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UTILIZATION OF INDIGENOUS FOOD PLANTS IN UGANDA: A CASE STUDY OF SOUTH-WESTERN UGANDA

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ABSTRACT

The purpose of the study was to document and establish the traditional processing methods of indigenous food plants in Rukungiri district. In order to establish the status and level of utilization and processing of indigenous food plants in south-western Uganda, a baseline survey was carried out using a participatory method of data collection. Respondents in Rukungiri district cited a total of 94 plants that were used for food. Some of the food plants were classified as indigenous to the area, while others were classified as exotic. The food types generally fell into five broad categories, namely; vegetables, fruits, roots/tubers, pulses and cereals. Vegetables and fruits were the most commonly used food plants and the *Amaranths* species were found to be the most popular vegetables, whereas wild plums (C*arissa edulis*) and gooseberries (*Physalis minima*) were cited among the preferred fruit species. In spite of the fact that indigenous/traditional food plants have always ensured food security at the household level, the process of collecting them from the wild, their production,consumption and domestication was found to be on the decline in this area. This decline can be attributed to limited available knowledge on their nutritional content and to the emphasis that is placed on commercial, high yielding exotic plants by both the agricultural extension officers and farmers. The majority of farmers are only interested in the cultivation of crops from which they can earn an income, and because no one has cultivated indigenous food plants with the intention of earning an income from them, the plants have not proved their worth. Although the methods of utilization, especially food preparation, varied from one household to another, boiling, steaming and frying were very common and cross-cutting almost all the households. The principal mode of food preservation cited by households, especially for seeds, was sun drying.

Key words: Survey, indigenous foods, utilisation, Uganda

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French

UTILISATION DE PLANTES ALIMENTAIRES INDIGÈNES EN OUGANDA : ÉTUDE DE CAS DU DISTRICT DE RUKUNGIRI

RÉSUMÉ

L'étude avait pour objectif de documenter et établir les méthodes de traitement traditionnelles de plantes alimentaires indigènes du district de Rukungiri. Afin d'établir la situation et le niveau d'utilisation et de traitement des plantes alimentaires indigènes au sud-ouest de l'Ouganda, une étude initiale a été réalisée en utilisant une méthode participative de collecte de données. Les enquêtés du district de Rukungiri ont cité 94 plantes qui sont utilisées comme des aliments. Certaines des plantes alimentaires ont été classées comme étant indigènes à la région tandis que d'autres ont été caractérisées comme étant exotiques. Les types d'aliment sont généralement regroupés en cinq principales catégories : les légumes, les fruits, les racines/tubercules, les légumineuses et les céréales. Les légumes et les fruits représentent les plantes alimentaires les plus utilisées et les espèces Amaranths se sont révélées comme étant les légumes les plus populaires, tandis que les prunes sauvages (carissa edulis) et les groseilles à maquereaux (physalis minima) ont été évoquées parmi les espèces de fruits préférées. En dépit du fait que ces plantes comestibles indigènes/traditionnelles ont toujours assuré la sécurité alimentaire des ménages, il a été constaté que les procédés utilisés pour les recueillir dans la nature, leur consommation et domestication sont en déclin dans ce secteur. Parmi les facteurs qui ont été cités comme étant responsables de ce déclin figure le fait que la connaissance de la valeur des plantes comestibles indigènes est très limitée au sein de la population et des vulgarisateurs agricoles.

Deuxièmement, la majorité des agriculteurs ne sont intéressés que par les cultures dont ils peuvent gagner un revenu, et étant donné que personne n'a cultivé les plantes comestibles indigènes dans le but de les vendre, ces plantes n'ont pas affirmé leur valeur. En général, la production et la consommation de ces plantes comestibles étaient en déclin. Ce déclin peut être attribué à la connaissance limitée de leur composante nutritive assimilable et à l'importance qu'accordent les vulgarisateurs agricoles aux plantes commerciales exotiques à haut rendement. Bien que les méthodes d'utilisation - en particulier celles de préparation des plantes comestibles - varient d'un ménage à un autre, les cuissons à l'eau, à la vapeur et en friture étaient les plus communément employées et dans presque tous les ménages. Le principal mode de préservation des produits alimentaires cité par les ménages - surtout pour les semences - était le séchage au soleil.

Mots-clés : Etude, aliments indigènes, utilisation, Ouganda

INTRODUCTION

The local households identified most of the plants found in Rukungiri district as indigenous to the area although information available in the literature shows that some of them are not indigenous to Uganda. For this reason, in this paper, the term Indigenous Food Plants (IFP) is used interchangeably with the term Traditional Food Plants (TFP). The introduction of exotic, high yielding food plants has led to progressively fewer wild plant species being gathered or being brought into cultivation in rural areas. Consequently, some of the neglected and under-exploited indigenous traditional food plants are progressively disappearing as more and more forests are brought under cultivation. IFPs in South western Uganda have not been documented before. The main purpose of this work was to establish and catalogue indigenous food plants in Rukungiri district, to document their traditional utilization, and hence assess their potential for industrial exploitation before they disappear.

