Environment, Natural Resources and Geography, Bangor University, Bangor, United Kingdom.
- Agea, G.J., B. Katongole, D. Waiswa and G.N. Nabanoga, 2008. Market survey of mondia whytei (mulondo) roots in kampala city, Uganda. Afr. J. Tradit. Complim. Altern. Med., 5(4): 419-420.
- Agea, G.J., J.M. Kimondo, C.K. Okia, R.A.A. Abohassan and J. Obua *et al.*, 2011. Contribution of wild and semi wild food plants to overall household diet in Bunyoro Kitara Kingdom, Uganda. Agric. J., 6(4): 134-144.
- Akankwasah, B., J.R.S. Tabuti, P. Van Damme, G.J. Agea and V. Muwanika, 2012. Potential for commercialization and value chain improvement of wild food and medicinal plants for livelihood enhancement in Uganda. Curr. Res. J. Bio. Sci., 4(2): 108-116.
- Buyinza, M. and S. Muyanja, 2008. Profitability and economic efficacy of Tamarind (*Tamarindus Indica L.*) production: A case of Green money in the drylands of Northern Uganda. J. Econ. Theor., 2(1): 1-9.

- De Caluwe, E., 2011. Market chain analysis of baobab (*Adansonia digitata L.*) and tamarind (*Tamarindus indica L.*) products in Mali and Benin. Ph.D. Thesis, Faculty of Bioscience Engineering, Ghent University, Ghent, Belgium.
- De Merode, E., K. Homewood and G. Cowlishaw, 2004. The value of bush meat and other wild foods to rural households living in extreme poverty in Democratic Republic of Congo. *Biol. Conserv.*, 118: 573-581.
- Giuliani, A. and S. Padulosi, 2005. Enhancing the value chain for markets for traditional producers of aromatic, vegetable and fruit species in the Near East: A pilot study in Syria. Proceedings of the International Conference, Promoting community-driven conservation and sustainable use of dryland agrobiodiversity, April 2005, ICARDA, Aleppo, Syria, pp: 18-21
- Ingram, V. and G. Bongers, 2009. Valuation of Non-Timber Forest Product Chains in the Congo Basin: A methodology for valuation. CIFOR. Yaounde, Cameroon, FAO-CIFOR-SNV-World Agroforestry Center-COMIFAC. pp: 80.
- Katende, A., P. Ssegawa, A. Birnie, C.H. Holding and B. Tengas, 1999. Wild food plants and mushrooms of Uganda. Regional Land Management Unit (RELMA), SIDA, Technical Handbook No 19, Nairobi.
- Marshall, E., K. Schreckenberg and A.C. Newton, 2006. Commercialization of Non-timber Forest Products: Factors Influencing Success: Lessons Learned from Mexico and Bolivia and Policy Implications for Decision-makers. Cambridge: UNEP World Conservation Monitoring Centre.
- Naluswa, J.T., 1993. A Report on a Pilot Country Study of Non-Wood Forest Products in Uganda. Commonwealth Science Council. Commonwealth Secretariat. London.
- Schippmann, U., D.J. Leaman and A.B. Cunningham, 2002. Impact of Cultivation and Gathering of Medicinal Plants on Biodiversity: Global Trends and Issues. FAO, Rome.
- Shackleton, C.M., S.E. Shackleton, M. Ntshudu and J. Ntzebeza, 2002. The role and value of savanna non-timber forest products to rural households in the kat river valley. *South Afr. J. Trop. For. Prod.*, 8: 45-65.
- Shanley, P. and L. Luz, 2003. The impacts of forest degradation on medicinal plant use and implications for health care in eastern Amazonia. *Bioscience*, 53(6): 573-584.
- Tabuti, J.R., S.S. Dhillion and K.A. Lye, 2004. The status of wild food plants in Bulamogi County, Uganda. *Int. J. Food Sci. Nutr.*, 55: 485-498.
- Tabuti, J.R.S., 2007. Status of non-cultivated food plants in Bulamogi County, Uganda. *Afr. J. Ecol.*, 45(Suppl. 1): 96-101.
- Uganda Bureau of Statistics, 2005. Uganda Population and Housing Census, Main report. UBOS, Entebbe, Uganda.
- Uganda Districts Information Handbook (UDIH), 2005. Fountain Publishers, Kampala.