In order to establish the status and level of utilisation of the IFPs in Rukungiri district, a baseline survey was carried out. This survey was part of a wider study whose ultimate aim was to assess and document the nutritional value of all indigenous/traditional food plants with a view to promoting their conservation, consumption and industrial exploitation [1]. The study covered 11 sub counties and a total of 116 households. Participatory research/data collection techniques together with a semi-structured questionnaire were utilized to obtain data on all the traditional plants used as food, and the traditional methods of utilizing and preserving them.

This paper specifically reports on indigenous/traditional food plants of south western Uganda, with particular emphasis on their utilization in Rukungiri and Kanungu districts as a milestone and basic foundation for advising policy formulators. The results presented in this paper will supplement the findings of Katende and others who have documented the wild food plants, mushrooms and useful trees and shrubs of Uganda [2, 3].

METHODS

Study area

The survey on IFPs was carried out in the year 2000 and at that time, the new district of Kanungu had not yet been carved out of Rukungiri district. For this reason, the data from the survey presented here pertains to the current Rukungiri and Kanungu districts. The study area has three agro-ecological zones; lowland or rift valley with altitude varying from 850 m to 1300 m above seal level with rainfall up to 40 inches annually, plateau zone with an altitude of 1300 m to 1700 m and an average rainfall greater than 40 inches, while the highland zone with a higher altitude (> 1800 m) averages more than 60 inches of rainfall annually. Vegetable cultivation is practiced mainly in the highland zone but *Amaranthus* species are found in all agro-ecological zones, usually growing unattended.

Scope of the study

The study focused on establishing the status of utilization of indigenous/traditional food plants through a baseline household survey. Through the survey, the most frequently used indigenous/traditional food plants as well as the parts of plants, which are used, were established. The methods of preparation of the food plants for consumption and the preservation techniques that are locally employed by the rural communities were investigated.

Household baseline survey

The selection of the sub-counties was purposely based on ecological zones that were known to be suitable habitats for the IFPs. 11 sub-counties were selected on the basis of the ecological zones that were known to be suitable habitats for the indigenous/traditional food plants. The key criterion for selection of a household was that household members be knowledgeable on the indigenous/traditional plants of the area. The elderly respondents in the households studied were selected with the guidance of the local community mobilisers and local leaders. On average, ten rural elderly persons were selected from each sub- county for individual interviews and interviewed at their place of residence. Before each interview, there was a general discussion on what individuals considered to be IFPs and the objective of the research was explained to each interviewee so as to prevent withholding of information. Semi-structured questionnaires administered in the local language sought knowledge on the following:

- Local names of vegetable and fruit species present and those that are utilized
- Frequency of vegetable and fruit consumption (as a measure of desirability or popularity)
- Part or parts of the plant used
- Local uses of the plants
- Location/habitat where vegetables and fruits are harvested
- Trend in collection of the wild edible food plants
- Methods of preparation for consumption
- Methods of preservation of the food plants

In this paper, emphasis is placed on the utilisation of indigenous/traditional food plants of Rukungiri and Kanungu districts, which are located in south-western Uganda.
In order to compare the frequencies of consumption of the various food plants, a weight of 1, 2 and 3 was applied to the frequencies obtained for ‘rarely’, ‘often’ and ‘very often’ respectively, to obtain the composite score, which was used to compute a mean score.

RESULTS

Table 1 shows the plants cited in Rukungiri district as being used for food in one way or another. In the table, the term frequency is used to show the number of people that cited a particular plant, out of the 116 households that were interviewed. Only those plants, which were cited by more than three respondents, are tabulated. Some of the plants were only cited in the pilot area of Nyakagyeme sub-county where the

questionnaire was pre-tested. However, the respondents in the 116 households that were subjected to the final questionnaire did not confirm the plants. The table also shows the main methods of utilization of the plants, namely; in the preparation of a staple food, in preparation of sauce, in the generation of revenue for the households, in herbal remedies, in the flavouring of food and, as snacks. The other minor, negligible uses include the processing of juice, use in the making of containers, and in cultural rituals.

Table 2 shows plants that were cited to be vegetables indigenous to Rukungiri district. This group of plants were taxonomically identified after confirmation of their presence in the area. The plants have been listed by the local names and scientific names, together with the methods of how they are traditionally used and their habitat. The percentage utilization in various modes for the species is based on the number of people who cited the food plant (frequency), and on the number of people that cited a particular use of that plant. A high frequency is an indication of the popularity of the particular food plant in Rukungiri area, whereas a small frequency may imply that the plant does not exist in the area where the few respondents were located.

Table 3 shows the parts, which are used for the plants that were confirmed to be present in Rukungiri area. The table shows the parts used as leaf, fruits, flowers, stem and tuber or root. From this table, it is easy to identify fruits and leafy vegetables.
Table 4 shows indigenous/traditional fruits used in Rukungiri district. The table also shows the local name of the plant, habitat, local use, frequency and percentage utilization. The percentage utilization is based on the number of respondents in the survey and those who cited the particular plant.

Table 5 shows information on the frequency of consumption of the various food plants amongst the respondents' households. The frequency of consumption was grouped into three broad categories, namely; rarely consumed (consumed less than two times a month), often consumed (consumed two to eight times a month), and very often consumed (consumed more than eight times per month). In order to compare the frequencies of consumption of the various food plants, a weight of 1, 2 and 3 was applied to the frequencies obtained for 'rarely', 'often' and 'very often' respectively, to obtain the composite score, which was used to compute a mean score.

Table 6 presents various methods cited by the respondent households as being used in the preparation of food plants for consumption. The table also shows the number of respondents who cited a particular method of traditional food processing (frequency), out of 107 households, and a percentage based on the two figures. Table 7 shows the methods that were described by households as being used in the process of preserving food plants for storage. Only 77 households responded to this question and the frequency shows the number of households out of the 77 that cited a particular method of food preservation.

DISCUSSION

A comprehensive list of food plants used in Rukungiri district is shown in table 1.The list was compiled in the year 2000 before Kanungu district was carved out of Rukungiri district. The compilation was based on a survey that was carried out in the sub-county, which was used in pre-testing the questionnaire known as Nyakagyeme. The list was updated in the course of interviews in the selected eleven sub counties of the then Rukungiri district. Similarly, the method of processing the individual food plants was compiled and updated based on the pretest results from Nyakagyeme sub-county. The food types generally fell into five broad categories, namely; vegetables, fruits, roots/tubers, pulses and cereals. However, it is mostly fruits and vegetables that were classified as indigenous/traditional to the area (Table 2).

The major uses of the plants included provision of staple food and the preparation of relish (sauce). The fruits were found to be predominantly consumed as a snack when ripe, and to a limited extent in making fruit juices. Although there were other uses cited such as in the performance of rituals and in the making of containers, only one plant was cited in each of the two uses, namely, *Cleome gynandra* (*Eshogi*) for rituals and *Lagenaria sicerari* (*Omwongo*), which is used as a calabash when dry. The fruit of *Lagenaria sicerari*, which was cited by 1.9 % of the respondents is eaten as a vegetable when it is still young. However, the young fruits of the indigenous/traditional *Lagenaria sicerari* are not found on both the weekly local markets and the daily urban vegetable markets. As a container, the mature dry fruit or calabash is increasingly becoming popular in the marriage ceremonies, in the central and western parts of Uganda where it is used to serve local drinks.

The table also shows that some of the food plants are sold to contribute to the household income. The first column in the table shows the number of respondents that cited a particular food plant out of the 116 households. This column provides some measure of the popularity of the food plant within the area. For example, a small number of respondents implies that many people in the area are not familiar with the plant, in which case it may not exist in the area. All the plants that were cited by less than three respondents have been excluded from the table. The other columns show the number of respondents who cited a particular use of the plant as a percentage of the total number of respondents who cited the plant. A high percentage in these columns is a measure of how important a particular use is with respect to the number of respondents who cited the particular plant, but not necessarily with respect to the people of Rukungiri. For example, one respondent cited lettuce as being utilized in the making of relish but the plant is not commonly known in Rukungiri district, although it can be found in the large urban markets such as those in Kampala city.

Some of the food plants grow voluntarily on fallowed land during the rainy season or they are cultivated in small backyard gardens. The rest of the food plants, especially fruits, are wild and are collected for home consumption during the rainy seasons (Table 2). The survey further revealed that some indigenous food plants make a contribution to

household incomes especially in poor households (Table 2) even when sourced from the wild. In general however, the income derived from the sale of the indigenous/traditional fruits was very small although it can be regarded as very important in the day-to-day running of lives for the rural households who are poor. The ability to generate minimal incomes from indigenous/traditional fruits and vegetables has been reported in previous studies [4, 5, 6, 7, 8, 9, 10]. It is possible that FAO's and Lipton and Longhurst's findings, which are contrary to our observations, were based on big commercial farmers who might consider the income from marketing indigenous/traditional fruits and vegetables rather secondary. For the small poor farmers we collaborated with, this was not the case[4, 11].

Three of the vegetables, which were cited in the generation of income, belong to the Amaranthus species; namely *Amaranthus dubius, A. graecizans and A. hybridus*. The other three vegetables are *Cleome gynandra, Solanum nigrum* and surprisingly, *Urtica massaica*, whose leaves have stinging hairs. On the other hand, a comparatively large number of households (1.9–90.7 %) of the respondents cited three species of indigenous fruits as a source of income generation, with the majority of the respondents (90.7 %) indicating A*matehe (Afromomum anguistifolium)* as cash-minting wild fruits (Table 1). *Solanum gilo* which was cited by 6.9 % of the respondents is boiled and eaten as a vegetable, and has a much wider market in urban markets where it is supplied by commercial farmers.

The indigenous/traditional fruits and vegetables were mainly used as food, in form of snacks, as a relish (sauce) and for medicinal purposes. A distinction between fruits and leafy vegetables can be based on table 3, which shows plant utilization by parts. Among the leafy vegetables, *Amaranthus dubius* (*dodo*), *Solanum nigrum* (*eshwiga*), pumpkin leaves (*ebishusha*) and *Amaranthus graecizans* (*enyabutongo*) were used by over 80 % of the respondents. *Cleome gynandra* (*eshogi*), *Amaranthus hybridus* (*omuriri*), pumpkin seeds (*entetere*), young leaves of beans (*ebijamba*) and fruits of *Solanum anguivi* (*entakara*) were used by 60 % to 80 % of the respondents (Table 1). The leafy vegetables of *Erucastrum arabicum* (eshaaga), *Basella alba* (enderema) and *Urtica massaica* (*Ekicuragyenyi/Ekicuranganyi*) were also used by 30 % and 50 % of the respondents. It should be noted that most of the people in this area know *Urtica massaica*, which has stinging hairs, as *ekicuragyenyi*. However, the Bakiga who migrated from Kabale area call it *ekicuranganyi*. There were other plants such as *Ekitongotongo, Kahendarwiko* and *Omuriri* that were given different local names depending on the origin of the respondents. This diversity in names can lead to confusion especially for interviewers who do not hail from the area of a particular survey. In this particular study, the people who carried out the interviews were accompanied by interpreters hailing from Rukungiri and selected by Uganda National Farmers Association.

Generally, indigenous/traditional food plants are used to fill in the relish gaps and in so doing they contribute to the food security and also provide dietary diversity for the people. Many respondents indicated that they use indigenous/traditional vegetables

whenever other relishes are in short supply or when famine strikes, thereby providing an alternative in times of need. Mnzava has reported similar observations in previous studies [9]. The fruits on the other hand, were mostly harvested from the wild and their utilization was generally lower than that of vegetables (Table 4). The fruits of *Solanum gilo* (*entonga*), *Physalis minima* (*entuutu*) and *Rubus pinnatus* (enkyerere) were used by more than 50% of the respondents. *Afromomum anguistifolium* (*amatehe*) and *Rhus vulgaris* (*obukanja*), which are wild, are used by between 40 % and 50 % of the people. The fruits of *Dovyalis macrocalyx* (*amatagyengyere)* and *Tristemma mauritianum* (*Oburobwenkombe*) were used by 30 to 40% of the respondents in the area. The fruits of *Hypericum peplidifolium* (*otuhaaza*), the traditional tomatoes (*enyanya enkye*) and young fruits of the African bottle gourd (*emyongo*) were used by between 30 % and 50 % of the respondents.

Frequency of use of the various food plants

The frequency of consumption can provide a clue on how important the food plants are regarded in household food security. The respondents to the questionnaire were asked to indicate the frequency of consumption (number of times in a specified period) of the various food plants they used in their homes. This question was elaborately explained and specifically referred to the time when the plants were in season.

In general, the leafy indigenous/traditional vegetables were much more frequently consumed than the fruits (Table 5). The most popular vegetables included *Eshwiga* (*Solanum nigrum*), *Entonga* (*Solanum gilo*), *Ekishuusha (Cucurbita maxima* leaves) and the *Amaranthus* species *Amaranthus dubius*, *A.graecizans* and *A.hybridus*. For the fruits, only the most common exotic fruits were popular. These included mangoes (Emiyembe), oranges (emicuungwa), tomatoes (*enyaanya*) and passion fruits (*obutunda*).

We can attribute the low rating of indigenous/traditional fruits to the biased promotion of exotic fruits by Agricultural Extension workers. Indeed, in a follow-up workshop for both the farmers and the agricultural extension workers, the two groups concurred that indigenous food plants are currently accorded a low priority by the National Agricultural Extension Service in spite of the historical and current role they play, in the nutrition and food security of the rural communities. The Agricultural Extension workers lacked information on the plants with regard to their role and knowledge and skills relevant to production, storage and processing technology.

Methods of food plant preparation for consumption

Generally, the households used traditional food preparation and preservation methods, namely; steaming, mashing and the boiling of staple foods separately from the sauce or boiling of the mixture of the two (*katogo*). Over three-quarters of the households (77.6 %) used boiling, 76.6 % used steaming and 55.1 % used mashing as methods of food preparation. Because the eating habits of Ugandans have been changing fairly fast, the frying of foods, which used to be a culinary practice of town and city dwellers, has been adopted by the rural dwellers and is now becoming a traditional way of preparing some specific dishes. This explains why more than half of the households used frying

(53.1 %), while about 30 % prepared the food plants into '*Katogo*' (*casserole*). Some respondents mentioned the use of a combination of cooking methods such as boiling prior to frying of the vegetables.

Food preservation methods

Sun drying is the principal mode of extending shelf-life of food commodities in Rukungiri area. 91 % of the respondents employ sun drying as a means of food preservation. This mode of preservation is the most common in the developing economies like Uganda, as has been observed by other researchers [12, 13, 14, 15 16, 17, 18]. However, it is applied more frequently to cereals than to fruits and vegetables. In fact, very few people in the area knew that both fruits and vegetables could be dried as a way of preserving them. The other commonly used methods included sun drying accompanied by grinding (22 %) and application of pesticides before storage (18 %). Food preservation is still very rare and this results in high post-harvest losses of the produce and hence food insecurity and malnutrition.

CONCLUSION

The purpose of the study was to document food plants indigenous to Rukungiri district. In the course of the survey we hoped to establish the level of utilization of the indigenous food plants, with a view to establishing their potential for industrial exploitation. A total of 94 plants were cited as being used for food in Rukungiri and Kanungu districts. The households who participated in the study classified the food plants either as indigenous to the area or as those that have been introduced to the area (exotic).In this area, vegetables or fruits were found to be the most commonly used indigenous/traditional food plants. Of all the food plants used in the preparation of sauce, the *Amaranthus* species were found to be the most popular. The most frequently gathered and preferred fruits were the wild plums *(Carissa edulis*) and the wild gooseberries (*Physalis minima*). These two fruits and those of *amashararazi* which is only found in parts of Kihiihi area, have a potential for industrial exploitation for flavonoids extracts which have been strongly implicated as contributors to the health benefits of beverages such as tea and wine, and foods such as fruit and vegetables and have a high price in the global market as food supplements and in the case of *amashararazi* for wine processing [19].

In spite of the fact that indigenous/traditional food plants have always ensured food security at the household level, the process of collecting them from the wild, their consumption and domestication was found to be on the decline in this area. A number of factors may be responsible for this decline as highlighted below. In view of the fact that knowledge of the value of indigenous food plants is very limited in the population and among Agricultural Extension workers, the plants are not easy to market. For this reason, they do not significantly contribute to most household incomes. Secondly, the majority of farmers are only interested in the cultivation of crops from which they can earn an income and because no one has cultivated indigenous food plants with the intention of earning an income from them, they have not proved their worth.

The trend in the collection of edible food plants from the wild has also declined as a result of the encroachment on forests and swamps for habitation and because the habitats are used for the cultivation of the more aggressively promoted cash crops. This decline in the gathering of the food plants and the cessation of their domestication can also be attributed to scanty knowledge that is available on their nutritional content, but largely due to the emphasis that is placed on commercial, high yielding exotic plants by Agricultural Extension officers. The poor soils and the absence of a conservation policy have also contributed to the decline, as has the fact that most of the local communities consider the indigenous food plants to be less nutritious than the exotic food plants, and only fit consumption by the poor communities. It is quite obvious from the findings of this work that unless there is a deliberate attempt to change the attitude of agricultural extension workers and the rural communities, indigenous food plants will become extinct. The change of attitude can only come about through deliberate sensitization based on researched knowledge on the nutritional and health values of indigenous food plants. In particular, vegetables and fruits are sources of anthocyanins and polyphenols among other compounds. Anthocyanins and polyphenols are associated with reduced risks of chronic diseases such as cancer, cardiovascular diseases, and Alzheimer's disease. They are also regarded as important nutraceuticals because of their antioxidant effects, which give them a potential role in prevention of various diseases associated with oxidative stress [19].

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Table 1. Use of Various Food Plants in Rukungiri and Kanungu Districts

	Plant name	Frequency	Food	Sauce	Medicine	Cash	Spice	Snack	Other uses
		n	%	%	%	%	%	%	
1	Amapapaari	44	18.2			2.3		81.8	
2	Amapeera	28	3.4		3.4		3.4	93.1	
3	Amatagyengyere	30						100	
4	Amatehe	53	3.7	3.7	9.3	90.7			
5	Amayonza	28		3.1				96.1	
6	Biringanya	9	11.1	88.9		22.2			
7	Cabbage	37	8.1	86.5		24.3		8.1	
8	Carrots	15	6.7	53.3		6.7	26.7	26.7	
9	Doodo	104		98.1	2.9	2.9			
10	Ebijhamba	82		100	2.4				
11	Ebikwaijo	7				14.3		100	
12	Ebitekyere	12	41.7	66.7				8.3	
13	Ebitookye	6	33.3	16.7				50	
14	Ebyoozi	4	75	50					
15	Ebyuufa	9		11.1	11.1			77.8	
16	Ekicuragyenyi	38	5.3	92.1	13.2	2.6			
17	Ekifene	23	26.1			4.3		69.6	
18	Ekishuusha	95	6.3	97.9					
19	Ekituruguma	19		84.2	26.3				
20	Emicuungwa	21	4.8		4.8	4.8		42.9	*
21	Emiyeembe	50	8	2		12	2	84	
21	Empokya	4		75				25	
22	Enanaasi	31	15.6	6.3		25		78.1	
23	Enderema	40		85.5	34.1			2.4	
24	Enkoore	60	6.6	95	1.7			10	
25	Enkyerere	75	2.7	2.7	8		1.3	93.3	
26	Enshwiga	109	1.8	98.2	16.5	0.9			
27	Ensyanya	4	25	75	25				
28	Entakara	76		81.6	34.2		13.2		
29	Entetere	83	2.4	66.3	1.2		1.2	57.8	
30	Entondigwa	53	1.9	81.1	17			17	
31	Entonga	101	2	95	5	6.9		5	
32	Entuutu	87	6.9	4.6	11.5			87.4	
33	Enyaanya	51	5.9	58.8	2	21.6	43.1		
34	Enyabutongo	94	2.1	95.7	2.1	2.1		1.9	
35	Enyanya enkye	6		50			33.3	16.7	
36	Eshaaga	43	2.3	95.3	14				
37	Eshenda	14		64.3			28.6	7.1	
38	Eshogi	87	2.3	94.3	17.2	3.4	1.1		**
39	Muhogo	15	6.7	93.3					
40	Obucoori	4	75			25		25	
41	Obukanjha	50	2	8	12			88	
42	Oburobwenkombe	35	8.6	11.4	14.3			77.1	
43	Obutunda	44	9.1	2.3	4.5	18.2		52.3	*
44	Obutunguru	23		26.1		8.7	65.2		
45	Omuriri	89	2.2	95.5	3.4	1.1			
46	Omwongo	52	67.3	32.7	9.6	1.9		5.8	***
47	Otuhaaza	54	51.9	35.2	7.4			22.2	
48	Ovacado	59	20.3	32.2	1.7	8.5		47.5	

N.B:

- *: 52.4 % and 56.8 % of respondents make juice out of oranges (*emicuungwa*) and passion fruits (*obutunda*), respectively.
- **: 1.1 % use *Cleome gynandra* for local rituals
- ***: 13.5 cited use *Lagenaria sicerari* fruits as containers
- Only plants cited by more than four respondents have been included in the table.

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Table 2. Indigenous/Traditional Vegetables of Rukungiri

Local name	Scientific name	Habitat	Percentage utilization					
			Food	Sauce	Medicine	Cash	Spice	Snack
Amatehe	*Afromomum anguistifolium*	W	3.7	3.7	9.3	90.7		
Amayonza	*Carisa edulis*	W		3.1				96.1
Doodo	*Amaranthus dubius*	V,C		98.1	2.9	2.9		
Ebijhamba	*Phaseolus vulgaris* (leaves)	C		100	2.4			
Ebitekyere	*Colocasia esculenta*	C	41.7	66.7				8.3
Ebyoozi	*Cucurbita maxima* fruits	V,C	75	50				
Ebyuufa	*Munodota junodoii*	W		11.1	11.1			77.8
Ekicuragyenyi	*Urtica massaica*	W	5.3	92.1	13.2	2.6		
Ekishuusha	*Cucurbita maxima* leaves	V,C	6.3	97.9				
Ekitongotongo/ kahendarwiko	*Amaranthus blitum*	V,C		100				
Ekituruguma	*Malva parviflora*	V,C		84.2	26.3			
Enderema	*Basella alba*	W		85.5	34.1			2.4
Enkoore/Egobe	*Vigna unguiculata* Cow peas	C	6.6	95	1.7			10
Enkyerere	*Rubus pinnatus*	W	2.7	2.7	8		1.3	93.3
Entakara	*Solanum anguivi*	C		81.6	34.2		13.2	
Entetere	*Cucurbita maxima* seeds	V,C	2.4	66.3	1.2		1.2	57.8
Entondigwa	*Capsella bursa*	C	1.9	81.1	17			17
Entonga	*Solanum gilo*	C	2	95	5	6.9		5
Entuutu	*Physalis peruviana*	W,C	6.9	4.6	11.5			87.4
Enyabutongo	*Amaranthus graecizans*	W	2.1	95.7	2.1	2.1		1.9
Enyanya enkye	*Lycopersicon esculentum*	W,C		50			33.3	16.7
Eshaaga	*Erucastrum arabicum*	V,C	2.3	95.3	14			
Eshenda	*Capsicum frutescens*	W,C		64.3			28.6	7.1
Eshogi	*Cleome gynandra*	V,C	2.3	94.3	17.2	3.4	1.1	
Eshwiga	*Solanum nigrum*	V,C	1.8	98.2	16.5	0.9		
Obukanjha	*Rhus vulgaris*	W	2	8	12			88
Oburobwenkombe	*Tristema mauritianum*	W	8.6	11.4	14.3			77.1
Omuka	*Rumex usambarensis*	W	33.3	66.7				
Omuriri	*Amaranthus hybridus*	V,C	2.2	95.5	3.4	1.1		
Omwongo	*Lagenaria sicerari*	V,C	67.3	32.7	9.6	1.9		5.8
Otuhaaza	*Hypericum peplidifolium*	C	51.9	35.2	7.4			22.2

N.B: W=Wild; C= Cultivated; V=Just grow

Table 3. Utilization of Plants by Parts

Plant Name		Frequency	Percentage utilization of parts					
Local name	**Scientific name**		**Leaf**	**Fruit**	**Stem**	**Tuber**	**Seed**	**Flowers**
Amatagyengyere	*Dovyalis macrocalyx*	34		100				
Amatehe	*Afromomum anguistifolia*	57	1.8	96.5	1.8			
Amayonza	*Carissa edulis*	32	3.1	96.1				
Ebihimba	*Phaseolus vulgaris(seeds)*	86	97.6	7.2			100	
Doodo	*Amaranthus dubius*	103	100					
Ebijhamba	*Phaseolus vulgaris(leaves)*	82	100					
Ebitekyere	*Colocasia esculenta*	12				100		
Ebyuufa	*Monodora junodoii*	8		100				
Egobe	*Vigna unguiculata*	22	90.9	13.6				
Ekicuragyenyi	*Malva parviflora*	38	94.7	5.3				
Ebyoozi	*Cucurbita maxima*	111	87.3	3.6				
Ekituruguma	*Malva parviflora*	19	100					
Enderema	*Basella alba*	40	92.5	7.5				
Enkoore	*Vigna anguiculata*	61	30.6				91.9	
Enkyerere	*Rubus pinnatus*	75	9	91	2.6			
Entakara	*Solanum anguivii*	76	2.6	80.5			18.2	
Entetere	*Cucurbita maxima(seeds)*	84					100	
Entondigwa	*Capsella bursa*	56	12.5				94.6	
Entonga	*Solanum gilo*	102	3.9	98				
Entuutu	*Physalis peruviana*	87	6.8	97.7	2.3		1	
Enyabutongo	*Amaranthus graecizans*	90	86.3	13.7			2.1	
Enyanya enkye	*Lycopersicon esculentum*	5		100				
Eshaaga	*Erucastrum arabicum*	43	100					2.3
Eshenda	*Capsicum frutuscens*	12	41.7	66.7				
Eshogi	*Cleome gynandra*	86	97.8	2.2	1.1			2.2
Eshwiga	*Solanum nigrum*	112	99.1	0.9	1.8			0.9
Obukanjha	*Rhus vulgaris*	50	10	94				
Oburobwenkombe	*Tristema mauritianum*	35	11.4	88.6			8.6	
Obutunda	*Passiflora edulis*	44		100				
Omuriri	*Amaranthus hybridus*	89	100					
Omwongo	*Lagenaria sicerari*	55	23.6	87.3			1.8	
Otuhaaza	*Hypericun peplidifolium*	55	12.7	96.4	1.8		1.8	
Ebyoozi	*Cucurbita maxima*	97	99.5	76	1		98.5	

N.B.:% Utilization is based on number of respondents citing a plant and those citing use of part of plant.

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Table 4. Indigenous/Traditional Fruits of Rukungiri

Scientific name	Local name	Part used	Habitat	Local use	Frequency n=116	Percentage
Dovyalis macrocalyx	Amatagyengyere	Fruits	Wild	Snack	34	29.3
Afromomum anguistifolia	Amatehe	Fruits	Wild	Snack, medicine	57	49.1
Carissa edulis	Amayonza	Fruits	Wild	Snack	32	27.5
Dioscorea odoratissima	Ebikwa	Fruits	Voluntary/cultivated	juice	1	0.9
Cyphomandra betaceae	Ebitonganwa	Fruits	Voluntary/cultivated	Snack	3	2.6
Cucurbita maxima	Ebyoozi	Fruits, leaves, seeds	Voluntary/cultivated	Food, sauce	4	3.4
Monodota junodoii	Ebyufa	Fruit	Wild	Snack	9	7.8
Lagenaria sicerari	Emyongo	Fruits	Voluntary/cultivated	Food	55	47.4
Rubus pinnatus	Enkyerere	Fruits, leaves	Wild	Snack, medicine	79	68.1
Solanum anguivi	Entakara	Fruits	Wild, cultivated	Sauce, medicine	76	65.5
Capsella bursa	Entondeirwa	Fruits, leaves	Wild, grown	Sauce	55	47.4
Solanum gilo	Entonga	Fruits	Cultivated	Sauce	102	87.9
Physalis peruviana	Entuutu	Fruits, leaves	Wild, cultivated	Snack, medicine	88	75.8
Lycopersicon esculentum	Enyanya enkye	Fruits	Wild, cultivated	Sauce, spice	5	4.3
Capsicum frutuscens	Eshenda	Fruits	Wild, cultivated	Spice	12	10.3
Solanum nigrum	Eshwiga	Fruits, leaves	Voluntary/cultivated	Sauce, medicine	112	96.5
Rhus vulgaris	Obukanja	Fruits, leaves	Wild	Snack, medicine	50	43.1
Tristema mauritianum	Oburobwenkombe	Fruits, leaves	Wild	Snack, medicine	35	30.2
Passiflora edulis	Obutunda	Fruits	Wild, cultivated	Snack, juice	44	37.9
Lantana trifolia	Omuhuukye	Fruits	Wild	Snack	1	0.9
Anona muricata	Omusitaferi	Fruit	Wild	Snack, wine	1	0.9
Vangueria madagascaie	Yakobo	Fruits	Wild, grown	Snack	3	2.6

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Table 5. Frequency of Consumption of the Various Food Plants

Food plant	Frequency	Rarely (x1)	Often (x2)	Very often (x3)	Composite score	Mean score
Doodo	103	2	24	77	281	2.7***
Enshwiga	112	2	30	70	272	2.4**
Entonga	102	2	30	70	272	2.7***
Enyabutongo	90	1	40	49	228	2.5***
Ekishuusha	97	6	53	38	226	2.3**
Omuriri	89		48	41	219	2.7***
Entetere	84	13	48	23	178	2.1**
Ebijhamba	82	12	48	22	174	2.1**
Entakara	76	9	43	24	167	2.2**
Avocado	57	3	9	45	156	2.7***
Eshogi	86	30	46	11	155	1.8**
Entuutu	87	30	46	11	155	1.8**
Enkyerere	75	29	35	11	132	1.8**
Enkoore	61	7	38	16	131	2.1**
Enyanya	45		9	36	128	2.8***
Emiyembe	47	6	7	34	122	2.6***
Entondigwa	55	9	35	11	112	2.0**
Otuhaaza	55	10	34	11	111	2.0**
Obutunda	40	2	16	22	100	2.5***
Omwongo	51	11	34	6	97	1.9**
Eshaaga	43	6	27	10	90	2.1**
Amatehe	53	24	22	7	89	1.7**
Enderema	40	9	24	7	78	2.0**
Obukanjha	48	28	11	9	77	1.6**
Enanasi	31	1	18	12	73	2.4**
Ekicuragyenyi	38	11	22	4	67	1.8**
Amapeera	28	4	10	14	56	2.0**
Fene	25	5	9	11	56	2.2**
Oburobwenkombe	33	15	15	3	54	1.6**
Amatagyengyere	30	17	8	5	48	1.6**
Obutunguru	19		4	15	53	2.8***
Egobe	24	3	18	3	48	2.0**
Emichungwa	20	2	9	9	47	2.4**
Amayonza	28	14	13	1	43	1.5**
Ekituruguma	19	5	9	5	38	2.0**
Eshenda	11	1	7	3	24	2.2**
Ebitekyere	11	3	7	1	20	1.8**
Enyanya enkye	5		3	2	12	2.4**
Ekubyo	5		4	1	11	2.2**
Ebyuufa	7	4	3		10	1.4*

Ebyoozi	4		3	1	9	2.3**
Emizaituni	3		1	2	8	2.7***
Nakati	3		2	1	7	2.3**
Amashararazi	3	1	1	1	6	2.0**
Ebitonganwa	2			2	6	3.0***
Omugonyo	2		1	1	5	2.5***
Omuka	2		2		4	2.0**
Obutuzi	3	2	1		4	2.0**
Kahendarwiko	1			1	3	3.0***
Ensyanya	1			1	3	3.0***
Amakondokondo	2	1	1		3	1.5**
Ekitongotongo	1		1		2	2.0**
Omwiha	1		1		2	2.0**
Omundya	1		1		2	2.0**
Yakobo	1		1		2	2.0**
Basiri	1		1		2	2.0**
Ebihama	1	1			1	1.0*
Ekitongore	1	1			1	1.0*
Omwisya	1	1			1	1.0*
Ebikwa	1	1			1	1.0*
Amatutu	1	1			1	1.0*
Ebicene	1	1			1	1.0*
Kashogwitwa	1	1			1	1.0*
Obugooti	1	1			1	1.0*

Key: *=Rarely used **=Often used *=Very often used**

Table 6. Methods Used By Households to Prepare /Process Food Plants

Method	Frequency	Percentage
Preparation (n=107)		
Boiling	83	77.6
Steaming	82	76.6
Mashing	59	55.1
Frying	57	53.3
Roasting	1	.9
"Half cook"	2	1.9
"Katogo"	32	29.9

Table 7. Methods Used By Households to Process/Preserve Food Plants

Processing/preservation (n=77)		
Sun drying	70	90.9
Dry + grind	17	22.1
Boil + dry + grind	3	3.9
Add pesticide	14	18.2
Add ash	4	5.2
Shelling	1	1.3
Add millet husks	2	2.6
Chop + dry	2	2.6
Add plant leaves	3	3.9
Add banana juice	1	1.3
Dry + roast	1	1.3

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